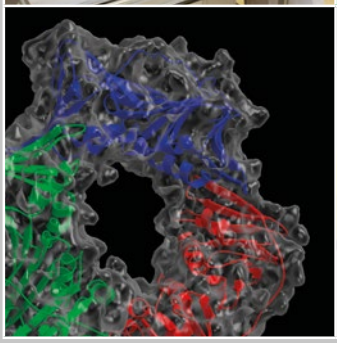
VILNIUS UNIVERSITY – SOLUTIONS FOR BUSINESS



VILNIAUS UNIVERSITETAS · 1579 · UNIVERSITAS VILNENSIS

VILNIUS UNIVERSITY

VILNIUS UNIVERSITY – SOLUTIONS FOR BUSINESS

Vilnius 2014

ISBN 978-609-459-336-9

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INTRODUCTION

Vilnius University, one of the oldest higher education institutions in Central and Eastern Europe, has been an integral part of European education, scientific and cultural life since its establishment in 1579.

Today it is the largest educational institution in the country priding itself on its continuous tradition of multi-disciplinary academic activity. One of the main aims of the University is to position and distinguish itself in European research and education with research and studies carried out at the highest levels of excellence.

The University retains its leading role in a broad spectrum of fundamental and applied research, education, training and retraining, consultancy, providing research and development services to a wide range of businesses.

The aim of this brochure is to provide information about possibilities of co-operation with business, industry and organizations in a broad spectrum of activities, research and services provided at different faculties, departments and institutes.

For this purpose, a short description, main facts and figures about the University, as well as a description of activities and services in different fields with contact information is presented.

Structure

Vilnius University has 14 faculties, 5 research institutes, 2 university hospitals and 4 study and research centres.

Innovations and infrastructure

The University is in the midst of the development of new structures to stimulate research development. While ensuring that research, education and innovation will interact and flourish. This is a guarantee for Vilnius University to position itself in European and global research and education, and link universities, research institutes, top-level high-tech companies and fast-developing start-ups.

The "Sunrise Valley" and the "Santara Valley" programs, initiated by Vilnius University, in cooperation with other national institutions, will ensure a closer interaction between Science, Higher Education and Business. Also, these programs will facilitate development and will accelerate transfer of know-how and high technologies to the business sector, and will accelerate start-ups and spin-offs.

The "Sunrise Valley" will mobilise the research potential of Lithuania, especially in the fields of laser and light technologies, materials science and nanotechnologies, semiconductor physics and electronics, biotechnology and life science research. It will house the National Centre of Physical and Technological Sciences (700 researchers), Laser Research Centre (18 researchers) and the Joint Centre of Life Sciences (290 researchers). The National Centre of Physical and Technological Sciences and the Joint Centre of Life Sciences will be opened in 2015.

The "Santara Valley" will develop biotechnology, innovative medical technologies, molecular medicine and biopharmaceuticals, ecosystems and sustainable environment, information and communication technologies. It will house Innovative Medicine Centre (60 researchers), Natural Research Centre (220 researchers) and Information Technology Centre (90 researchers).

Those developments provide high quality sites and premises suitable for technology-driven businesses and promote networking between universities and businesses, among the businesses themselves, and with partners elsewhere in Lithuania and worldwide.

Research

Fundamental and applied research is pursued at Vilnius University in many fields of science.

The main research areas are:

- Humanities
- Lithuanian Studies
- Structure and Development of Society
- Biological and Sociopsychological Cognition and Evolution of Man
- Healthy Man, Prevention, Diagnostics and Treatment of Diseases
- Genomics, Biomolecules and Biotechnologies
- Changes in Ecosystems, Protection, Natural Resources
- New Functional Materials and Derivatives
- Theoretical and Condensed Matter Physics
- Laser Physics and Light Technologies
- Fundamental and Applied Mathematics
- Informatics and Information Technologies

Research Cooperation on National and International Level

VU researchers are increasingly engaged in various national and international scientific programs, such as EU FP7, COST, EUREKA, CERN, EU Public Health, NATO, and national programs.

Scientists in laser technologies participate in the European Laser Network. The Lithuanian Laser research school has developed at Vilnius University, and currently lasers for research made by Lithuanian companies account for 10% of the global market share.

The Institute of Biotechnology participated in FP7 project MoBiLi, with the main objective of transforming it into a centre of excellence in molecular biotechnology.

An increased number of research contracts with companies from Lithuania and other European countries, the USA and Japan; agreements of cooperation are signed with Barclays, Huawei Technologies Co., Ltd. and etc.

KEY FIGURES

1876 academic and research staff

Over 19 000 students

785 international students

4 Open Access Research Centers

6 start-ups over the past five years

13 patents over the past five years

12 patent applications over the last year

Over 500 articles in highly ranked scientific publications per year

84 international research projects per year

BIOMEDICAL SCIENCES

Development of Monoclonal Antibodies

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Institute of Biotechnology, Department of Immunology and Cell Biology

Keywords
Hybridomas, antibodies, diagnostics

Description of service, product, technology
Development of new monoclonal antibodies against different antigens

Purpose
Monoclonal antibodies can be used in research, diagnostics and other areas

Field of application, use
Biotechnology, diagnostics, research

Characteristics, technical information
Monoclonal antibodies are proteins (immunoglobulins)

Development level
Laboratory level

Patents
Process for the production of monoclonal antibodies using chimeric VLPs (US 7,919,314 (2011-04-05)); (LT 5843 (2012-06-25)).

Possible, required cooperation forms
Services, joint project

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The High Complexity Blood Tests

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Faculty/Institute, Department, Laboratory
Faculty of Medicine, Department of Physiology, Biochemistry, Microbiology and Laboratory medicine

Keywords
Blood test, flow cytometry, liquid chromatography

Description of service, product, technology
The high complexity laboratory blood tests requiring expertise and sophisticated equipment are performed. A comprehensive analysis of extracellular and intracellular markers of blood cells and other cells suspension is performed using flow cytometry technology. Liquid chromatography is used for determining concentration of different carotenoids and measuring indicators of oxidative stress. Mass spectrometry is used for metabolomic studies. Enzyme-linked immunosorbent assays are performed for the analysis of various biomarkers.

Purpose
Comprehensive analysis of human blood biochemical and cellular parameters

Field of application, use
Biomedical research institutions, pharmaceutical companies, medical institutions

Characteristics, technical information
Flow cytometry, liquid chromatography, ELISA tests

Development level
All of these laboratory tests are installed

Possible, required cooperation forms
Joint projects, services

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Diagnostic and Treatment of Diseases of Gastrointestinal Tract

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Faculty/Institute, Department, Laboratory
Faculty of Medicine, Clinic of Gastroenterology, Nefrourology and Surgery

Keywords
Gastroenterology, hepatology

Description of service, product, technology
Diagnostic and treatment of gastrointestinal tract diseases; diseases of esophagus, stomach, pancreas, liver and intestinal tract

Purpose
Clinical drug investigations

Field of application, use
Medicine, gastroenterology

Possible, required cooperation forms
Clinical investigation of drugs (II, III, IV phases)

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Abdominal Surgery, General Surgery

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Faculty of Medicine, Clinic of Gastroenterology, Nefrourology and Surgery

Keywords
Surgery, transplantology, oncologic surgery

Description of service, product, technology
Surgical treatment of stomach, thyroid, esophagus, pancreas, liver and intestine; minimally invasive surgery, transplantology, oncologic surgery

Purpose
Clinical drug investigations

Field of application, use
Medicine, abdominal surgery

Possible, required cooperation forms
Clinical investigation of drugs (II, III phases)

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Integrated Digital Molecular Pathology Service

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Faculty/Institute, Department, Laboratory
Faculty of Medicine, Department of Pathology, Forensic Medicine and Pharmacology. Works are carried out at the National Center of Pathology, affiliate of Vilnius University Hospital Santariškių Clinics

Keywords
Pathology, molecular, digital, research, biomarker

Description of service, product, technology
Integrated digital molecular pathology service includes the following procedures: 1) project-driven biobank; 2) histology; 3) paraffin sections; 4) tissue microarrays (TMA);5) immunohistochemical/immunofluorescence tests; 6*) in situ* hybridization; 7) transmission electron microscopy (TEM); 8) molecular tests; 9) laser capture microdissection; 10) slide scanning, virtual microscopy, digital image analysis.
More information about services: www.vpc.lt

Purpose
For clinical and basic tissue-based research

Field of application, use
Services

Characteristics, technical information

- Digital pathology: microscopic slides can be scanned using virtual high resolution microscopy equipment for digital image analysis in pathology research. Algorithms of digital analysis accurately describe the degree of pathological changes, the distribution of molecular diseases markers in tissues, cell-cell interactions.
- The molecular pathology: testing of various organs of tumor and benign tumor tissues. Proteins and nucleic acids (DNA, RNA) are tested. Molecular tests under request of research spectrum are also conducted.
- Project-driven biobank: biological material of tumor and non-tumor tissues prospectively (at Bioethics authorization) are collected, prepared, and stored in a long-term storage for biomedical research in NPC project biobank.

Development level

Laboratory

Possible, required cooperation forms

Services, joint projects

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Cardiac Output and Hemodynamic Monitoring System "Heartlab"

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Faculty/Institute, Department, Laboratory

Faculty of Medicine, Department of Cardiovascular Disease

Keywords

Cardiac output, impedance cardiography

Description of service, product, technology

Cardiac output is calculated using impedance cardiography method. Between outer pairs of electrodes placed on thorax, high frequency current (41 kHz, 1 mA) is induced and voltage changes are detected between inner two pairs

of electrodes. A computer program automatically finds the required points for the Cardiac Output calculation in the impedance cardiography signal. Cardiac output is calculated using Sramek-Bernstein formula. "Heartlab" system (prototype) computer displays the following parameters: Impedance Cardiogram (ICG), ECG, Cardiac Output (CO), the trend of CO changes, Cardiac Index (CI), Heart Rate (HR), System Vascular Resistance (SVR) when mean arterial pressure is known.

Purpose

Patient cardiac output monitoring in the cardiac intensive care units or ambulatory patients

Field of application, use

Cardiology, medical equipment

Characteristics, technical information

Cardiac output range: 1.5 up to 15 l/min
Measurement current: 1.2 mA (41 kHz, on 1 kΩ load)
Input voltage: 220 V ± 10%, 50 Hz
Power consumption: 0.03 A
Generated current electrically isolated
Device conforms: IEC601 standard
Classification: Class I, BF type
Dimensions: 0.3 m length, 0.2 m width, 0.075 m height
Weight: 2 kg

Development level

Prototype

Possible, required cooperation forms

Research projects

Contacts

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Expertise in Clinical Virology
Expertise in Human Immunology
Expertise in Laboratory Diagnosis of Autoimmune and Viral Gastrointestinal Diseases

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Faculty of Medicine, Clinic of Gastroenterology, Nefrourology and Surgery

Keywords
Hepatitis C virus, Hepatitis B virus, autoimmunity

Description of service, product, technology
Competence in the field of clinical virology and human immunology is based on experience of laboratory research work, which allows understanding and performing a big variety of laboratory techniques (western blott, B-cells ELISpot, PCR, ELISA, virus neutralization technique, etc.), as well as expertising and introducing those techniques elsewhere

Purpose
Biomedical research, clinical laboratory diagnostic, expertise

Field of application, use
- Clinical laboratory diagnostic
- Pharmaceutical company research unit

Possible, required cooperation forms
Expertise activity, joint projects

Contacts
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In Vivo and *in Vitro* Diagnostic Tests of Photoactivated Sites in Rheumatoid Arthritis Affected Joints

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Faculty of Medicine, Clinic of Rheumatology, Traumatology-Orthopaedy and Reconstructive Surgery

Keywords
Photosensitizers, phototherapy, arthritis

Description of service, product, technology
Phototherapy treatment options are investigated extensively in rheumatology, due to the fact that inflammatory rheumatoid arthritis synovium, similar to neoplastic tissues, is characterized by hypermetabolic activity and high vascularization. Laser technologies figure out which fluorophores are the most active in inflammatory joints site by stimulating it with different wavelength and dosage light in order to design diagnostic and treatment trends. The fluorescence intensity of accumulated porphyrins in tissue is proportional to the inflammatory degree of joint tissue. Actively proliferated synovial tissues without external induction are able to produce larger amounts of endogenous porphyrins due to the increased cell activity rate. The light signal caused by endogenous fluorophores in rheumatoid arthritis inflammatory synovium is registered without the use of extrinsic fluorescent dyes.

Purpose
Development of laser bandage prototype for the individualized treatment of rheumatoid arthritis affected joints

Field of application, use
Non-invasive treatment for rheumatoid arthritis

Characteristics, technical information
Laser bandage for topical therapy

Development level
Laboratory level

Possible, required cooperation forms
Services, sales of product

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The Aspects of Functional and Structural Damage in Various Diameters Arteries in Patients with Systemic Sclerosis

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Keywords
Endothelial function, microcirculatory dysfunction

Description of service, product, technology
Systemic sclerosis is an autoimmune connective tissue disease, which affects not only the skin, but also vital organs. The pathogenesis involves blood vessel damage, which manifests itself as vasculopathy, Raynaud's syndrome, premature atherosclerosis. Early, non-invasive vascular damage diagnosis is especially important in order to stop the progression of the disease and the dramatic (gangrene, finger ulcers, osteolysis of phalanges) complications. The assessment of arterial wall stiffness parameters, endothelial functions and peripheral microcirculation abnormalities is performed.

Purpose
Early non-invasive diagnosis of endothelial damage and atherosclerosis

Field of application, use
Vascular disease

Development level
Laboratory level

Possible, required cooperation forms
Services

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Clinical-Epidemiological Trials

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Faculty of Medicine, Clinic of Rheumatology, Traumatology-Orthopaedy and Reconstructive Surgery

Keywords
Clinical trials, rheumatology, validation, registers

Description of service, product, technology
Different kinds (including international, multicenter) of clinical and epidemiological research, designing and developing various cooperation protocols of such investigations, according to the epidemiological studies, validation of questionnaires, are conducted.

Purpose
Various rheumatologic conditions, diagnosis, treatment, disease activity and evaluation of solutions; the comparative multicenter study for these metrics to analyze the differences between the countries; disease diagnosis and research monitoring for diagnostic and treatment algorithms and evaluation

Field of application, use
Medical diagnostic equipment, health statistics rheumatologic centers

Development level
Studies performed, scientific publications published

Possible, required cooperation forms
- Performing epidemiological-clinical trials
- Validation of the questionnaires for rheumatologic patients
- Development of rheumatologic epidemiological research protocols
- Educational institutions and other rheumatology centres could apply for joint multicentre research projects

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Clinical Trials

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Keywords

Clinical trials, rheumatology

Description of service, product, technology

The listed above researches are highly experienced in performing drug trials (phase IIA-IV).

Purpose

New drugs preclinical and post-marketing studies

Field of application, use

Pharmacy industry

Possible, required cooperation forms

Execution of clinical trials, planned clinical trials of medicinal protocols expertise

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NATURAL SCIENCES

Providing Publishing Houses with Information for Annual Calendars

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Keywords
Eclipse, length of a day, phase of the Moon

Description of service, product, technology
Providing publishing houses with the astronomical information is used for annual calendar preparation: times of sunset and sunrise, length of a day, conditions for the observation of planets, information about eclipses of the Sun and the Moon, phases of the Moon, etc.

Purpose
Annual calendar publishing

Field of application, use
Publishing

Development level
Tested

Possible, required cooperation forms
Services

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Recombinant Viral Proteins and Purification Technology

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Institute of Biotechnology, Department of Eukaryote Gene Engineering

Keywords
Recombinant viral proteins

Description of service, product, technology
Yeast expression system for biosynthesis of recombinant viral proteins is as follows. The producer strains are obtained in genetic engineering methods and contain viral gene that determines biosynthesis of viral protein. The latter is purified using centrifugation and chromatography methods of yeast extract.

Purpose
Viral recombinant proteins are used for research, diagnostics and vaccine development purposes.

Field of application, use
Research, diagnostics and vaccine development

Characteristics, technical information
Viral recombinant proteins:
Purity: 80-95%
Amount: 0.1-100 mg
Viral capsid proteins are forming virus-like particles (VLP)
Interaction with antibodies is close to natural virus

Development level
Viral recombinant proteins are produced in laboratory and implemented into the market.

Possible, required cooperation forms
Contract research, joint projects, services or technology transfer

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DNA Sequencing

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Keywords
DNA Sequencing

Description of service, product, technology
The Applied Biosystems 3130xl Genetic Analyser 16-capillary automated DNA sequencer that yields 700 to 1000 bases per template is used. Cycle Sequencing Reaction is performed using Sanger's dideoxy Terminator Method. The sequencing is done using BigDye® Terminator v3.1 Cycle Sequencing Kit. Types of DNA templates sequenced are the following ones: plasmid DNA, PCR product, BAC/phage/cosmid clones, etc. Sequencing results are provided by e-mail in two files: ".seq" as a text file and ".ab1" as an electropherogram.

Development level
Laboratory level

Possible, required cooperation forms
DNA sequencing services

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Development of Biocatalytic Systems

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Keywords
Biocatalysis, biotransformations, enzymes, immobilization, metagenomics

Description of service, product, technology

- Screening for enzymes (environmental samples, enzyme and strain collections, metagenomic and expression databases, etc.);

- Development of biocatalysts (gene engineering, development of analytical systems, immobilization, etc.);
- Application of biocatalysts (proof of principle, recycling, stability, reaction media, etc.).

Purpose
Development of target biocatalysts; biotransformations

Field of application, use
Various industrial needs to replace conventional technologies

Development level
Laboratory level, prototype

Possible, required cooperation forms
Joint projects, services

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Self-Assembled Phospholipid Systems and Periphery Devices for Protein/Membrane Interaction Studies

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Keywords
Phospholipid membranes, membrane damage, electrochemical detection, spectroscopy, periphery devices, toxins

Description of service, product, technology
Periphery devices for semi-automatic formation of self-assembled phospholipid bilayers for electrochemical and spectroscopy studies of protein/membrane interaction can be used in a stand-alone mode equally as integrated into complex measurement systems, including high performance flow-through detection systems. Equipment can be designed to detect membrane damage by toxins, including bacterial toxins.

Purpose
Instrumental techniques for research and technology development

Field of application, use
Research and technology development in biomedical fields, spectroscopy and material science

Characteristics, technical information
Stand-alone mode and integration into automatic detection systems

Development level
Prototype

Possible, required cooperation forms
Technology/product transfer, joint projects towards further product development

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Studies of the Explosives and Other High Energy Compounds of Nitroaromatic and Nitroaliphatic Structure

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Faculty/Institute, Department, Laboratory
Institute of Biochemistry, Department of Xenobiotics Biochemistry

Keywords
High energy nitroaromatic compounds, high energy nitroaliphatic compounds, organic synthesis, ecotoxicology

Description of service, product, technology
- Synthesis of the test samples of high energy nitroaromatic and nitroaliphatic compounds, such as explosives, propellants, detonators, rocket fuel components. A library of ca. 100 compounds of this class is available. A synthesis of the large amounts of the above mentioned substances for practical purposes may be performed.
- Detection and quantitative analysis of the above mentioned compounds in the environment (soil, groundwater) using the liquid chromatography (HPLC) and colorimetric methods.

- Testing ecotoxicity of the above mentioned compounds using the model enzymatic systems and cytotoxicity studies in the mammalian cell cultures.

Purpose
Synthesis, detection, analysis and assessment of ecotoxicity of the high energy nitroaromatic and nitroaliphatic compounds

Field of application, use
Munitions industry, firing fields

Characteristics, technical information
Characteristics and technical information are individual for each product, depending on the customer's requirements. Generally, the authors present data confirming the structure and purity of the product (^{1}H, ^{13}C NMR, GC, HPLC, mp/bp).

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Cell Growth Inhibition, Differentiation and/or Apoptosis Induction Assays; Cell Cycle Distribution Test; Histone Modifications Analysis; DNA Methylation Evaluation; DNMT and HDAC Activity Assay

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Faculty/Institute, Department, Laboratory
Institute of Biochemistry, Department of Molecular Cell Biology

Keywords
Cytotoxicity, epigenetics, differentiation, apoptosis

Description of service, product, technology
Assessment of original anti-cancer compounds targeting epigenetics

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Development of Biocatalysts

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Keywords
Enzymes, biocatalysis, screening systems, protein technologies, bioconversion

Description of service, product, technology
- Screening and/or construction of new enzymes or their mutants;
- Purification and analysis of the target proteins;
- Development of bioconversion processes.

Purpose
Synthesis of organic compounds, bioconversion

Field of application, use
Chemical industry, food conversion, bioconversion of the agriculture waste

Development level
Laboratory level, prototype

Possible, required cooperation forms
Services, technology transfer, joint projects

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Protein and Peptide Analysis by Mass Spectrometry and Confocal Microscopy

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Keywords
Proteomics, mass spectrometry, cell biology, biomarkers, confocal microscopy

Description of service, product, technology
Proteomics analysis including sample preparation by 1D and 2D electrophoresis as well as chromatography and subsequent mass spectrometry protein identification and quantitation by MALDI TOF-TOF (Applied Biosystems) mass spectrometer:

- Q-trap 4000 hybrid triple-quadruple and linear trap mass spectrometer for protein posttranslational modification analysis;
- Advanced Higher Definition Mass Spectrometer Synapt G2 for label-free high throughput differential proteome analysis.

Microscopy facility for in-depth protein analysis in live cells by laser scanning spectral confocal microscopy combined with microinjection and micromanipulation by laser tweezers.

Purpose
Medicine (diagnostics; therapy individualization)
Technological process monitoring by surrogate markers
Protein-based products purity and composition monitoring
Testing drugs and other substances in cell culture by monitoring protein localization in cells

Field of application, use
Medicine; pharmacology; biotechnology process validation and monitoring, etc.

Characteristics, technical information
Differential quantitative proteomics analysis: up to 10 000 protein identification/quantitation per sample. Confocal microscopy: live cell monitoring; scanning speed 60 frames/sec.

Development level
Infrastructure (mass spectrometry, nano-LC; confocal microscopy) is in operational state.

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Possible, required cooperation forms

Services, collaboration, joint projects

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Assessment of New Materials and Chemical Compounds Impact on Living Organisms by Using Experimental Animals

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Faculty/Institute, Department, Laboratory
Institute of Biochemistry, Department of Biological Models

Keywords
Toxicity, biological activity, experimental animals

Description of service, product, technology
Assessment of acute and chronic toxicity or biological safety, immunological, carcinogenic or anticancer activity of various materials: applied industrial (food and supplies; feed; new materials; environmental, food or other types of pollution), biomedical (medical and veterinary medicines and various solutions, immunoadjuvants, etc.) or other chemical compounds by using small experimental animals.
Assessment result is identification of biological activity, safety or toxicity of test material.

Purpose
Evaluation of the safety of new materials, analysis of the activity of biologically active compounds

Field of application, use
Pharmaceutical industry, research, veterinary, medicine

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Targeted Covalent Labelling of Biopolymers

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Keywords
Biopolymer labelling, imaging, DNA, RNA, microRNA, AdoMet cofactor analogue, methyltransferase, mTAG

Description of service, product, technology
Targeted covalent attachment of functional and reporter groups on biopolymers, such as DNA, rRNA, miRNA, proteins using corresponding AdoMet-dependent methyltransferases and chemically engineered cofactor analogues.

Purpose
Targeted biopolymer labelling for imaging, analysis and derivatization

Field of application, use
Biomedicine, biophysics, biochemistry, cell biology, miRNA profiling, single-molecule genomics, biomaterials

Development level
Laboratory level

Possible, required cooperation forms
Service, collaboration, joint project, licencing

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Patents US8008007, EP1874790, JP5129120.

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Electrophysiological Investigation

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Keywords
Nervous system, potentials, electroencephalography

Description of service, product, technology
Electrophysiological investigation of model organism (rat) aiming to explore the effect of new biologically active compounds on nervous system. Investigation is possible at a single neuron level *in vivo* and the whole brain – electroencephalography.

Purpose
To explore the effect of new biologically active compounds on nervous system and behaviour.

Field of application, use
Biomedicine, pharmacy

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Electroencephalographical Investigation

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Keywords
Nervous system, evoked potentials, electroencephalography

Description of service, product, technology
Electroencephalogram of human subjects aiming at determination of reaction to presented stimuli. Up to 64 channels EEG recording is possible.

Purpose
Non-invasive objective evaluation of central nervous system response to presented stimuli

Field of application, use
Biomedicine, psychology

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Biothermodynamics of Protein-Drug Interactions

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Keywords
Protein-ligand interactions, recombinant protein production, isothermal titration calorimetry, fluorescent thermals shift assay, ThermoFluor®, protein stability, enzyme inhibition, carbonic anhydrase, Hsp90, organic synthesis

Description of service, product, technology

- Determine thermodynamics of protein-ligand interactions (the largest collection of calorimeters in Eastern Europe, other biophysical techniques);
- Determine the conditions of protein stabilization by additives (high-throughput fluorescent shift assay);
- Produce recombinant proteins in *E. Coli* and human mammalian cell cultures (a collection of all 12 human carbonic anhydrase isozymes and Hsp90 chaperones and various mutants);
- Synthesize various small MW organic compounds (a collection of 550 aromatic sulfonamides and a group of resorcinol compounds).

Purpose
Design of compounds with drug-like properties and target protein affinities

Field of application, use
Biomedicine, biophysics, biochemistry, pharmaceutics

Development level
Laboratory level, animal testing

Possible, required cooperation forms
Services, joint projects, patents available for licensing, patent applications pending

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Custom Synthesis of Organic Compounds

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Keywords
Organic chemistry, synthesis, technology, custom synthesis of organic compounds

Description of service, product, technology
Synthesis of different classes of organic compounds, development of multistage synthesis schemes, implementing of the designed technologies and manufacturing of experimental batches of the products.
Production capacity varies from grams to hundreds of kilograms, depending on the compound structure and contractual requirements. Compounds are purified to a very high degree (>99%).
Product list can be found: www.bchi.vu.lt.

Field of application, use
Fine chemicals for research, development and Chemical and Pharmaceutical industry

Characteristics, technical information
Characteristics and technical information of every product are individual, depending on the customer's requirements. Generally, the author presents data confirming the structure and purity of the product (^{1}H, ^{13}C NMR, GC, HPLC, mp/bp).

Development level
Laboratory level

Possible, required cooperation forms
Services, sales of product

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Increase of Liquid Flow Velocity

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Keywords
Interphase, liquid, flow, stability

Description of service, product, technology
Control of laminar-to-turbulent transition in boundary layer by electric polarization of the wall

Purpose
Increase of wall-bounded flow velocity

Field of application, use
Energy, liquid transportation in pipes

Characteristics, technical information
Decrease of friction in boundary layer, increase of liquid flow velocity

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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MOCVD Deposition of Thin Films of Various Functional Oxide Materials

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Keywords
Functional oxides, thin films, deposition, MOCVD

Description of service, product, technology
MOCVD deposition of films of various oxide materials: transparent conducting oxides as for electrodes, magnetoresistant oxides, high-Tc superconductors, dielectric oxides, etc. Possible implementation of technology.

Purpose
Contractual research on deposition of functional oxide materials

Field of application, use
Electronics, optics, optoelectronics

Characteristics, technical information
Various

Patents
French (1993)/ES (1994)/USA(1999) patent; submitted by CNRS, France. A. Abrutis – co-author of the patent.

Development level
Laboratory level

Possible, required cooperation forms
Services, technology transfer, joint projects

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Synthesis and Characterization of Nanomaterials and Nanoparticles

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Keywords
Nanomaterial, nanoparticles, synthesis, characterization

Description of service, product, technology
Nanomaterials and nanoparticles of silica, cadmium selenite, calcium and magnesium carbonate, silver nanoparticles, upconversion sodium yttrium fluoride doped with lanthanoids.

Purpose
Applied research

Field of application, use
Optics, optoelectronics, biotechnology, biomedicine

Characteristics, technical information
Various

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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High-resolution Mass Spectrometry Analysis (HRMS) with/without High-pressure Liquid Chromatography (HPLC), UV and Fluorescence Spectra Analyses

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Keywords
HRMS, determination of molecular mass, analysis

Description of service, product, technology

- Determination of molecular masses of organic compounds using high-resolution mass spectrometer;
- In addition to high-pressure liquid chromatography analysis, qualitative and quantitative analysis of organic compounds mixtures;
- UV and fluorescence spectra of compounds.

Purpose
Characterization of new organic compounds, qualitative analysis of organic compounds mixtures. Qualitative analysis of especially small amounts of known impurities (e.g., searching of non-natural metabolites of steroids in blood or known antibiotics in food).

Field of application, use

- Synthesis of organic compounds
- Quality control of food

Characteristics, technical information
Instrument: Agilent 6230 TOF with JSESI ionization module and Infinity 1260 chromatography equipment (DAD UV and FLT detection modules). Accuracy of mass spectrometer sub 1ppm, sensibility sub 10ppb by introducing 5mkL concentration solution into system, when the flow rate of eluent is 0.5ml/min.

Development level
Laboratory level

Possible, required cooperation forms
Contract research, joint projects

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Elemental Analysis – Determination of CHNS/O Elements in Compounds and Materials

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Keywords
Elemental composition, CHNS/O analysis

Description of service, product, technology
Determination of elemental composition of organic compounds and polymeric materials. Thermo Scientific Flash2000 elemental analyzer is used for combustion of compounds and analysis of resulting gases. These elements can be determined by one combustion: C (carbon), H (hydrogen), N (nitrogen), S (sulfur), by use of another reactor and termolysis O (oxygen) can be determined.

Purpose
Characterization of new organic and polymeric materials is especially important for determining modification degree of polymer in materials. Quality control of polymer materials: discrepancy of polymer elemental composition for determined standard by client is the main quantitatively determined attribute of faulty raw material.

Field of application, use
- Synthesis of organic and polymer compounds
- Quality control of raw materials of polymer products
- Characterization of new polymer materials (elemental composition and out of this monomeric composition of formed polymer)

Characteristics, technical information
Instrument: Thermo Scientific Flash2000 elemental analyzer, accuracy of determining C (carbon), H (hydrogen), N (nitrogen), O (oxygen) elements – sub 0.4%, S (sulfur) – sub 1%

Development level
Laboratory level

Possible, required cooperation forms
Contract research, joint projects

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NMR Spectroscopy

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Keywords
NMR, spectroscopy

Description of service, product, technology
Recording one and two dimensional nuclear magnetic resonance spectra with Brucker Ascend 400 spectrometer.

Purpose
NMR spectra for determination of the structure of chemical compounds, evaluation of intermolecular interactions

Field of application, use
Chemistry, analysis, research

Characteristics, technical information
NMR spectra are registered with Brucker Ascend 400 spectrometer. ^{1}H, ^{13}C, ^{15}N, ^{11}B, ^{29}Si, ^{19}F, ^{31}P and other nuclei may be registered.

Development level
Developed technology

Possible, required cooperation forms
Services

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Brush Polymers for Surface Modification

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Keywords
Brush polymers, polyelectrolytes, poly(ethylene oxide), adsorption, living polymerization

Description of service, product, technology
Development of cationic and anionic brush (comb) polymers containing poly(ethylene oxide) side chains and multiblock brush polymers containing anionic side chains. Brush polymers prepared by the methods of living radical polymerization ATRP or RAFT have random, diblock or multiblock structure. Brush polymers are characterized by size exclusion chromatography with quadruple detection, dynamic light scattering and spectroscopic methods.

Purpose
Brush polymers can be used as lubricating and protein repelling materials, as polymeric surfactants preventing aggregation of nanoparticles in concentrated colloidal systems, as superplasticizers for cement compositions and as additives changing rheological properties of detergent compositions.

Field of application, use
Nanotechnology, coatings technology, constructive materials, detergent technology

Characteristics, technical information
Brush polymers of poly(meth)acrylate type, with high density of hydrophilic/anionic side chains.
Molecular weight: 100.000 – 1.000.000
Amount: 1 – 100 g

Development level
Laboratory level

Possible, required cooperation forms
Contract research, joint projects, technology transfer

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Polymeric Carriers for Enzyme Immobilization

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Keywords
Polymeric carriers, biocatalysts, immobilization, poly(urethane urea), chitosan derivatives

Description of service, product, technology

- Synthesis of microparticle-form polymeric carriers with desirable composition and structure;
- Immobilization of enzymes on polymeric carriers;
- Testing of immobilized enzymes in laboratory scale.

Purpose

- Biocatalysts for multiple uses;
- Immobilized biocatalysts have scientific, practical and commercial value in development of novel biotechnological and biopharmaceutical systems.

Field of application, use
Biotechnology, diagnostics, food industry, research

Characteristics, technical information
Polymeric carriers based on poly(urethane urea) or derivatives of natural polysaccharide chitosan. Enzymes are attached to carriers via covalent binding.

Development level
Laboratory level

Possible, required cooperation forms
Contract research, joint projects, technology transfer

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Characterization of Polymers and Nanoparticles by the Methods of Size Exclusion Chromatography and Dynamic Light Scattering

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Keywords
Size exclusion chromatography, dynamic light scattering, diffusion coefficient, particle size, hydrodynamic radius, molecular weight

Description of service, product, technology

- Characterization of proteins, synthetic and natural polymers by size exclusion chromatographs Viscotek GPCmax with quadruple detection (UV, RI, RALS/LALS and DP). Evaluative parameters: number M_n and weight M_w average molecular weights, intrinsic viscosity IV ([η]), hydrodynamic radius R_h, composition, branching, conformation and aggregation of macromolecules;
- Characterization of polymer aggregates and nanoparticles by dynamic light scattering instrument Zetasizer NanoZS. Evaluative parameters: diffusion coefficients and dimensions (diameters from 0.6 to 6000 nm) of macromolecules, their aggregates, nano- and microparticles, Zeta potential.

Development level
Laboratory level

Possible, required cooperation forms
Contract research

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Genome-wide Analysis of DNA Modification Sites

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Keywords
Epigenome profiling DNA methylation, cofactor analogue, AdoMet, methyltransferase, mTAG labeling

Description of service, product, technology
Genome-wide analysis of cytosine modification profiles in mammalian (i.e. human) DNA via covalent capture and enrichment of modified CpG sites using M.SssI methyltransferase and chemically engineered cofactor analogues.

Purpose
Analysis of genomic DNA methylation profiles for research and diagnostics

Field of application, use
Epigenetics, biomarkers, biochemistry, genomics, biomaterials, diagnostics

Development level
Laboratory level, patents pending

Possible, required cooperation forms
Services, collaboration, joint projects

References
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Lukinavičius *et al. J. Amer. Chem. Soc*. 2007, 129: 2758.

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Data Analysis and Mathematical Modeling for Economic and Biomedical Problems

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Keywords

Econometrics, biostatistics, modeling

Description of service, product, technology

Data analysis and mathematical modeling for economic and biomedical problems.

Purpose

- Analysis of financial and medical research data for policy making
- Development of disease treatment algorithms
- Models for short to long term forecasting of economic series

Field of application, use

Medical institutions, economic institutions, medical or economic authorities

Possible, required cooperation forms

Services, joint projects

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Non-Classical Logics

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Keywords
Modal logic, temporal logic, logic of knowledge

Description of service, product, technology
Along with traditional non-classical logics (such as intuitionistic, modal logics), various new non-classical logics (such as dynamic logics, logics of knowledge, logics for computer agent) are proposed.
Modal and multi-modal logics are applied to reason about knowledge and execution of computer agents. Knowledge and its interaction are of the most importance for theory and practice of knowledge based economics. Theoretical results obtained in the area of non-classical logics are applied in investigation and modelling of various complex technological and social processes, and in development of knowledge based economics. Formal methods based on mathematical logic are widely applied in reliability and verification of complex computer systems and technological processes.

Purpose
To formalize methods in use to obtain greater effectiveness and reliability of software development

Field of application, use
Fields in which formal logical methods and models are used

Possible, required cooperation forms
Services

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Investigation of Various Fluid Flow Models (Blood Flow, Oil and Gas Piping, etc.)

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Keywords
Modeling of fluid flows

Description of service, product, technology
Service – modeling of fluid flows.

Purpose
For companies in which the use of (suitable) fluid flow models would increase quality of product or service

Field of application, use
For companies that would benefit from modeling of fluid flow

Development level
Research level

Possible, required cooperation forms
Services

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Boundary Value Problems, Problems with Nonlocal Boundary Conditions

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Keywords
Boundary problems, nonlocal boundary conditions, mathematical modeling

Description of service, product, technology
Differential and discrete problems with nonlocal boundary conditions and eigenvalue problems with nonlocal conditions, theoretical issues, in order to obtain the necessary and sufficient for the existence of solutions, uniqueness and correctness conditions. Investigation of Dirichlet type boundary problems for the system of degenerating elliptic equations.

Purpose
Differential equations with various types of nonlocal conditions are now one of the most intensively researched areas of differential equations and numerical methods.

Field of application, use
Applied problems of mathematical biology, biophysics, biochemistry, thermo- and high-precision mechanics, environmental protection, as well as the internal math needs

Characteristics, technical information
Possible to distinguish between different classes of such problems (stationary, parabolic, hyperbolic, one-dimensional and multidimensional, with variable and constant coefficients, the multipoint and the nonlocal integral conditions)

Development level
Theoretical studies and simulations of model problems

Possible, required cooperation forms
Consulting, theoretical and numerical investigation of solutions of such problems

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Analysis of Stable Models in Finance

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Keywords
Mathematical modeling, stable models, finance engineering

Description of service, product, technology
The system for financial modeling is developed following stability hypothesis of financial data. Statistical and robust procedures are implemented creating the system for stock portfolio simulation and optimization. The developed software enables to calculate option price, estimate stability parameters, build efficient portfolio and solve other optimization problems.

Purpose
Mathematical modeling of stock markets

Field of application, use
Stock markets

Characteristics, technical information
C++ software

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Rent of Light Conversion Femtosecond Yb:KGW Oscillator with Amplifier "Pharos"

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Keywords
Femtosecond, Pharos, parametric amplifier

Description of service, product, technology
Rent of 6W average power diode-pumped high repetition rate femtosecond Yb:KGW laser. It can be used as femtosecond laser pulse source for parametric amplifier pumping, investigation of nonlinear optical processes or as ultrashort pulses seed source for further laser radiation power increase

Purpose
Femtosecond laser pulse source for parametric amplifier pumping, investigation of nonlinear optical processes;
Ultrashort pulses seed source for further laser radiation power increase.

Field of application, use
Research in laser and nonlinear optics fields
Companies manufacturing lasers and optical parametric amplifiers

Characteristics, technical information
6W average power diode-pumped high repetition rate femtosecond Yb:KGW laser. Maximum repetition rate is 200 kHz. Central wave length is 1030 nm. Pulse duration is 300 fs.

Possible, required cooperation forms
Services, joint projects

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Femtosecond Laser Pulses Contrast Measurement

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Keywords

Femtosecond pulses, contrast measurement

Description of service, product, technology

Femtosecond pulses temporal contrast measurement is performed with the pulse temporal contrast meter Sequoia 800. Femtosecond pulses temporal contrast can be measured in ~800 spectrum range.

Purpose

For femtosecond pulses temporal contrast measurement

Field of application, use

Research of femtosecond optical devices
Companies manufacturing femtosecond optical devices

Characteristics, technical information

Sequoia 800 spectral range: 760-840 nm
Temporal range: 500 ps
Dynamic range: 10^{10}
Minimal impulse energy: 100 μJ

Possible, required cooperation forms

Services, joint projects

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Femtosecond Pulse Duration Measurement

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Keywords
Femtosecond pulse, duration measurement

Description of service, product, technology
Femtosecond pulse duration is measured with APE PulseCheck 15 ShortPulse meter. 20-1000 fs laser pulse duration can be measured in spectral range from 410 to 2000 nm using variable optical sets. Measurement of 20-50 fs duration pulses with FROG technique can be measured in 700-900 nm spectral range.

Purpose
For femtosecond pulses duration measurement

Field of application, use
Research and manufacturing of femtosecond optical devices

Characteristics, technical information
20-1000 fs laser pulse duration can be measured in spectral range from 410 to 2000 nm using variable optical sets. It is possible to measure 20-50 fs duration pulses with FROG technique in 700-900 nm spectral range.

Possible, required cooperation forms
Services, joint projects

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Rent of Hitachi Tabletop Electron Microscope TM-1000

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Keywords
Electron microscope, morphology

Description of service, product, technology
Investigation of samples morphology with Hitachi Tabletop electron microscope TM-1000.

Purpose
For samples morphology investigation

Characteristics, technical information
Microscope characteristics: accelerating voltage is 15 kV, maximum magnification is 10000, maximum sample size is 70 mm in diameter, maximum sample height is 20 mm, detector is a backscattered electron detector (BSE).

Possible, required cooperation forms
Services, joint projects

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Spectral Measurement with Broad Spectral Range Spectrograph and the Andor CCD Camera

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Keywords
Spectral measurement, spectrograph, broad range

Description of service, product, technology
Service provided using spectrograph Shamrock SR-500i (Andor Technology) and CCD camera iXon+-885.

Purpose
Spectral characteristic study of lasers, optical parametric generators and laser created plasma

Field of application, use
Research in lases, optical parametric generators, laser-induced plasma fields; Companies manufacturing laser and optical parametric devices

Characteristics, technical information
Spectrograph Shamrock SR-500i (Andor Technology) has two sets of three optical gratings. Spectral range: 150 – 30.000 nm, resolution 0.1 nm in the visible spectral range.
CCD camera spectral range: 400-1100 nm.

Possible, required cooperation forms
Services, joint projects

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Image Recording with Optical Microscope and a CCD Camera

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Keywords
Optical microscope, CCD camera

Description of service, product, technology
Image recording service is provided using "Olympus BX51" optical microscope with the Qimaging CCD camera microPublisher 5.0 and a computer.

Purpose
For various samples morphology investigation and image recording

Field of application, use
Characterization and image recording of various samples affected by laser radiation

Characteristics, technical information
Optical microscope characteristics: UIS2 optical system, objectives: UPlanFL N (10 times magnification), LUC PlanFL N (20 times magnification), LUCPlan FL N (40 times magnification), focusing: vertical table travel 25 mm.

Possible, required cooperation forms
Services, joint projects

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Laser Nanophotonics Reseach and Services

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Keywords
Laser nanophotonics, polymers, scaffolds for stem cells

Description of service, product, technology

- Numerical modelling, laser formation, geometry and optical properties (focus, collimation, phase modulation) description of multifunctional (refractive/diffractive) and integrated (on the optical fiber tip) micro-optical elements (10-100 μm);
- Artificial three-dimensional frames laser formation for cell biology and tissue engineering applications. There is a possibility to use biologically inert and degrading polymers and to produce carcass made of several different materials. Pore size and filling factor can be varied from 1 to 100 μm and 20-80%, respectively.
- Laser formation of nanophotonic elements in polymers and transparent material forming with laser two- and three-dimensional fixed and gradually variable period photonic crystals of period from 0.5 to 10 μm. Numerical modelling of these items and characterization of their light control properties.

Available instruments: Light Conversion femtosecond laser system Pharos, anometric three coordinates shift table, Hitachi Tabletop electronic microscope TM-1000, optical profilometer Sensofar PLμ2300, unique nanophotonic instrumental diagnostic complex.

Purpose
Formed micro-compounds are used in optical systems, cell biology and tissue engineering applications.

Field of application, use
Research of laser physics, biology, medicine, optical technology

Characteristics, technical information
Light Conversion: 6W average power diode-pumped high repetition rate femtosecond Yb:KGW laser. Maximum repetition rate is 200 kHz, central wavelength is 1030 nm, pulse duration is 300 fs, pulse energy is up to 0.4 mJ. Nanometric three coordinates shift table: maximum X, Y, Z axis travel: 100 μm, accuracy 0.2 nm.

Possible, required cooperation forms
Services, joint projects

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Rent of Optical Profilometer Sensofar PLμ2300

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Keywords
Optical profilometer, topographic test

Description of service, product, technology
Topographic analysis of different samples surface is done with Profilometer Sensofar PLμ2300 with a computer and the proper software.

Purpose
For topography analysis of different samples surface

Field of application, use
Topographic analysis of different laser exposed samples

Characteristics, technical information
Technical information of optical profilometer Sensofar PLμ2300:
5 objectives: Nikon 10x/0.30 DI , Nikon Lu Plan 10x/0.30 A, Nikon Lu Plan 20x/0.45, Lu Plan 100x/0.9, Nikon Lu Plan 50 x 0.8 A.
Maximum table travel: x ~115 mm, y ~ 75 mm, z ~ 35 mm.

Possible, required cooperation forms
Services, joint projects

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Microfabrication with Femtosecond Laser Radiation

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Keywords
Laser microfabrication, femtosecond pulses

Description of service, product, technology
6 W average power Light Conversion femtosecond Yb:KGW laser Pharos and mid motion five coordinate precision positioning module Aerotech with a unique set of equipment and diagnostic are used.

Purpose
Transparent media drilling, metal masks formation

Field of application, use
Precision microfabrication with laser radiation, research of femtosecond pulses and material interaction

Characteristics, technical information
Technical positioning parameters:

- X and Y axis (ANT180-160-L): maximum motion is 160 mm, speed is 350 mm/s, accuracy is 300 nm;
- Z axis (ANT130-060-L): maximum motion is 60 mm, speed is 350 mm, accuracy is 200 nm;

Rotating axes technical parameters:

- ADRS-150: rotating part diameter is 140 mm, accuracy is ± 6 arc sec, resolution is 0.315-31.5 μrad;
- ANT130-360-R: ±360° rotation angle, accuracy is ±10 arc sec, maximum speed is 200 rps.

The system is assembled on a granite plate with control electronics. There is also installed software for 5-axis positioning system management, integrated 10 m/s velocity and positioning 1.5 m/s marking speed fiber management subsystem for 1030/515/343 nm wavelength radiation and system for beam focusing to the sample with a 150 mm focal length for 1030/515/343 nm wavelength radiation. In the positioning systems, 6W average power diode-pumped high repetition rate femtosecond Yb:KGW laser is used, which

maximum repetition rate is 200 kHz, central wavelength is 1030 nm and pulse duration is 320 fs.

Possible, required cooperation forms
Services, joint projects

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Measurements of Optical Elements Characteristics

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Keywords
Laser induced damage threshold

Description of service, product, technology
Measurements can be performed for:
- 1030-106 nm, 515-532 nm, 343-355 nm (using Inolas SpitLight Hybrid III laser and laser-induced damage threshold (LIDT) test station);
- 760-840 nm, 380-420 nm (using TITAN 20 FM SLM laser and laser-induced damage threshold (LIDT) test station).

Purpose
Measurement of laser induced damage threshold of optical coatings

Field of application, use
Optical coatings manufacturer firms
Laser technology manufacturing firms
Service provided to analyse optical coatings

Characteristics, technical information
- High energy nanosecond laser with single longitudinal and transversal mode and 2-5 harmonics generation unit Inolas SpitLight Hybrid III. Pulse energy:
  - ≥ 400 mJ @ 1064 nm wavelength,
  - ≥ 190 mJ @ 532 nm wavelength,

- ≥ 100 mJ @ 355 nm wavelength,
- ≥ 50 mJ @ 266 nm wavelength,
- ≥ 8 mJ @ 213 nm.
- Pulse duration is 8-11 ns, pulse repetition rate is ~50 Hz, divergence is < 0.5 mrad. Automated positioning of sample: XY directions in target plane (range of positioning is ≥ 70 mm). There is also installed the analogue digital converter with sample and hold functions and with 16 bits, 2 or more inputs for registration of the scattered and incident pulses and a personal computer with software.

- High repetition rate single longitudinal and single transversal mode nanosecond laser TITAN 20 FM SLM. Pulse energy is ≥ 20 mJ @1064 nm, pulse duration is < 8 ns, pulse repetition rate is 1 kHz. Automated positioning of sample: XY directions in target plane (range of positioning is ≥ 70 mm). There is also installed the analogue digital converter with sample and hold functions and with 16 bits, 2 or more inputs for registration of the scattered and incident pulses and a personal computer with software.

Possible, required cooperation forms
Services, joint projects

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Spectral Measurement with Fiber Spectrograph

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Keywords
Spectral measurement, NIR fiber-optic spectrograph

Description of service, product, technology
Service provided using NIR fiber spectrograph AvaSpec-NIR256-2.5.

Purpose
Possibility to measure spectrum in 1000-2500 nm range

Field of application, use
Test and production of optical devices generating optical radiation in 1000-2500 nm spectral range

Characteristics, technical information
AvaSpec-NIR256-2.5 spectrograph has an integrated InGaAs detector with 1000-2500 nm spectral range.

Possible, required cooperation forms
Services, joint projects

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Ultrafast Spectroscopy Research: Femtosecond Multi-Pulse Absorption Spectroscopy

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Keywords
Ultrafast spectroscopy, femtosecond, multi-pulse absorption, Ti:sapphire amplifier

Description of service, product, technology
Regenerative Ti:Sapphire amplifier of femtosecond pulses with 30W solid-state pump laser Libra-USP-HE, a unique set of spectroscopy equipment and diagnostic and two Light Conversion parametric generators Topas 800 are used. Chemical/biological materials, semiconductor properties using ultrafast absorption spectroscopy methods at room and liquid nitrogen temperature are analysed. It is necessary to have investigative materials and necessary tools for their handling (dosage, dilution, dissolution and fixation).

Purpose
For testing chemical/biological materials, semiconductor properties

Field of application, use

Chemical/biological materials, semiconductor properties analysis using ultrafast absorption spectroscopy methods

Characteristics, technical information

Regenerative Ti:Sapphire amplifier of femtosecond pulses with 30W solid-state pump laser Libra-USP-HE and a unique set of spectroscopy equipment and diagnostic. Central wavelength of the amplified pulses is 800 nm, maximum pulse repetition rate is 1 kHz, pulse duration is < 50 fs. Pulse energy at 1 kHz repetition rate is > 3.5 mJ. It has an option of switchover between 50±5 fs pulse and 110±10 fs pulse amplification modes.

Two Light Conversion parametric generators TOPAS-800: pumped by the first harmonic of Ti:Sapphire amplifier, 1150-2600 nm spectral range. One of them has an opportunity to use a different frequency method to expand the spectral range: 100 nm – 20 μm.

Possible, required cooperation forms

Services, joint projects

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Ultrashort Pulses Investigation with Nonlinear Methods

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Keywords

Nonlinear materials, ultrafast pulses

Description of service, product, technology

Service provided with Spectra Physics Ti:Sapphire femtosecond system with non-collinear parametric amplifier, ultrashort pulses IR radiation source, high dynamic range Andor CCD camera, pulses duration meter Grenouille and a

unique set of diagnostic for space-time and spectral characteristics. Investigation of ultrashort pulses spatial, spectral and temporal characteristics (from UV to IR spectral range) in transparent nonlinear materials, characterization of materials nonlinear properties.

Purpose

Investigation of ultrashort pulses spatial, spectral and temporal characteristics (from UV to IR spectral range) in transparent nonlinear materials, characterization of materials nonlinear properties

Field of application, use

Research in nonlinear optics using transparent nonlinear materials

Characteristics, technical information

Spectra Physics Ti:Sapphire femtosecond system with non-collinear parametric amplifier and ultrashort pulses IR radiation source: central wavelength of the amplified pulses is 800 nm, maximum pulse repetition rate is 1 kHz, pulse duration is 130 fs. Pulse energy at 1 kHz repetition rate is 3 mJ. Non-collinear parametric amplifier generates <20 fs radiation in 550-750 nm spectral range. Ultrashort pulses IR source generates < 20 fs pulses in 2 μm spectral range.
High dynamic range Andor CCD camera, pulses duration meter Grenouille and a unique set of diagnostic for space-time and spectral characteristics: possibility to record the spatial distribution of radiation in 300-1100 nm spectral range. Pulse duration in visible and IR spectral range and spectral characteristics in 200-2500 nm can be measured.

Possible, required cooperation forms

Services, joint projects

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Evaluation of Chemical Composition of Artworks Pigments and Layers Using Non-destructive FT-IR and FT-Raman Spectral Microscopy

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Keywords
Pigments, grounds, artworks, FT-IR, FT-Raman spectroscopy

Description of service, product, technology
Qualitative and quantitative spectral analysis of various artworks that are covered by some paint layers using FT infrared spectral microscopy and FT-Raman spectral microscopy. This analysis provides information about chemical structure of paints and ground and binders materials, which is especially important for restoration, preservation and conservation.

Purpose
Restoration and conservation of painting layers of artworks

Field of application, use
Spectral analysis of paintings for art restoration and conservation work for public and private museums or persons

Characteristics, technical information
The FT-IR and FT-Raman spectra of painting samples of pigments and grounds are recorded in the region 400-4000 cm^{-1} using Bruker Vertex-70 and Bruker MultiRam spectrometers (wavelength of laser radiation is 1064 nm, and other, power used one is 5-1000 mW).

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Studies of Carbon Allotrope (Diamond, Graphite, Graphene, Fullerenes, Nanotubes) and Gem Structure and Purity by the Means of Non-destructive Vibrational Spectrometry

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Keywords
Vibrational spectrometry, gem, nanotubes, grapheme

Description of service, product, technology
Vibrational spectrometry to study different types of materials for exact determination of material and detection of various impurities in the samples. Study of carbon allotropes by the means of infrared and Raman spectrometry allows precise discrimination between different carbon species and detection of any organic impurities, if present. Investigation of gem stones by the means of vibrational spectrometry allows determination of the origin (e.g., natural or synthetic diamond) and detects the level of impurities.

Purpose
Identification of materials, determination of structure and chemical composition, detection of impurities

Field of application, use
Elaboration and testing of new functional materials
Determination of gem quality
Synthesis and application of carbon nanotubes and graphene

Characteristics, technical information
Two spectrometers are available for the measurements. Raman spectra can be recorded on FT-Raman spectrometer MultiRam (Bruker), resolution is 0.75 cm^{-1}, the smallest sample is 50μm, spectral range is 3500-100 cm^{-1}. Infrared absorption spectra can be recorded on Vertex 70 spectrometer coupled with Hyperion 3000, microscope from Bruker, spectral resolution is 0.5 cm^{-1}, the smallest sample is 20 μm, spectral range is 7000-400 cm^{-1}. Samples can be held at the temperatures ranging 500-10 K for spectral measurements.

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Development level
The technology is at laboratory level and measurements can be performed in the Laboratory of Vibrational Spectroscopy.

Possible, required cooperation forms
- Services in determination of gem or carbon allotropes structure and quality
- Joint research projects in development of novel carbon nanotube or graphene based materials

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The Mathematical Model and Software for the Case Rectangular Cross Section Sample, Placed into Rectangular Waveguide

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Keywords
Measurements, permittivity, permeability, waveguide

Description of service, product, technology
The measurements of the permittivity and permeability consist of three main components: measurement equipment, investigated material (in the device under test) and mathematical model. The model relates electrical values measured by the equipment and physical properties of the material.
The mathematical model and software for the case rectangular cross section sample, placed into rectangular waveguide, is developed. It allows measuring both permittivity and permeability in a wide range of values. The software operates without time consuming numerical integration.

Purpose
Material characterization and quality control

Field of application, use
Fabrication and investigation of ceramics, composites and other materials

Characteristics, technical information

Software calculates dielectric permittivity and magnetic permeability for the case rectangular cross section sample, placed into rectangular waveguide. The height of the sample is equal to waveguide's narrow wall height. The width of the sample should be up to waveguide's wide wall width. The length of the sample should be up to twice waveguide's wide wall width. Maximal dielectric constant value is 10000. There is a possibility to increase calculation accuracy by choosing quantity of modes.

Development level

Implemented in the market

Possible, required cooperation forms

Services, technology transfer, joint projects

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Identification of Cancerous Tissues and Determination of Chemical Composition and Morphology of Inorganic Formations in Human Renal System

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Keywords

Vibrational spectrometry, cancer diagnostics, renal stones

Description of service, product, technology

Infrared absorption and Raman spectrometry for the investigations of materials at the molecular level. Studies of chemical composition of multicomponent materials; spectral microscopy for tracking of the distribution of chemical components in the sample with high lateral resolution. Discrimination between healthy and cancerous tissue using vibrational spectrometry and spectral microscopy.

Purpose

Identification of cancerous tissues, determination of renal stones chemical composition and morphology

Field of application, use

Medical diagnostics

Characteristics, technical information

Raman spectra can be recorded on FT-Raman spectrometer MultiRam (Bruker), resolution is 0.75 cm^{-1}, the smallest sample is 50μm, spectral range is 3500-100 cm^{-1}.

Infrared absorption spectra can be recorded on Vertex 70 spectrometer coupled with Hyperion 3000, microscope (Bruker), spectral resolution is 0.5 cm^{-1}, the smallest sample is 20 μm, spectral range is 7000-400 cm^{-1}. Samples can be held at the temperatures ranging 500-10 K for spectral measurements.

Development level

The technology is at laboratory level and measurements can be performed in the Laboratory of Vibrational Spectroscopy.

Possible, required cooperation forms

- Services in determination of renal stones chemical composition or chemical composition of urinary sediments
- Joint research projects in development of novel diagnostics methods

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Impedance Spectroscopy of Materials, Layers and Devices

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Keywords
Impedance, conductivity, permittivity

Description of service, product, technology
Impedance spectroscopy to characterize semiconducting and dielectric materials as well as ionic and mixed electronic-ionic conductors. Measurements of complex impedance in frequency range from 0.1 Hz to 10 GHz and temperature ranges from 20°C-1000°C. For such broad frequency range measurements, a coaxial waveguide assembly is used. Moreover, for up to 2 MHz measurements, 4-electrode setup is implemented. Sample holder is made of platinum covered refractory ceramics to perform accurate impedance spectra measurements with relatively small systematic errors up to 1000°C.
Details are available on the Internet: http://rfk.ff.vu.lt/kkj/

Purpose
Sample holder is adapted for studies of single crystals, ceramics, glasses, interfaces between different materials as well as integrated circuit devices, which operate under elevated temperatures.

Field of application, use
Scientific research, materials engineering, industry of electronics

Characteristics, technical information
Measurements of complex impedance in frequency range from 0.1 Hz to 10 GHz and temperature ranges from 20°C to 1000°C.

Development level
Laboratory level

Possible, required cooperation forms
- Services
- Joint projects in all physical, chemical and technical fields of science and industry

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Characterization and Analysis of Electrical and Photo-Electrical Parameters, Charge Carrier Transport Properties and Defects in Organic and Inorganic Crystalline and Disordered Semiconducting Materials and Devices on Their Basis for Micro- and Opto-Electronics

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Keywords
Semiconductors, characterization, (photo-) electrical parameters, charge carrier transport, defects

Description of service, product, technology

- Analysis of electrical and photoelectrical properties and parameters of organic and inorganic semiconductors, devices and structures in wide temperature regions depending on applied voltage and light excitation;
- Analysis of charge carrier transport and measurement of carrier mobility in organic and inorganic semiconductors and devices by the Hall, Van der Pauw, Time-of-Flight and other complex methods. Sensitivity: 10^{-7} – 10^{5} cm^{-2}/Vs;
- Analysis and characterization of defect states in semiconductors by optical and thermally stimulated spectroscopy;
- Analysis and characterization of semiconductor *pn* structures and devices by current-voltage and capacitance-voltage equipment, evaluation of their contact and signal transfer properties at different excitations and temperatures;
- Analysis and characterization of semiconductors and their structures by complex impedance technique at different temperatures, depending on excitation;
- Implementation and tailoring of the experimental equipment for characterization and analysis of electrical and photoelectrical properties and parameters of organic and inorganic semiconductors and devices.

Purpose
Analysis, development and R&D of semiconductor materials and devices, their testing, implementation and tailoring for the specific customer needs

Field of application, use

- Semiconductor materials and semiconductor devices R&D and industry
- Solar energy R&D and industry

Characteristics, technical information

Automated system for (photo-) electrical characterization of semiconductors and their device structures:

- Sub-Femtoamp Remote SourceMeter Keithley 6430, current measurement range: 10^{-17}-10^{-2} A
- Digital voltage source: -1000 V – +1000 V
- Liquid Helium cryogenic system ARS Cryo, temperature range 10 K – 450 K
- Equipment for the charge carrier mobility measurements by the Hall, Van-der-Pauw, Time-of-Flight, CELIV and Dark Injection Space Charge Limited Currents (DI-SCLC) methods. Sensitivity ranges: 10^{-7} – 10^{5}cm^{2}/Vs.
- Electro-Magnet up to 3T
- Set of Function/Arbitrary signal generators with arbitrary sample rate up to 300 MSa/s and pulse amplitudes up to 100 V
- Digital Tektronix Oscilloscopes
- Pulsed light excitation by high intensity fast LEDs
- Available temperature range 77 K – 500 K

Optical spectroscopy equipment:

- Digitally controlled optical monochromator Bentham TM300, spectral range – from near UV to IR
- Light intensity controller Bentham 605
- Digital electrometer/high resistance meter Keithley 6517A, current measurement range: 10^{-15} – 10^{-2} A
- Temperature controller SI9700

Equipment for charge carrier trapping and transport characterization by Thermally Stimulated Current and Thermally Stimulated Depolarisation methods:

- Janis VPF-475 Cryostat, temperature range 77 K – 500 K with digital temperature controller CryoCon-32
- High intensity white light excitation source
- Digital picoammeter/voltage source Keithley 6487, current measurement range: 10^{-15} – 10^{-2} A, voltage source – up to 500 V

Complex impedance analysis equipment:

- Wayne Kerr 6440B precision component analyser, Frequency Range: 20Hz to 3MHz in > 1800 steps, accuracy of set frequency ±0.005%
- Available temperature range 77 K – 500 K

DLTS equipment SULA. Defect trap detection relative sensitivity: 10^{-6}.

Development level

- Laboratory level
- Prototypes available, implementation and customization according to the specific customer requirements

Possible, required cooperation forms

Services, joint projects, technology transfer, investments required for the large scale R&D

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Contactless Determination of Free Carrier Lifetime and Diffusivity in Semiconductors and Devices

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Keywords

Excess carriers, lifetime, diffusivity, semiconductors, semiconductor structures

Description of service, product, technology

Measurement of key electrical parameters, such as carrier diffusivity, mobility, lifetime, surface recombination velocity, using conventional pump-probe and know-how transient grating techniques. These techniques are based on excitation of the material or a device by a short laser pulse of required wavelength and spatial shape and consequent observation of carrier dynamics by delayed pulses. Advantage of this approach is in contactless and non-destructive nature of the measurement techniques enabling determination of key electrical parameters of a semiconductor or device structure. Diffusivity above 0.1 cm^2/s and lifetime above 300 fs can be measured in materials with energy band gap within 0.6-5.8 eV. The parameters can be investigated within wide ranges of temperature (10-700 K) and carrier densities (10^{18}-10^{20} cm^{-3}).

Purpose

To measure electrical parameters in materials and devices for optoelectronic applications

Field of application, use
Semiconductor industry

Characteristics, technical information
Measurement setup is based on "Ekspla" lasers *PL2143* and *PL2243*, OPG PG401, Light Conversion laser *Pharos* and OPA *Orpheus*, "Cryo Industries" helium and nitrogen cryostats, completed with all necessary optical, mechanical and data acquisition equipment.

Development level
Measurements are provided with detailed data analysis and interpretation of the results

Possible, required cooperation forms
Services, joint projects

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Control of Technological and Radiation Defects

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Keywords
Control of technological and radiation defects, spectroscopy

Description of service, product, technology
- Monitoring and technological control of changes of recombination characteristics before and after technological procedures of industrial fabrication of Si based electronic devices and solar cells;
- Spectroscopy of deep levels ascribed to different technological defects by using DLTS and pulsed capacitance of various regimes (in junction structures) and contactless techniques;
- Investigations of barrier parameters in junction structures based on Si, Ge, GaAs, GaN, Cu-CdS;
- Combined characterization of operational characteristics of junction structures by using capacitance and current;

- Photoelectrical spectroscopy of deep levels in Si structures;
- Calibration of technical parameters of the compact fluorescence spectrophotometers and spectroscopy of fluorescence in biological tissues.

Purpose

1-6 for technological control of industrial procedures in High Tech enterprises, 7 for bio-medicine industry

Field of application, use

Enterprises of electronics and photo-electricity

Characteristics, technical information

- Control and manipulation of radiative and thermal technological processes
- *In-situ* and *ex-situ* control of radiative damage of materials and devices

Development level

Laboratory level

Possible, required cooperation forms

Services, joint projects
Measurements are provided with detailed data analysis and interpretation of the results.

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Control and Manipulation of Radiative and Thermal Technological Processes (VUTEG-3, VUTEG-4, VUTEG-5)

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Institute of Applied Research, Division of New Material Research and Measurements Technologies

Keywords

Control of technological and radiation defects, spectroscopy

Description of service, product, technology

- VUTEG-3 – an instrument for contactless distant and *in-situ* control of the evolution of radiation defects and recombination characteristics during irradiation by high energy hadrons;

- VUTEG-4 – an instrument for technological control of recombination characteristics and lateral and depth scans of distribution of recombination parameters;
- VUTEG-5 – an instrument for rapid and contactless dosimetry.

Purpose
For technological control of industrial procedures in High Tech enterprises

Field of application, use
Enterprises of electronics and photo-electricity

Characteristics, technical information
- For control and manipulation of radiative and thermal technological processes
- *In-situ* and *ex-situ* control of radiative damage of materials and devices

Development level
Prototype

Possible, required cooperation forms
Commercialisation
Measurements are provided with detailed data analysis and interpretation of the results.

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Solid-State Lighting Technology with the Control of Colour Rendition Properties

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Keywords
Light-emitting diodes, colour rendition, RAGB cluster

Description of service, product, technology
Lighting technology with controllable and tuneable colour rendition properties.

In contrast to conventional lighting techniques, this technology allows for not only tuning the hue of white light (colour temperature), but also the colour saturation of illuminated objects.
The concept is based on polychromatic clusters of light-emitting diodes that can be tuned over all metameric spectra with gradually varying colour rendition properties from colour dulling to colour fidelity, preference rendition, and colour saturation. Also, this approach allows for colour gamut correction, control of photochemical damage, minimization or maximization of human photobiological (circadian) action, optimization of illumination for mesopic vision conditions, improved visualization of aged artwork, etc.

Purpose

The purpose is the rendition of the colours of illuminated objects with an ability to dull, saturate or correct them. Also, luminaires with dynamically tuned spectrum allow for meeting individual preferences to colour rendition properties of illumination and for adjusting chromatic visualization of particular objects.

Field of application, use

Such illumination technology can find applications in many spheres of retail and exposition lighting, where colour aesthetics, attractiveness and visual expression are important. In particular, it can be recommended for museum and art gallery lighting, since it offers both versatile colour rendition and control of photochemical damage.

Characteristics, technical information

The technology represents smart light engines, i.e., the method of generating light with the spectral power distribution controlled by a smart device using a proprietary control algorithm. One of the products launched in the market is a red-amber-green-blue (RAGB) rail luminaire controlled by a wireless Bluetooth or Wi-Fi protocol with an electrical power of 20-30W and a luminous flux of up to 1000 lm.

Development level

The development and implementation into the market is being performed by a start-up company "LEDigma", which performs manufacturing and distribution of the products based on this technology.

Patents

Lithuanian patent No. 5918 an international PCT patent application WO/2013/009157

Possible, required cooperation forms
Search for partners for distribution, joint research and development projects in the field of smart lighting. Measurements are provided with detailed data analysis and interpretation of the results.

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Measurement of the Optical, Electrical and Thermal Properties of Light Sources and Lighting Systems

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Keywords
Light-emitting diodes, luminous flux, wall plug efficiency, colour rendition properties

Description of service, product, technology
Investigation of the optical parameters of light sources (lamps, LEDs, etc.), such as spectral power distribution, luminous and radiant flux and chromaticity coordinates. Assessment of colour rendition properties by CIE colour rendering metrics, NIST Colour Quality Scale, Statistical approach and other methods. Measurements of the optical properties of reflective and refractive optical elements, angular and spatial diagrams of luminous intensity, illuminance and luminance of illuminated objects/scenes. Evaluation of street illumination conditions according to the LST-EN-13201-3 standard. Investigation of the electrical parameters of the LEDs and LED based systems, such as power efficiency, power factor, higher order harmonic distortion, efficiency of dimming algorithms (pulse width modulation, frequency modulation, constant current, etc.).
Measurements and evaluation of the thermal parameters of LEDs and LED based systems, such as junction temperature (including remote measurements), thermal resistance, and thermal relaxation constants. Investigation of sophisticated systems using high resolution thermovison.

Purpose
Services allow for the qualitative and quantitative assessment of light sources and systems, as well as comparison of different products and/or optimization of manufacture or design processes.

Field of application, use
Light sources and systems. Assessment of illumination project implementation for indoor and outdoor applications

Characteristics, technical information
Radiant and luminous flux, angular diagram, wall-plug efficiency and luminous efficacy, colour rendition properties, spectral power distribution, electrical power, power factor, LED junction temperature, thermal resistance, parameters of optical and electrical components and power supplies.

Development level
Laboratory level

Possible, required cooperation forms
- Search for potential customers
- Long term collaboration agreements
- Implementation of joint technology development projects

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Measurement of Spatial Distribution of Photoluminescence Parameters

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Keywords
Photoluminescence, spatial distribution, semiconductors, semiconductor structures

Description of service, product, technology
Measurement of spatial distribution of photoluminescence parameters (intensity, peak position, band width) using confocal and scanning near-field optical (SNOM) microscopy. Spatial resolutions (depends on emission wavelength) are approximately 200 nm (in-plane) and 650 nm (axial). A CW laser diode emitting at 405 nm is used for photoluminescence excitation. It determines the short-wavelength limit of the spectral range. Correlation between the photolu-

minescence parameters can be calculated, and surface topography with spatial resolution of 10 nm can be mapped using atomic force microscopy (AFM).

Purpose
To study homogeneity of semiconductors and semiconductor structures and carrier dynamics with submicron spatial resolution

Field of application, use
Semiconductor industry

Characteristics, technical information
The equipment consists of multi-modular microscopy system *WITec Alpha 300* capable of operation in confocal, scanning near-field optical (SNOM), and atomic force microscopy (AFM) modes. Photoluminescence is recorded using spectrometer *UHTS 300* coupled with CCD camera or photomultiplier *Hamamatsu H8259-01*. High spatial resolution is ensured by *NIKON* objective of large numerical aperture (NA=0.9).

Development level
Measurements are provided with detailed data analysis and interpretation of the results

Possible, required cooperation forms
Services, joint projects

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Photophysical Characterization of Organic Materials and Devices

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Keywords
Fluorescence, spectroscopy, quantum yield, diffusion, lifetime

Description of service, product, technology
- Absorption, fluorescence and phosphorescence spectra measurements of organic thin films and solutions;

- Determination of fluorescence and phosphorescence quantum yield by integrating sphere and comparative methods;
- Fluorescence lifetime measurements by using time correlated single photon counting method or streak camera;
- Determination of colour coordinates;
- Determination of radiative and nonradioactive decay time constants;
- Determination of singlet and triplet energy levels;
- Determination of optical properties of materials in a temperature range of 8-300 K;
- Determination of ionization potential or HOMO energy level by cyclic voltammetry;
- Determination of compound concentration at the onset of fluorescence concentration quenching;
- Determination of exciton diffusion coefficient and diffusion length in amorphous films;
- Determination of amplified spontaneous emission threshold by thin stripe method;
- Determination of photostability;
- Determination of size of colloidal nanoparticles (in a range of 0.6-5000 nm) by dynamic light scattering technique;
- Evaluation of reflection spectra of strongly scattering samples;
- Evaluation of film-forming properties and morphology by using optical fluorescence microscopy.

Purpose

Determination of material parameters for higher value-added in the market and for application in organic electronic devices

Field of application, use

Industry of organic electronic materials and devices (organic lightemitting diodes, organic solar cells, sensors, etc.)

Development level

Laboratory level

Patents

2009-12-11 LR patent (LT 2009 096 A). P. Adomėnas, V. Gaidelis, V. Getautis, J. V. Gražulevičius, S. Juršėnas, K. Kazlauskas, T. Malinauskas, R. Rinkūnas, J. Sidaravičius, "Iridium Organic Complexes, Method of Their Manufacturing and Organic Electroluminescent Device"

Possible, required cooperation forms
Services, joint projects

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Epitaxy of Group III-Nitride Semiconductor Structures by MOCVD Method

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Keywords
III-nitrides, MOCVD, epilayer, quantum well, multi-layered structures, optoelectronic devices, high-power electronic devices, SEM

Description of service, product, technology
- Growth of group III-nitride films (GaN, AlN, InN, AlGaN, InGaN, InAlN, BGaN) by metalorganic chemical varour deposition (MOCVD) on sapphire, Si, SiC, and bulk GaN wafers;
- Growth of structures for optoelectronic devices (light emitting diodes (LED), solar cells, detectors), sensors, high-power electronic devices;
- Surface analysis of the materials with optical microscope and scanning electron microscope (SEM);
- Quality estimation of the grown epilayers by a Hall effect measurement, the device structures by electron beam-induced current (EBIC) measurement;
- Elemental analysis and/or mapping of chemical elements in the material by energy-dispersive X-ray spectroscopy device (EDS).

Purpose
Development and improvement of optoelectronic devices, sensors, high-power electronics

Field of application, use

Industry of high-power electronic and optoelectronic materials/devices (LED, field transistors, solar cells, diodes, different detectors)

Characteristics, technical information

- Unintentionally doped GaN (uGaN), minimal carrier concentration $n_e=10^{16}$ cm^{-3}, electron mobility $\mu_e=250$ cm^2/Vs, growth speed 0.1÷2.5 μm/h, maximum layer thickness up to 15 μm.
- n-type GaN doped with Si, $n_e=10^{16}\div10^{18}$ cm^{-3}, $\mu_{eeee}=150\div250$ cm2/Vs; growth speed 1÷2.5 μm/h.
- p-type GaN doped with Mg, $n_h=10^{16}\div10^{18}$ cm^{-3}, $\mu_{eeee}=5\div10$ cm^2/Vs, growth speed 0.5÷2 μm/h.
- InGaN – In concentration from 1% up to 25%, and from 60% to 99%, min $n_e=10^{17}\div10^{20}$ cm^{-3}, $\mu_{eeee}=100\div230$ cm^2/Vs, mobility value depends on In concentration, growth speed 50÷200 nm/h, InGaN with In concentration from 26% up to 59% under evaluation, possible doping with Si and Mg.
- InN, $n_e=10^{18}\div10^{20}$ cm^{-3}, $\mu_{eeee}=600$ cm^2/Vs, growth speed 10÷100 nm/h.
- AlGaN, Al concentration in alloy from 1% up to 100% (AlN), growth speed 0.05÷1 μm/h, uncracked layers can be grown from 1÷2 nm up to 1 μm.
- AlInN and BGaN under evaluation.
- Wafers: sapphire (thickness 420÷330 μm), Si, SiC, bulk GaN.

Development level

Laboratory level

Possible, required cooperation forms

Services, joint projects

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Geographic Information Expertise, Analysis and Cartographic Modelling

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Keywords
GIS, maps, analysis, web services, cartography

Description of service, product, technology

- System analysis and geodatabase design in various fields where geographic information is or can be used;
- Professional cartographic visualizations;
- Interactive web maps and applications;
- Quality assessment of printed and web maps, consulting;
- Advertising and publicizing on web maps (geomarketing);
- Web maps and applications for crowdsourcing projects;
- Feasibility studies, assessment of costs and benefits, risk analysis in geographic information projects.

Purpose
To demonstrate and implement in various fields possibilities of use of geographic information technologies and maps in management, marketing, planning, informing, training and other decision making activities

Field of application, use
All possible fields where geographic information is or can be used – from land management to literature mapping

Characteristics, technical information
Services, details specified in individual contracts

Development level
Implemented in the market

Possible, required cooperation forms
Services, joint projects

Illustrative material:
www.geoportal.lt; www.cartoiq.com; www.dovidkatz.net

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Geographic and Cartographic Information Modeling, Publishing and Educational Services

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Keywords
GIS, cartography, maps, modeling, education, publishing

Description of service, product, technology

- Geographic and cartographic information, provision of a variety of mathematical and cartographical models using customer data;
- Supply of cartographic material in electronic and analog format;
- Workshops on digital design, publication design, digital data analysis and data presentation techniques for various business areas;
- Tactile maps for visually impaired people.

Purpose

- Training of specialists in various areas of business and educational institutions, which use cartographic and GIS data;
- Additional practical and theoretical sessions, an opportunity to various business establishments and educational (training) institutions to raise the skills of workers;
- Practically, we are able to provide cartographic material for all businesses and educational institutions for advertising and direct needs of purposes.

Field of application, use

- All business and educational activities related to GIS and cartographic information use
- Product development to facilitate the integration of persons with disabilities into society

Characteristics, technical information
Services purpose, scope and content combined in each case

Development level
Tested in the market

Possible, required cooperation forms

Provision of services, joint projects

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Production of Recombinant Selenoproteins

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Keywords
Synthetic biology, protein engineering, selenoproteins, selenocysteine, unnatural amino acids, photo-caged proteins

Description of service, product, technology
Production of recombinant selenoproteins in yeast cells based on incorporation of a genetically encoded photo-caged selenocysteine residue, which can be converted to selenocysteine *in vivo* or *in vitro* by UV illumination.

Purpose
Synthesis of selenoproteins and light-controlled proteins for research and biotechnological applications

Field of application, use
Biotechnology, protein science, biochemistry

Development level
Laboratory level, patents pending

Possible, required cooperation forms
Services, collaboration, joint projects, licensing

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Research, Evaluation and Expertise of Damage, Growing and Exploitation of Slugs, Bivalves and Snails

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Keywords
Monitoring, snails, molluscs, damage, control, biodiversity

Description of service, product, technology

- Slug and snail pests in agriculture damage and control;
- Characteristic features, diseases, growing and exploitation of edible snails;
- The establishment/replacement of protected areas of the EU;
- Identification of land and water mollusc species;
- Invasive species.

Purpose
Research and expert opinion of molluscs growing and regulation of abundance, evaluation of damage made by molluscs: consultations for businessman, farmers and others.

Field of application, use

- Agriculture: ecological horticulture
- Snail industry
- Forest industry
- Urban construction and road-building sector

Development level
Laboratory level, implemented in the market

Possible, required cooperation forms
Consultation, services, joint projects

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Educational Tour or Lecture on Zoological or Biological Topics

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Keywords
Zoology, excursion, biology, animals

Description of service, product, technology
Educational tour or lecture on zoological or biological topics

Purpose
Education and entertainment

Field of application, use
Entertainment; Advanced Qualification Programs

Development level
Implemented in the market

Possible, required cooperation forms
Services, joint projects

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Identification of Invertebrates of Forensic, Medical and Economic Importance

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Keywords
Pests, insects, arthropods, forensics

Description of service, product, technology

- Identification of invertebrates;
- Identification of agricultural, household and storehouse pests;
- Arthropods of medical importance;
- Determination of Post Mortem Interval (PMI) by means of insects (forensic entomology).

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TECHNOLOGICAL SCIENCES

Massive Data and Business Data Mining

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Keywords
Databases, data mining spatio-temporal databases, Hadoop, key-value storage

Description of service, product, technology
Management and analytics of massive data sources.
Application oriented research tasks related to:

- Massive data management and applications for data mining;
- Business process evolution to embed data mining process;
- Heterogeneous and distributed databases;
- Geographical and spatio-temporal databases and application in mobile apps scenarios.

Purpose
Massive data management, spatio-temporal applications

Development level
Prototype level

Possible, required cooperation forms
Joint projects, technology transfer, services

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Data Mining

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Keywords
Data mining

Description of service, product, technology
Service – extracting knowledge from large amounts of data

Purpose
To increase effectiveness and profitability of companies

Field of application, use
For companies that generate large amounts of data

Development level
Prototype level

Possible, required cooperation forms
Services

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Analysis of Innovation Processes. Process Capability Assessment and Improvement in Companies from IT and Other Industries

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Keywords
Innovations, technology transfer, knowledge commercialization, process capability assessment

Description of service, product, technology
Service – domain independent enterprise-wide process capability assessment applying Enterprise SPICE model and innovation, knowledge and technology transfer process capability assessment applying innoSPICE™ model. We assess processes using 0-5 score and make conclusions/recommendations for improvement of process results predictability.

Purpose
For cost saving and quality improvement in large, middle size and small companies

Field of application, use
Mainly for large companies and research institutions.
Service can be applied for small and middle size companies.

Development level
Service is ready for delivery

Possible, required cooperation forms
Services

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Robot Motion Manipulation

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Keywords
Manipulation of robot motions

Description of service, product, technology
Service – programming of robot motions. The robot recognises objects and is capable to do simple mechanical motions with them.

Purpose
For middle and large size companies from robotics industry

Field of application, use
For middle and large size companies from robotics industry

Development level
Service is ready for implementation

Possible, required cooperation forms
Services, joint projects

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Multiagentsystems for Analysis of Social Phenomena

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Keywords
Multiagent systems for analysis of financial and social phenomena

Description of service, product, technology
Models of social simulators and portfolio design

Purpose
Companies involved in development and sales of simulators

Field of application, use
Companies involved in development and sales of simulators

Development level
Implementation level

Possible, required cooperation forms
Services

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Optimization and High Performance Computing

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Keywords
Optimization, global optimization, high performance computing

Description of service, product, technology

- Optimization of technological processes, engineering constructions, etc.
- Implementation of optimization, multidimensional data analysis and visualization, high performance computing. Parallelization of algorithms.

Purpose
Efficient use of resources

Field of application, use
Industry, energy, construction, transport

Characteristics, technical information
Application programs implemented in C/C++

Development level
Laboratory level

Possible, required cooperation forms
Joint projects, services

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Speech Recognition

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Keywords
Speech, recognition, processing

Description of service, product, technology
The laboratory version of isolated word recognizer is created. The engine is used for research and testing.

Purpose
The speech recognition engine can be used for limited vocabulary voice control of a computer and other devices, keyword detection in speech.

Field of application, use
Information technologies, software

Characteristics, technical information
The engine is speaker-dependent, the maximal size of vocabulary is 1000 words.

Development level
Laboratory version of speech recognition engine

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Missing Data Restoration Algorithm and Program

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Keywords
Missing data, restoration, parameter estimation

Description of service, product, technology
Algorithm and program can restore missing data in a noisy environment. The algorithm is implemented in two consecutive steps. In the first step, the

forward-backward approach is used to estimate the parameters of the given neighboring segments, while in the second step, the extrapolation technique for the given segments is applied to restore the samples of the missing segment.

Purpose
Algorithm and program can be used to restore missing data of technological processes or signals.

Field of application, use
Algorithm and program may be applied in the technological processes or signal measurements in case when parts of the data are missing.

Characteristics, technical information
Depending on the noise level, the algorithm may restore up to 80 missing samples.

Development level
Laboratory level, algorithm and computer program

Possible, required cooperation forms
Services, joint projects

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Control of Dynamical Systems using Observations, Systems Identification

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Keywords
Observations, systems and signals, identification, control

Description of service, product, technology
Actuators are used in industrial applications due to their ability to transform electrical signals into high forces or torques. Actuators present some undesirable hard nonlinearities (HNs) that are acting on the performance of ordinary controllers, and the control quality. Static HNs as a saturation and a deadzone

damage the observed signal measurements on the output of the control system, cutting-off their amplitudes. Backlash and hysteresis represent the dynamic HNs. They change the measurements according to respective nonlinear expressions. The nonlinearities of both types damage the measurements of controlled signal by nonlinear distortions, and thus, are acting on the control quality of a self-tuning object. The aim is for a controlled object to create a simple and efficient nonlinear distortions compensation approach and corresponding algorithms. The approaches for the compensation of distorted signal measurements by distinct HNs will be proposed. In order to obtain reliable control results, the project will be realized for the open-loop as well as closed-loop self-tuning systems. Computer simulation results for distinct HNs in a noisy frame will be presented.

Purpose

To increase the efficiency of control of dynamical systems using input-output observations

Field of application, use

Where digital signals processing approaches are used for observed dynamical systems

Development level

Laboratory level

Possible, required cooperation forms

Joint projects

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Software Localization (Lithuanization)

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Keywords
Localization, Lithuanization, software, technical translation

Description of service, product, technology

- Tentative expertize of an internationalization level of localizable software. Customer and software developers are informed about the internationalization errors detected to fix the errors in time;
- All texts available to display on a computer screen (e.g., dialog boxes, help, messages) are translated;
- Automated translation tools (e.g., translation memory);
- The terms are taken from the dictionaries, approved by the State Commission of Lithuanian Language. New terms, not available in existing dictionaries, are agreed with the State Commission of the Lithuanian Language;
- All the translated texts are edited;
- Software cultural elements are localized;
- Overall testing of localized software. Functional equivalency with those of the original software is tested. Non-recurring agreements are suggested to support existing software release's localization or long-term agreements to localize new software releases. This ensures software localization at the time of the new release of the original software.

Purpose
To raise efficiency and comfort levels of work with a computer, lower the training costs of the employees, to allow employees, independently of their knowledge of the English language, use the Lithuanian language

Field of application, use
Any field, where computers are used

Possible, required cooperation forms
Product release and support upon the agreement

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Computer Literacy, IT Management, Programming and Software Localization Courses, Training

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Keywords
Programming teaching, IT management, localization, Lithuanization, education

Description of service, product, technology
Computer literacy courses:
- Text processing (Microsoft Word)
- Spreadsheets (Microsoft Excel)
- Databases (Microsoft Access)
- Presentations (Microsoft Power Point)
- European computer driving license training (ECDL, ECDL Start)

IT Management courses:
- CompTIA Project+
- ITIL Foundation
- PRINCE2 Foundation
- Project Management Professional (PMP)
- PRINCE2 Practitioner Upgrade
- CompTIA Network+
- CompTIA Server+
- CompTIA A+
- CompTIA Cloud Essentials
- CompTIA Security+

Programming courses:
- Basic programming, algorithms
- Programming Pascal
- Programming C and C++
- Programming Java
- Programming VBasic
- Programming Python
- Programming C#
- Introduction to .NET technology
- Databases

Software localization courses

Purpose
Companies personnel, professionals training, teaching

Field of application, use
IT, telecom companies; production, trade companies, educational institutions

Characteristics, technical information
60 hours of the introduction course, 144 hours of the basic course

Development level
Laboratory level

Possible, required cooperation forms
Services, join project

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Data Mining in Medicine, Technologies and Case-Studies

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Keywords
Multidimensional data, data mining, visualization, artificial neural networks, optimization, parallel computing in data mining

Description of service, product, technology
- Data mining in medicine, technologies and case-studies, via solving the solved classification, clustering, pattern, similarity and relations discovery, visualization, optimization problems. The data of various natures (static and dynamic) are investigated.
- Product: algorithms of data mining and their implementation tools, adapted to the solving of a specific problem.

Purpose
Development of knowledge bases for decision making and prediction, based on the results obtained using data mining algorithms

Field of application, use
The service could be applied in all areas of activities, where the analysis of collected multidimensional data is required (medical, financial institutions and others).

Development level
Laboratory level, prototype

Possible, required cooperation forms
Services, joint projects

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Development of the Recommendation Systems

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Keywords
Recommendation systems, E-commerce

Description of service, product, technology
Product: recommendation system, which predicts the most suitable products or services on the basis of the user's preferences and constraints.

Purpose
Applications of recommendation systems for E-commerce

Field of application, use
- Entertainment: recommendations for movies, music, IPTV, etc.
- Content: personalized newspapers, recommendation for documents, recommendations of Web pages, e-learning applications, and e-mail filters
- E-commerce: recommendations for consumers of products to buy, such as books, cameras, PCs, etc.
- Service: recommendations for travel services, experts for consultation, houses to rent, or matchmaking services

Development level
Prototype

Possible, required cooperation forms
Services, joint projects

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The Development and Adjustment of Manufacturing Processes' Scheduling Algorithms

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Keywords
Scheduling of manufacturing processes, optimization, rescheduling reacting to the casual business events

Description of service, product, technology
The analysis and formal description of manufacturing processes, manufacturing environment as well as business aims and priorities. The development or adjustment of manufacturing processes' scheduling algorithms with regard to the approach of the manufacturing (make to order production, design to order production, mass production, batch production, etc.), with regard to the production and business environment (job shop, flow shop, flexible production lines, employment of alternative work places or subcontractors, etc.), as well as with regard to the business priorities and aims. The scheduling algorithms use information about the actual production situation and historical data as well as information about decision maker's priorities and constraints taken from the data bases of the Enterprise Resource Planning (ERP) system or from special interface. The preventive scheduling and rescheduling algorithms make schedules resistant to the casual business events (the broken machine or tool, missing of workers or materials, etc.). Depending on scheduling aims and the desirable time span for scheduling, various algorithms are implemented – heuristic, genetic, mixed integer mathematical programing, etc.

Purpose
It is proposed to sell the service that consists of the production process analysis and the development of scheduling algorithms suited for the production under consideration. The aim of the service is assisting in the development or improvement of the Enterprise Resource Planning system.

Field of application, use
The production of discrete products

Characteristics, technical information
The results of the production process analysis and of the development of scheduling algorithms will be presented in the report.

Development level
Laboratory level, prototype under development

Possible, required cooperation forms
Services, joint projects

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Solving the Multi-Objective Optimization Problems

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Keywords
Multi-objective optimization, decision making, decision support systems

Description of service, product, technology
Multi-objective optimization in various fields, when it is necessary to optimize the same objectives simultaneously, and the objectives are contradictory, i.e., it is impossible to improve any objectives without deteriorating at least one of the other objectives. The methods for solving the multi-objective optimization problems as well as the decision support systems assisting for a decision maker are necessary.
Proposed service: solving the multi-objective optimization problems.
Product: multi-objective optimization algorithms, decision support system.

Purpose
The developed algorithms and the decision support systems are used for solving multi-objective optimization problems.

Field of application, use
Fields of application cover multi-objective optimization problems in business, industry, financial industry, etc.

Development level
Laboratory level

Possible, required cooperation forms
Services, joint projects

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Digital Image Analysis and Processing, Image Analysis Systems, Decision Support as Well as Diagnostic Systems

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Keywords
Image analysis, segmentation, state detection, classification, decision support strategies

Description of service, product, technology
Design and develop image analysis systems that are able to facilitate the user job. Such systems should be used as an auxiliary tool for the implementation of decision support functionality.

Services available:
- Creation and development of image objects segmentation and parameterization methods;
- Development of automated parameterization tools;

- Knowledge discovery methods development from parameterized data sets;
- Information interface development for automated investigative state prediction;
- Fractal, synergy, complexity, chaos parameters estimation from various synthetic or physiological data;
- Classification or clusterization methods application for the class or clusters detection.

Purpose
Applications in computer vision problems, research

Field of application, use
Medical institutions, video surveillance, security

Development level
Prototype

Possible, required cooperation forms
Services, joint projects, prototype

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Bioinformatics Data Analysis Services

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Keywords
Bioinformatics, microarray data analysis, epigenetics, data mining, machine learning

Description of service, product, technology
Microarray and next generation sequencing data mining from genetics and epigenetics experiments. Services range from traditional statistical analysis to application of novel data mining and machine learning techniques.

Purpose
The services for biomedical R&D labs developing novel treatment techniques as well as by research institutions performing genetic studies

Field of application, use
Biomedicine

Development level
Laboratory level, prototype

Possible, required cooperation forms
Services, investments

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Services of Optimization and Applications

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Keywords
Optimization, global, stochastic applications, virtual financial markets, distance graduate studies

Description of service, product, technology
New global and stochastic optimization methods, new models of financial market, new engineering applications.

Purpose
Applications in modeling financial markets, distance graduate studies of operation research and optimization of engineering problems

Field of application, use
- Optimizing engineering and economical systems
- Testing different investment strategies using historical and virtual data
- Distance graduate studies in operations research

Characteristics, technical information
Services are implemented as Java applets and servlets and are available on the net

Development level
Most of services are at a laboratory level; a system for graduate studies in operations research was tested during the period of 2000-2012 in KTU, VGTU and VU IMI.

Possible, required cooperation forms
Possible cooperation with asset managers and universities in the form of services, technology transfer and joint projects

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Virtual Server Hosting and Calculation Service

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Keywords
Servers, calculations

Description of service, product, technology
- Virtual server hosting service (3-4 units, configuration of server according to customers' requirements);
- Renting for resource intensive calculations.

Characteristics, technical information
Linux, 16 CPU, 256 GB RAM

Development level
Tested

Possible, required cooperation forms
Services

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High Performance Computing Application

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Keywords
HPC, High Performance Computing, cloud computing, massive data, analytical algorithms

Description of service, product, technology

- **Creation of data analysis models in HPC environment**. Initiation of data analysis process; data preparation for data analysis; development and experimental evaluation of algorithms suitable for data analysis (algorithms of data filtering, discovery of outliers, classification, clustering, and association rule mining and time series. Used programs: R, Weka, Qctave and others).
- **Optimization and creation of analytical algorithms in the HPC environment of business process data visualization and analysis.** Visual analysis of generated data for business processes applying common visualization methodologies of data analysis and processes in the HPC environment. Structural, visual and descriptive analysis considering data multidimensionality and complexity of the process in applied business process environment (used programs: R, Weka, Octave, Gaussian and Gamess, and others).
- **Creation of massive data management and analysis algorithms using cloud computing.** Creation, experimental usage and evaluation of "Big data" or even massive data databases in the HPC and cloud computing environments (used programs: NoSQL, Hadoop, BigTable and others).
- **Development of management and analytical algorithms of sensors and stream data in the HPC and cloud computing**. Implementation of algorithms of constantly evolving and regularly updated data models and similarity of time series. Application of essential temporal properties in research and algorithms for sensorial and geographic data (used programs: PostgreSQL, TPR indexes, streaming DB and others).
- **Relocation and data analysis of business processes in cloud computing**. Customization and experimental evaluation of Business Systems for transition to cloud computing environments. Consulting and installa-

tion of commercial or open-source cloud computing environment (used programs: S3, OpenNebula, OpenStack, VMware (ESXi), Hyper-V, Xen-Server, KVM, OpenVZ, VirtualBox and others).

- **Calculations and creation of algorithms for video and audio processing**. Extraction of properties for conventional (photos and video) and medical images. The development of efficient algorithms for content image search and massive processing (used programs: FFTW, WT, POV-Ray and others).

Purpose

Rendering, massive data analysis in the HPC environment for business or research

Field of application, use

Biomedical and medical organizations, research centers, data storage and analysis organizations (this is a priority field, but it can be extended)

Characteristics, technical information

Supercomputer:

- 1920 cores
- 3,6 TB RAM
- 620 TB data storage
- Peak performance 25 TFLOPS

Development level

Implemented in the market

Possible, required cooperation forms

Services, technology transfer, joint project

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The Creation of a Website in Several Languages (Lithuanian, English, German, Russian) for a Company or Organization

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Keywords
Programming, testing, text preparation, translation, editing

Description of service, product, technology

- Analysis of a specific area for which the website will be arranged and the specifics of company's work, its production and services;
- Preparation of a project and customer requirements specification;
- Programming and testing;
- Sociolinguistic analysis of the target audience's linguistic requirements;
- Analysis of the text in Lithuanian, the research on cultural aspects and preparation for a website;
- Identification of realias and the selection of equivalents;
- Translation into a foreign language (English, German, Russian) by applying a translation strategy which guarantees text adequacy and is oriented towards the target audience.

Purpose
Creation of a website in several languages for a company or organization, which would correspond to the company's needs and nature of work

Field of application, use
Various companies, organizations

Level of completion
Ready to execute

Possible, required cooperation forms
Services

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HUMANITIES

Archaeological Research (Destructive and Non-Destructive) in the Territory of Archaeological Objects before the Earthworks

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Keywords
Archaeological excavations, archaeological research, heritage

Description of service, product, technology
Archaeological excavations in the territories of archaeological objects in accordance with the heritage sector legislation requirements. The character of cultural layer is identified, archeological excavation of cultural layer is carried out, archaeological structures and finds are identified, the primary analysis of finds and relevant samples for the future research are taken. Reports on the research results for the contracting authority and the relevant recommendations for the Department of Cultural Heritage concerning the territory under excavation are prepared.

Purpose
Implications on archaeological research are compulsory in order to develop infrastructure and building projects in the territories of archaeological heritage and its vicinity.

Field of application, use
Enterprises developing building and infrastructure projects

Characteristics, technical information
Research is conducted according to the relevant legislation and regulations for conducting of archaeological heritage research (PTR 2.13.01:2011, decree of the Minister of Culture No ĮV-538, 2011-08-16).

Possible, required cooperation forms
Services of archaeological research

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Parallel English-Lithuanian and French-Lithuanian Corpora of Fiction

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Keywords
Corpus linguistics, language technology, parallel corpus, linguistic expertise

Description of service, product, technology
The size of the English-Lithuanian and French-Lithuanian Corpora of Fiction is about 8 million words (4 million words each). They are bidirectional, synchronic, non-annotated. It could be applied for linguistic analysis and development of language technologies, automatic translations.

Purpose
Language teaching, lexicographic and translation practice: CAT (Computer Aided Translation); linguistic research: contrastive studies, linguistic expertise in legal problems

Field of application, use
Educational institutions, translation agencies, application of linguistic expertise to legal problems

Characteristics, technical information
The Parallel English-Lithuanian and French-Lithuanian Corpora of Fiction are bidirectional, synchronic, non-annotated (about 4 million words each).

Development level
Laboratory level

Possible, required cooperation forms
Services: compilation of mono-/bi-/multi-lingual corpora, linguistic expertise
Joint projects: linguistic research

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Audits of Translations, Translators' Selection, Tailor-made Courses of Translation and Terminology, Translator and Interpreter Training

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Keywords
Audit of translations, expert opinion, linguistic expertise, selection of translators, translation analysis, terminology

Description of service, product, technology

- High level professional translation, interpreting and terminology, development of tests and methodology for translation assessment;
- Audits of translations, admission test procedures for translator positions and provision of consultations on issues of translation and terminology;
- Tailor-made courses and seminars on translation and terminology.

Languages: Lithuanian, English, German, French, Italian and Russian.

Purpose
The services can be used to enhance translation qualifications of client's employees, to conduct translator selection tests or provide a qualified opinion about translations, most often in legal disputes.

Field of application, use
All areas which may be in need for respective services

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The English Language in Academic Context

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Keywords
Spoken (lectures, discussions, meetings, conferences) and written (scientific article writing) communication in academic environment

Description of service, product, technology

The 40-academic-hour module is designed for university teachers to master their linguistic and didactic skills that would enable them to prepare high quality lectures in English. The aim of the module is to introduce the university teachers to some aspects of didactics and the whole range of other techniques necessary for preparing and delivering lectures in English either at Vilnius University or foreign universities. The module also aims at helping university teachers to develop and master their linguistic skills and abilities for effective teaching and communication in international academic environment while sharing information, opinions, experience.

The participants will be able to prepare visual aids in an appropriate way and use them effectively during lectures, seminars or while delivering presentations at conferences. From the linguistic perspective, the Module participants will be able to apply relevant linguistic means, necessary functional linguistic or grammar structures for their communication in intercultural professional academic settings.

The Module "The English Language in Academic Context" is comprised of the following topics:

- The language of academic communication (discussions, meetings, conferences);
- On organising teaching and learning process in English;
- On methodology of lecture design and delivery;
- The structure of lecture/seminar/conference presentations;
- Spoken and written English: Similarities and differences;
- The strategies of academic writing and reading;
- Integrating of watching, listening, writing and speaking abilities;
- Visuals for presenting information.

Teaching methods

Student-orientated contemporary teaching and learning methods are applied: group and pair work in discussions and case study analysis. Language lessons are based upon consolidation of linguistic material studied, mastering of communicative skills, group and individual task performance, lecture design, delivery and feedback. Analysis of a written scientific paper. Recommendations on lecture delivery mostly cited in UK methodology on lecture delivery are provided. Module participants' feedback is taken into consideration. Module themes and content can be designed upon the learners' needs.

Purpose

The aim of the module is to introduce the university teachers to some aspects of didactics and the whole range of other techniques necessary for preparing and delivering lectures in English.

Field of application, use

The Module is meant for university and college teachers willing to deliver their lectures in English

Characteristics, technical information

The 40-academic-hour module

Development level

It has been offered since 2008

Possible, required cooperation forms

The course is organised for the groups of 10 people.

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Issues of Contemporary Education

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Keywords
Foreign language teachers, contemporary education, values, teaching/learning process, value internalisation, teaching/learning methods

Description of service, product, technology
Having finished this course, the learners will acquire theoretical knowledge about changes of contemporary educational paradigms, the importance of the development of learners' value attitudes in competence based teaching/learning process, the crisis of values in the context of change of modern society, the importance of values and their manifestation in various personal relationships. Course participants will deepen their theoretical knowledge about the different classifications of values (from the point of view of deontology, value theory and the theory of the consequences) and get acquainted with the definition, types and mechanisms of the internalisation of values and will be able to apply the knowledge gained in the practical education.

The course will focus on the following topics:

- Paradigms of contemporary education;
- The change of values, the crisis of values and its origins;
- Values – the foundation of educational content;
- Values and the significance of their manifestation in intra- and inter-personal relationships;
- Classifications of values. Absolutism and relativism. Universal values;
- Value internalisation mechanisms;
- The integrity of training and educational functions in educational reality;
- The importance of the development of value attitudes in competence based teaching/learning process;
- The possibilities of teaching/learning process for the development of learners' value attitudes.

Teaching mode and methods
Interactive lectures and seminars. Contemporary learner-centered teaching and learning methods are applied: cooperation, discussions, case studies, working in groups and pairs.

Purpose
The Module is aimed at helping foreign language teachers to develop their general competences, provide theoretical knowledge about the development of students' value attitudes and its importance in the context of educational paradigm change of modern society, develop course participants' ability to apply the acquired knowledge into practice, integrating values into the curriculum of foreign language teaching, as well as to apply properly chosen teaching/learning methods in the reality of educational practice.

Field of application, use
Foreign language teachers of gymnasiums and schools of secondary education

Characteristics, technical information
A 32-academic-hour module

Development level
Ready for implementation

Possible, required cooperation forms
The course is organised for the groups of 10 people.

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Foreign Language (English, German, French, Spanish) Didactics

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Keywords
Didactic competences, intercultural competence, foreign language teaching/learning methods, teaching/learning process

Description of service, product, technology
The learners will acquire knowledge about foreign language teaching/learning theories and methods, effective development of learners' linguistic, communi-

cative and intercultural competences and will be able to apply it in their teaching practice. They will be able to analyse, assess and apply different methods of teaching English, to compare and relate cultural aspects of their own culture and the culture of the target language, to analyse, evaluate and adapt different teaching materials available in a creative way, as well as to define their own style of teaching and match it to the variety of the learning styles of the learners.
The course participants will also be able to apply the strategies of communication in interactions with foreign language speakers, in planning, organising as well as analysing teaching/learning process critically.
The course provides the analysis of the following topics:

- A short overview of the development of foreign language teaching methods and their impact on the English language learning/teaching;
- Linguistic, communicative and intercultural competences;
- Development of four basic language skills (speaking, writing, listening, reading) and their specifics; receptive vs. productive language skills;
- Creative writing, academic writing;
- Different ways of introducing the new language;
- The role of grammar in language teaching;
- Vocabulary teaching;
- Different ways of introducing, practicing and revising grammar and vocabulary;
- Error classification and correction;
- Learner training;
- Different lesson types; lesson planning;
- Selecting, adapting and creating learning materials.

Purpose

The aim of the course is to help develop as well as update foreign language teachers' (English, German, French, Spanish) didactic competence, to provide them with the knowledge of the underlying foreign language teaching/learning theories and different contemporary student-centered foreign language teaching methods and develop their skills to apply the obtained knowledge in order to evaluate, select and use these methods appropriately in organising the teaching/learning process.

Field of application

Qualification of foreign language teachers of secondary schools and gymnasiums

Characteristics, technical information

A 40 academic-hour module

Development level
Ready for implementation

Possible, required cooperation forms
The course is organised for the groups of 10 people.

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English/German/French/Italian/Spanish/ Russian A1 – C1 Level Teaching/Learning Modules

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Keywords
English/German/French/Italian/Spanish/Russian languages, communicative skills (reading, speaking, writing, listening), linguistic and communicative competences

Description of service, product, technology
A 50 + 50 academic-hour-length course plus self-study hours is meant for mastering the main communicative skills under the basis of General English/ German/French/Italian/Spanish/Russian, developing the skills of reading, writing, speaking and listening oriented to A1 – C1 levels (according to "Common European Framework of Reference for Languages"), intercultural communication and cooperation.
During the course, active teaching and learning methods, such as brain-storming, group discussion, mind-maps, role-play, case study, interactive learning and traditional methods, such as demonstration of audio and video material, illustration, narration, problem solving tasks, collecting information from scientific sources, are applied. Attention is paid to the preparation for the lessons and individual task performance.

Purpose
The Module is meant for everybody targeting at developing and mastering their skills of listening, reading, writing and speaking at various levels of Italian language proficiency.

Field of application
Students of Upper-Secondary schools or gymnasiums, school-leavers, university students seeking to learn a second/third foreign language, civil servants, public at large

Characteristics, technical information
A 50 + 50 academic-hour-length course for each level of language proficiency

Development level
It has been offered since 2008

Possible, required cooperation forms
The course is organised for the groups of 10 people.

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Preparatory Course for IELTS Exam

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Keywords
English language, IELTS examination, development of linguistic communicative skills (listening, reading, writing and speaking)

Description of service, product, technology
A 50-academic-hour-length course encompasses practical tasks to master the following skills:

- Listening: dealing with recorded passages focused on social survival need; recorded passages related to educational and training sections;
- Reading: analysing "social survival" texts relevant to basic linguistic survival in English with tasks mainly about retrieving and providing general factual information; analysing "workplace survival" texts

focusing on work-related contexts presenting a more complex language; analysing texts meant for "general reading" that involve more extended prose with a more complex structure;

- Speaking: analysing typical task types (introduction and interview; individual long turn talk based on written input; participation in discussion based on verbal questions;) mastering students' fluency and coherence of the speech, its lexical resource, grammatical range and accuracy, and pronunciation;
- Writing: dealing with the ways of describing, summarising and explaining the information presented in a graph, table, chart or diagram; organising, presenting, comparing data; describing the stages of a process or procedure, describing an object or event, or a sequence of events; explaining how something works; opinion essays; for and against essays; solutions to problem solving essays. Ways of presenting a solution to a problem, justifying an opinion, comparing and contrasting evidence, opinions and implications, evaluating and challenging ideas.

Purpose

The Module is meant for everybody targeting at taking IELTS examination and willing to master their listening, reading, writing and speaking skills.
The Module introduces IELTS applicants to the requirements and structure of the IELTS examination test and focuses on the analysis of the tasks related to the development of the applicants "Listening, Reading, Writing and Speaking skills under the basis of Academic English".

Field of application

Students of Upper-Secondary schools or gymnasiums, school-leavers, university students seeking to be awarded with the Certificate of the internationally acknowledged examination, relating their future studies at the universities and colleges in the English speaking countries

Characteristics, technical information

A 50 academic-hour-length course

Development level

It has been offered since 2008

Possible, required cooperation forms

The course is organised for the groups of 10 people.

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Content and Language Integrated Learning (CLIL)

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Keywords
Subject teaching, foreign language, development of teachers' didactic and target language (foreign language) communicative competences

Description of service, product, technology

240 hour-length module is meant for Secondary school subject teacher education which encompasses the development of the following teachers' competences:

- CLIL didactic competences under the basis of the following topics (50 hours):
  - Definition of CLIL, its theoretical background: origin and the main developmental stages in the history of the approach. Different concepts, contexts and driving forces. Challenges and advantages;
  - Basic methodological principles of CLIL. Task types to develop various linguistic skills. The ways to foster vocabulary expansion;
  - Language and Subject ratio. Tasks encouraging reasoning. Integration of ITC; tasks based on project work. Lesson and module design. Criteria for module selection;
  - Practical planning of tasks, lessons and modules. Design of cognitively and linguistically appropriate learning materials. Experimental lessons. The outline of the CLIL Lesson plan;
  - CLIL assessment methods, test formats. Language Portfolio application to the students' progress. Language role in tests;
- Linguistic Communicative competences: development of target language (foreign: English, German, French) communicative competences, developing the specific vocabulary of the subject taught (150 hours);
- Application of the designed CLIL lessons to practice (40 hours): CLIL lesson delivery at school; colleagues' lesson observation, comments on feedback.

Purpose

The Module introduces the teachers of Secondary schools to the concept of CLIL which encompasses the subject in foreign language teaching and the possibilities of its practical application in the school environment. It is

also meant for mastering teachers' didactic and linguistic communicative competences of the target (foreign) language (including a specific language).

Field of application
The Module aims at introducing subject teachers to the application of content and foreign language integrated learning approach in the process of General education and Vocational training

Characteristics, technical information
A 240 academic-hour-length module:
- CLIL didactic competences (50 hours)
- Linguistic Communicative competences (150 hours)

Application of the designed CLIL lessons to practice (40 hours)

Possible, required cooperation forms
The course is organised for the groups of 10 people.

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Translation of Specialised Texts from/to Lithuanian, English, German and Russian

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Faculty/Institute, Department, Laboratory
Kaunas Faculty of Humanities, Department of Foreign languages

Keywords
Translation, specialised texts

Description of service, product, technology
Translation of scientific texts (monographs, dissertations, MA thesis, BA thesis, articles and their summaries), specialised texts (manuals, contracts, other documents) from/to Lithuanian, English, German and Russian

Purpose
Providing information in Lithuanian, English, German and Russian into the market

Field of application, use
In all fields

Possible, required cooperation forms
Services

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Linguistics Interpretations

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Keywords
Linguistics, pragmatics, semantics

Description of service, product, technology
Linguistics interpretations could be applied for linguistic analysis and development of language technologies.

Purpose
Linguistic research: contrastive studies, linguistic expertise in legal problems

Field of application, use
Application of linguistic expertise to legal problems

Level of completion
Laboratory level

Possible, required cooperation forms
Services: compilation of linguistic expertise
Joint project: linguistic research

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SOCIAL SCIENCES

Expert, Research and Consultancy Services

Faculty/Institute, Department, Laboratory
Faculty of Communication

Keywords
Consultancy, communication and information

Description of service, product or technology
Development of standards and consultancy for both business and public sectors in the following thematic fields: document management, efficiency of information services, management of heritage collections, heritage communication, museology, digitalisation of cultural heritage, valuation of tangible and intangible heritage objects, standardisation of information and documentation, cultural heritage preservation and digital geographical information, media management, media and journalism research, efficiency of knowledge economy, knowledge culture in organisations, intellectual property management, open access implementation, cinema research, monitoring and assessment of culture and creative industries, building of information competences, strategic management of communication activity, monitoring and assessment of social responsibility and sustainable development, development and implementation of information and communication policies, monitoring and analysis of the publishing market, social media application, and research of contemporary visual media.

Purpose
Strategic management, quality management, efficiency of application of information and communication technology

Field of application, use
According to the Classification of Economic Activities:

- Publishing
- Motion picture, video and television broadcast production, sound recording and publishing of sound recordings
- Television and radio production and broadcasting
- Information services
- Activities of holding companies, management consultancy activities
- Advertising and market research
- Other professional, research and technical activities
- Creative, artistic and entertainment organization activities
- Library, archives, museums and other cultural activities

Possible, required cooperation forms
Provision of services, joint projects

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Services of Continuing Training

Faculty/Institute, Department, Laboratory
Faculty of Communication

Keywords
Continuing training, life-long learning, information management, heritage communication

Description of service, product or technology
Services of continuing training including improvement of qualification and life-long learning for professionals working in both business and public sectors in thematic fields and branches of research and studies implemented by the Faculty: archival science, library science and information, information services, public communication, culture information and communication, publishing, heritage communication, public relations, business information management, knowledge management and leadership, journalism.

Purpose
Qualification raising, acquisition of additional qualifications

Field of application, use
According to the Classification of Economic Activities:
- Activities of information services
- Advertising and market research
- Creative, artistic and entertainment organization activities
- Library, archives, museums and other cultural activities
- Other professional, research and technical activities

Characteristics, technical data
Training programmes are organised in modules, by way of sessions using credit system as units of accounting. On completion, all participants are awarded

certificates issued by Vilnius University. Credits awarded on completion of some programmes of continuing education may be recognised in studies of Bachelor degree study programmes at the Faculty of Communication.

Possible, required collaboration forms

Provision of services, joint projects

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Expert Consultations on Finance and Investment Issues

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Faculty/Institute, Department, Laboratory
Faculty of Economics, Department of Finances

Keywords
Financial instruments, derivative, bonds, linked bonds, investor risk assessment, investment

Description of service, product, technology
Analysis and expert assessment of new derivative financial instruments, which are offered by finance institutions to non-professional investors.

Purpose
To protect rights of investors

Field of application, use
Administrative Court, disputes and expert opinion on eligibility of new investment tools for non-professional investors

Possible, required cooperation forms
Consultations, joint projects

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Expert Opinion about the Budget Balancing and Tax System

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Faculty/Institute, Department, Laboratory
Faculty of Economics, Department of Finances

Keywords
Lithuanian budget, convergence program, balanced budget, tax system

Description of service, product, technology
Participation and moderation in discussions, expert opinion about the country budget strategy, balancing, etc., and tax system.

Purpose
Implementation of Lithuanian Republic convergence program

Field of application, use
Country economy

Possible, required cooperation forms
Services, joint projects

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Training in Preparation for the Finance Broker Certification Exam

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Faculty of Economics, Department of Finances

Keywords
Training of finance brokers, financial statement, financial ratio

Description of service, product, technology
Training in preparation for the finance broker certification exam includes the following issues:

- Financial statements;
- How to understand financial statements and prepare a cash flow statement;
- Financial ratio and their analysis;
- Examples of test questionnaires, personal tests.

Purpose
Training for bank personnel, insurance managers and brokers, financial analysts, investors

Field of application, use
Banking and insurance sector

Development level
Implemented

Possible, required cooperation forms
Creating and implementing training and professional courses and programs on finance issues

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Formation of Financial and Management Accounting Policy

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Faculty/Institute, Department, Laboratory
Vilnius University, Kaunas Faculty of Humanities, Department of Finance and Accounting

Keywords
Accounting policy

Description of service, product, technology
Formation of financial and management accounting policy

Field of application, use
In all fields

Possible, required cooperation forms
Services

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Sustainable Development Research and Consultancy Services

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Faculty/Institute, Department, Laboratory
Kaunas Faculty of Humanities, Department of Business Economics and Management

Keywords
Sustainable development, modern marketing trends, gender equality

Description of service, product, technology
Applied research and consultancy in the following thematic areas: sustainable development, environmental management and economics, sustainable development issues, including gender equality as well as the issues of gender equality measurement, online advertising, social network advertising, the latest trends in online advertising and techniques, the country's higher education, the image of the organization; modern marketing trends in entrepreneurship development issues: economic, social, demographic, political-legal factors and human resource management.

Purpose
Professional development

Field of application, use
Country economy, management and marketing fields

Level of completion
Consultations are designed to meet the needs of employees from both public and private sectors

Possible, required cooperation forms
Consultations are provided by researchers that have PhD degree in social sciences (economic, management, marketing).

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"How to Become Interculturally Intelligent?" Module of Intercultural Communication for Secondary School Teachers of Foreign Languages

Author
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The Institute of Foreign Languages

Keywords
Foreign language didactics, intercultural communication, development of students' intercultural communicative competence

Description of service, product, technology

32 hour-length module for a Secondary school Foreign Language teacher education. It encompasses a series of training sessions on how to develop students' Intercultural Communicative Competence and embraces the following topics:

- Communication from historical and contemporary perspectives. The intercultural learner and his/her intercultural communicative competence (4 academic hours);
- Do I know who I am? Conceptions and definitions of personal, social and cultural identities (2 academic hours);
- The concept of culture from the anthropological, sociological and humanistic points of view. Cultural patterns and communication (2 academic hours);
- Models explaining culture. E. T. Hall's Cultural Iceberg Model and its varieties. G. Hofstede's The Cultural Onion Model (2 academic hours);
- Cultural patterns and communication: Kluckhohn's and Strodtbeck's Value Orientation Model. E. T. Hall's High and Low Context Cultural Taxonomy (2 academic hours);
- Hofstede's Cultural Taxonomy. R. D. Lewis's Linear-active, Multi-active and Reactive cultures. Cultural dimensions according to H. Triandis (2 academic hours);
- M. J. Bennet's Developmental Model of Intercultural sensitivity. Culture shock. Process of assimilation and acculturation; identification of its stages (2 academic hours);
- Communication and its schools. Verbal communication: language, thought, culture (2 academic hours);
- Cultural identity and its influence on Intercultural Communication (2 academic hours);

- Peculiarities of nonverbal communication: proxemics. Chronemics. Clothing and physical adornments (2 academic hours);
- Nonverbal communication: A. Mehrabian's Communication study: the theory of "3Vs" (2 academic hours);
- The importance of the context and its influence on communication. Physical, perceptual, socio-relational and cultural contexts and their influence on Intercultural Communication (2 academic hours);
- Stereotypes, prejudice and other obstacles towards successful Intercultural Communication (2 academic hours);
- Ethnographic survey (4 academic hours).

Purpose

The Module offers an interdisciplinary approach towards foreign language teaching at Secondary schools. It provides a range of strategies targeting at the development of students' Intercultural Communicative Competence and offers to integrate the basics of subjects, such as Anthropology, Sociology and Arts into the lessons of foreign languages.

Field of application, use

The Module aims at introducing new tendencies in foreign language teaching and developing students' Intercultural Communicative Competence.

Development level

The Module has been implemented since 2012

Possible, required cooperation forms

Services

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Legal Training Services

Authors
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Faculty/Institute, Department, Laboratory
Vilnius University, Faculty of Law Training Center

Keywords
Law, training, seminars, qualification, lectors

Description of service, product, technology
The Training Center organizes seminars, trainings, conferences on various issues of law and the latest legislative changes. The participants benefit from trainings and find the solutions to their problems in legal sphere. Vilnius University Faculty of Law Training Center's:

- **Mission** is to organize and provide universally acknowledged quality legal training services in order to meet the needs of society and state;
- **Vision** is to become the first choice legal training center in the Lithuanian market;
- Values: 1) Mutual respect and trust; 2) High academic competence and professionalism; 3) Leadership.

Purpose
Professional development

Field of application, use
Trainings are designed to meet the needs of employees from both public and private sectors

Characteristics, technical information
Trainings are provided by researchers that have PhD degree in Social Sciences (Law)

Development level
High quality training on topics, such as:

- Tax Law
- Intellectual Property Law
- Tax Disputes
- Contract Law
- Public Procurement
- Environmental Law
- Labour Law
- Administrative Procedure Law
- Company Law

- Family Law
- European Union Law
- Social Security Law
- Human Rights

Possible, required cooperation forms
Training sessions, organization of seminars and discussions, consultations

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Research and Consultancy Services on Law

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Faculty/Institute, Department, Laboratory
Vilnius University, Faculty of Law, Science Research Center

Keywords
Law, applied research, analysis, study, conclusions, proposals, projects, expert activities, consultancy

Description of service, product, technology
The contractual scientific and exploratory research, preparation of the legal acts projects, legal regulation proposals, expert reports and conclusions, consultancy and advice.

Purpose
In case of legal regulation development, innovation practice, evaluation of social possibilities and justification of the decisions

Field of application, use
Various subjects of public and private sectors

Development level
Implemented in the market

Possible, required cooperation forms
Services in Lithuania and abroad, joint applied research, science-business partnership, science-public sector partnership

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Impact Assessment in Political Decision Making

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Institute of International Relations and Political Science

Keywords
Public policy, impact assessment

Description of service, product, technology
The aim of the impact assessment is to summarize information about consequences of a particular decision, probable and realized, negative and positive, short-term and long-term. Application of the instruments of the impact assessment allows identification of alternative solutions of the problem, increases transparency of decisions, provides criteria for monitoring of implementation and evaluation of the results.

Purpose
Political decision making, interest representation

Development level
Revised and tested methodologies of impact assessment, which can be applied to assess the impact of particular regulations

Possible, required cooperation forms
Services

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Clinical Psychoanalysis

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Faculty of Philosophy, Psychological Innovations and Research Training Centre

Keywords

Clinical psychology, informal learning, psychoanalysis

Description of service, product, technology

Clinical Psychoanalysis program for training professional psychotherapists and in-service training. Clinical Psychoanalysis aims to give learners an ability to look individually at the unique patient's or client's problems, to collaborate with the patient in therapeutic environment and to promote the patient's personal insights and mature autonomy.

Theory studies provide with knowledge of different psychoanalytic schools and their methods. Instructional Analysis gives an opportunity to experience deep emotional states and use this personal experience for working with clients. The practical experience and individual supervisions are assigned to case study for psychodynamic understanding and ability to use the intersubjective phenomena in clinical situations, the ability to properly use a variety of interventions and forms of interpretations, work with resistance, anticipate and overcome potential difficulties.

Studies of Clinical Psychoanalysis for professionals, who teach psychotherapy, consult and supervise colleagues working in the mental health sector. A deep knowledge of the psychoanalysis allows working with patients with mental disorders.

The program is made according to the International Psychoanalytical Association (IPA) training standards and meets the requirements of the European Association for Psychotherapy. It is consistent with the IPA Sponsoring Committee.

Purpose

In-service training for psychologists and physicians working in the field of mental health

Field of application, use

Mental Health Care

Characteristics, technical information

5 years, 103 cr., 3054 academic hours (including 432 academic hours of classroom work)

Development level
The program was approved by the Council of Faculty of Philosophy on November 23, 2011. Participants gain the Certificate of Vilnius University.

Possible, required cooperation forms
Training services for interested institutions and individual professionals, and cooperation in organizing the program

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Psychological Counseling

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Keywords
Individual counseling, children/adults/family counseling, psychotherapy, group counseling

Description of service, product, technology
The aim of psychological counseling is to help the client understand and tackle personal and interpersonal difficulties related to everyday life or psychological well-being. It can help to manage stress, anxiety, deal with negative thoughts and feelings, gain self-confidence.
The Centre provides individual counseling, group counseling, family and children counseling.

Purpose
Psychological help

Field of application, use
Mental Health Care

Development level
1305 psychological consultations during the year 2012, including 705 consultations for staff and students of Vilnius University

Possible, required cooperation forms
Psychological services, joint projects in improving mental health services and/or providing help for high risk and vulnerable groups of community

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The Psychodynamic Interpretation of Children and Adolescents' Drawings

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Keywords
Clinical psychology, informal learning, psychodiagnostics, children and adolescents' drawings

Description of service, product, technology
The program is oriented for health and educational professionals working with children. During the course, participants are taught to use interpretation of children's drawings as an additional psychodiagnostic tool to analyse the significant figures in the drawings, as well as working with children's drawing methods.
This course is designed as a psychodiagnostic laboratory (integration of theory and practice with individual tasks), where participants are taught to distinguish significant figures in the drawings of children and adolescents. During this program, participants are taught to understand links between the ability to create (draw) and subconscious emotions.
The participants are introduced to the common developmental statuses of a child, such as conflicts, anxiety, phobias, aggressive behaviour and other disorders, as well as their expressions in drawings.

Purpose
In-service training for psychologists and physicians working in the field of mental health

Field of application, use
Mental Health Care

Characteristics, technical information
1 year, 7 cr., 188 academic hours (including 48 academic hours of classroom work)

Development level
The program was approved by the Council of Faculty of Philosophy on April 25, 2012. Participants gain the Certificate of Vilnius University.

Possible, required cooperation forms
Training services for interested institutions and individual professionals, and cooperation in organizing the program

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Psychological Assessment

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Keywords
Psychological assessment, psychological services, mental health

Description of service, product, technology
Psychological assessment is a process when cognitive abilities, personality traits, aptitude and other issues are evaluated. The process includes testing, analysis of testing results and preparing the report. Psychological assessment can be made on clinical, education, intervention effectiveness or for other purposes. The client of psychological assessment might be one person, a group, family or organization. Duration of psychological evaluation can vary from two to several academic hours, depending on the goals of the psychological assessment. Psychological assessment is also carried out in custody cases, in order to respond to the issues related to the child's needs and emotional maturity, as well as emotional ties with parents and communication capabilities. Typically, a complex psychological evaluation of the child, family and child-parent relationships is needed.
After the assessment, the client (the court) is provided with a psychological report, which responds to the questions and gives recommendations. Psychological assessment in custody cases is available only under the court order.

Purpose
Psychological help

Field of application, use
Mental Health Care

Development level
Psychological report, which responds to the questions and gives recommendations

Possible, required cooperation forms
Services, joint projects

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Group Relations Seminar Using Methodologies of Experiential Learning Developed by Tavistock Institute

Authors
Organized by Tavistock Institute of Human Relations and Vilnius University (Assoc. Prof. Dr. Jolita Buzaitytė-Kašalynienė)

Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Department of Social Work

Keywords
Group relations, leadership and followership in organization, management of/in change, experiential learning, non-formal learning

Description of service, product, technology
The aims of the seminar are the following:

- To create possibilities for participants to enhance competences of management of uncertainty and change in organizations and communities and competences of coping with stress, which allows working constructively in a constantly changing environment;
- To enhance understanding of leader's and follower's roles, which are necessary for successful operation of organization; to enhance abilities to perform those roles and develop successful strategies of the roles' performance;
- Bring together understanding of the conscious and hidden, sometimes unconscious, motivations and resistance of work groups as they engage collaboratively and competitively with one another.

Participants learn about how to do the following:

- Manage yourself in the multiple roles necessary for contemporary leadership, where greater inter-personal and inter-organisational collaboration is called for;
- Use your emotional literacy to inform your actions;
- Understand and manage motivation and resistance to change/ innovations in yourselves and others;
- Understand personal strategies of coping with stress;
- Make decisions and perform constructively in uncertainty;
- Take up formal and informal leadership and followership roles as you explore group and institutional dynamics as they happen.

This programme is as flexible as possible, in order to ensure maximum possibilities to learn the following:

- How to become more effective in working with the underlying dynamics within and between organisations and between these and the wider society;
- How to apply the roles taken up within the programme to your own organisations and networks;
- Exercise innovation and authority for oneself and on behalf of others;
- The interplay between tradition, innovation and change;
- The place of feelings, impressions, expectations, thoughts, fears, likes and dislikes that reverberate in the programme and provide the raw material for understanding relationships and relatedness between individuals, groups, organisations and systems;
- Taking up the challenge of learning about what is known and what is not known in organisations; where knowledge is based and how it is disseminated throughout the different systems;
- The cooperative and competitive relationship of organisations to their social, political and economic environments.

Purpose

In-service training for leaders, managers, consultants, educators, researchers and administrators, professional and technical workers, who are working in diverse work settings

Field of application, use

Management of organizations and communities

Characteristics, technical information

3 credits, 84 academic hours (including 42 academic hours of direct contact – 5 days seminar)

Development level
The program was approved by the Council of Faculty of Philosophy and VU Senate in 2011. Participants gain the Certificate of Vilnius University.

Possible, required cooperation forms
Training services for interested institutions and individual professionals, and cooperation in organizing and delivering the program

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Psychological Mediation

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Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Psychological Innovations and Research Training Centre

Keywords
Mediation, conflict, psychology

Description of service, product, technology
Participation of experienced psychologist in resolving disputes between two or more parties. In psychological mediation, a third party, the mediator, is a psychologist and assists the parties to negotiate a settlement. Disputants may mediate disputes in a variety of domains, such as child custody, family and workplace matters.
Mediator is an experienced psychologist (PhD or long practical experience is needed).

Purpose
Psychological help

Field of application, use
Mental Health Care

Characteristics, technical information
4 to 5 academic hours

Possible, required cooperation forms
Services, joint projects

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Psychodynamic Child and Adolescent Psychotherapy (Base Level)

Authors

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Faculty/Institute, Department, Laboratory

Faculty of Philosophy, Psychological Innovations and Research Training Centre

Keywords

Clinical psychology, informal learning, psychodynamic psychotherapy, children, adolescent

Description of service, product, technology

The program is designed for in-service training for psychologists and physicians working in the field of mental health. The aim is to provide participants with basic knowledge of child and adolescent psychodynamic psychotherapy and to develop skills important for specialists working with children and young people, as well as to prepare participants for deeper psychodynamic child and adolescent psychotherapy studies.

The program includes studying psychodynamic development and diagnostics of the child, also sets out the main principles of psychodynamic psychotherapy theory and methods. Personal experience in small groups and supervised early relationships monitoring practices prepare for successful working with children, adolescents and their families. Practical experience and group supervision are signed to case studies.

During the program, the knowledge of diagnosis and psychodynamic development will be given. The participant will be taught to combine psychodynamic and clinical diagnostic systems, to recognize situations when early intervention is needed, to monitor child-parent early relationships, recognize and evaluate the challenges they meet and choose the best methods of interventions, as well as to reflect on their own personal experience, feelings, percepts and thoughts.

Purpose

In-service training for psychologists and physicians working in the field of mental health

Field of application, use

Mental Health Care

Characteristics, technical information
2 years, 50 cr., 1022 academic hours (including 364 academic hours of classroom work)

Development level
The program was approved by the Council of Faculty of Philosophy on December 10, 2008. Participants gain the Certificate of Vilnius University.

Possible, required cooperation forms
Training services for interested institutions and individual professionals, and cooperation in organizing the program

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Psychodynamic Child and Adolescent Psychotherapy (Qualification Level)

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Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Psychological Innovations and Research Training Centre

Keywords
Clinical psychology, informal learning, psychodynamic psychotherapy, children, adolescent

Description of service, product, technology
The program is designed for therapeutic skills training of professionals (psychologists and doctors), who are already familiar with the theories of psychodynamic development, basic principles of psychodynamic psychotherapy and are able to apply this knowledge into the assessment of children and adolescents' psychological problems.
The main objective of the program is to teach psychodynamic psychotherapy techniques for the treatment of children and adolescents with a variety of behavioural and emotional disorders, as well as working with their parents. The aim of the program is to improve the knowledge of psychodynamic psychology and psychopathology, to improve the understanding of processes of psychotherapy and dynamics, the ability to recognize, reflect and analyse the therapeutic processes and their dynamics.

Studies combine theory and workshops, including learning of psychodynamic techniques, working with patients under the supervision, as well as personal experience and its analysis.
Successful graduates of the program will gain the following competencies: ability to make correct diagnosis of mental and behavioural disorders, choose the most effective therapeutic method for the treatment, apply psychodynamic psychotherapy for children and adolescents, as well as be able to work with the family within interdisciplinary team.

Purpose
In-service training for psychologists and physicians working in the field of mental health

Field of application, use
Mental Health Care

Characteristics, technical information
3 years, 60 cr., 1610 academic hours (including 602 academic hours of classroom work)

Development level
The program was approved by the Council of Faculty of Philosophy on September 17, 2012. Participants gain the Certificate of Vilnius University.

Possible, required cooperation forms
Training services for interested institutions and individual professionals, and cooperation in organizing the program

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LPIK: Lithuanian Vocational Interests Inventory (Second Edition)

Authors
Assoc. Prof. Dr. Feliksas Laugalys, Prof. Dr. Albinas Bagdonas

Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Laboratory of Special Psychology

Keywords
Vocational interest, vocational briefing, vocational consulting

Description of service, product, technology

The main principles of LPIK construct (top-down, similarity, disjuncture, simplicity, accessibility, universality, responsibility) allows making a non-time consuming review of all legal jobs in Lithuania and selecting a relevant avocation. LPIK helps making an individualized choice, while eliminating irrelevant without missing preferable vocations. Self-report choice can be corrected by corresponding internet data bases. Also, there is a possibility of independent usage of LPIK after a short introduction and training made by a qualified supervisor. LPIK can be administered to school-aged children, adults and elderly people. Knowledge of the Lithuanian language is essential.

Purpose

LPIK can be applied during vocational briefing, consulting, personnel selection, in process of planning occupational changes for the unemployed, disabled, retired, dissatisfied with their current occupation, etc., career planning

Field of application, use

Educational and training institutions, rehabilitation institutions, employment and labour exchange centres, academic research

Characteristics, technical information

The inventory consists of 150 typical professions that represent over 5000 real jobs, divided in 10 groups and 27 subgroups. LPIK also provides an opportunity to calculate the width of external and internal range of vocational interests and its amplitude.

A complete LPIK set consists of the following:

- 1 LPIK Manual
- 1 LPIK Profession Classifier
- 25 LPIK response sheets

Development level

Implemented in the market

Possible, required cooperation forms

Product sale, teaching and training services

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Revised NEO Personality Inventory and NEO Five-Factor Inventory (NEO PI-R and NEO-FFI; Lithuanian Version)

Authors
Lithuanian adaptation carried out by Prof. Dr. Albinas Bagdonas and Dr. Antanas Kairys

Authors of the original version: Paul T. Costa and Robert R. McCrae

Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Laboratory of Special Psychology

Keywords
Personality inventory, test, NEO PI-R, NEO-FFI

Description of service, product, technology
NEO PI-R is one of the most widely applied personality tests that measure five major personality traits: neuroticism, extraversion, conscientiousness, agreeableness and openness to experience. Additionally, NEO PI-R measures 30 personality facets that correspond with the mentioned major personality traits. NEO-FFI is a shorter version of NEO PI-R that measures five major personality traits (personality trait groups).

Purpose
Inventories are used to evaluate individual's personality traits. NEO PI-R allows making a comprehensive and detailed assessment, whereas NEO-FFI scores provide the examiner with a general view of individual's personality. The result of the mentioned inventories allows the examiner to raise assumptions about individuals functioning in a wide range of situations. It can also be used for research purposes.

Field of application, use
NEO PI-R and NEO-FFI can be applied in the following fields:

- Educational field: personality assessment can be used for a better understanding of student's features, possible causes of encountered difficulties, raising student's self-awareness, especially in vocational guidance;
- Clinical field: personality assessment can be used for a better understanding of client's features, helping clients to better understand themselves, predicting counselling course, etc.;
- Organizational field: personality assessment can be used for personnel selection, counselling clients on personal development or vocational guidance;

- Scientific research field: NEO PI-R and NEO-FFI are used when it is important to assess subject's personality traits.

Other fields where understanding of client's personality features may be relevant.

Characteristics, technical information

NEO PI-R and NEO-FFI is a personality assessment tool that is used with individuals aged form 17 to 89. NEO PI-R consists of 240 items, NEO-FFI – 60 items.

A complete NEO PI-R set includes the following:

- 1 NEO Manual;
- 10 NEO PI-R Reusable S form Item Booklets;
- 25 NEO PI-R Answer Sheets;
- 25 Feedback Sheets (*Your NEO Summary*);
- 25 Automatic Individual Profile Compiling.

Composition of NEO-FFI set is as follows:

- 1 NEO Manual;
- 25 NEO-FFI Item and Answer Booklets;
- 25 Feedback Sheets (*Your NEO Summary*);
- 25 Individual Profile Compiling.

NEO PI-R administration takes approximately 30-40 min.; NEO-FFI administration takes approximately 7-10 min.

Development level

Adapted and standardized to use in Lithuania, implemented in the market

Patents

According to Publication Agreement (effective from June 25, 2007), Psychological Assessment Recourses (PAR), the copyright and intellectual property rights holder of translated and culturally adapted Wechsler intelligence tests grants to Laboratory of Special Psychology of Vilnius University (Faculty of Philosophy) limited, exclusive, non-transferable license to distribute NEO PI-R and NEO-FFI to qualified users on the territory of Lithuania and provide services related to NEO PI-R and NEO-FFI.

Possible, required cooperation forms

Product sale

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Wechsler Adult Intelligence Scale (WAIS-III) (Third Edition)

Authors

Lithuanian adaptation created for NCS Pearson, Inc., carried out by
Prof. Dr. Albinas Bagdonas, Dovilė Butkienė, Milda Černiauskaitė, Assoc. Prof. Dr. Sigita Girdzijauskienė, Vida Jakutienė, Rima Malakauskaitė, Liucyna Narkevič-Skurko
Author of the original version: David Wechsler

Faculty/Institute, Department, Laboratory

Faculty of Philosophy, Laboratory of Special Psychology

Keywords

Wechsler intelligence scale, assessment of adult intelligence, test

Description of service, product, technology

WAIS-III is a Lithuanian adaptation of a standardized individually administered clinical instrument for assessing the intellectual abilities of adults aged 16 to 89 years.

Purpose

For psychological assessment purposes, when decisions on the individual's education plan or program in secondary school or other education or training institution are being made. It is also the main instrument for determining intellectual or learning disability, assessing strengths and weaknesses. WAIS-III may be useful for differential diagnostics of neurological and psychiatric disorders that affect mental functioning. It can also be used for research purposes.

Field of application, use

Educational and training institutions, health care facilities (primary health care centres, mental health centres, and hospitals)

Characteristics, technical information

WAIS-III allows making a reliable assessment of intellectual abilities of individuals aged 16 to 89 years. WAIS-III yields Verbal, Performance and Full Scale IQ scores as well as Verbal Comprehension, Perceptual Organization, Working Memory and Processing Speed Index scores. WAIS-III consists of 14 subtests.
A complete WAIS-III set consists of the following:

- 1 WAIS-III Administration Manual;
- 1 WAIS-III Technical Manual;
- 1 WAIS-III Stimulus material;
- 25 WAIS-III Record Forms.

Duration of assessment is approximately 1.5 – 2.0 h.

Development level
Adapted and standardized to use in Lithuania, implemented in the market

Patents
According to Publication and Distribution Agreement (Nr. ATTS-250000-1576, effective from June 15, 2007), NCS Pearson, Inc., the copyright and intellectual property rights holder of translated and culturally adapted Wechsler intelligence tests grants to Laboratory of Special Psychology of Vilnius University (Faculty of Philosophy) limited, exclusive, non-transferable license to distribute WAIS-III to qualified users on the territory of member states of the European Union and provide services related to WAIS-III.

Possible, required cooperation forms
Product sale

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Wechsler Abbreviated Scale of Intelligence (WASI, Lithuanian Version) (Third Edition)

Authors
Lithuanian adaptation created for NCS Pearson, Inc., carried out by Assoc. Prof. Dr. Gražina Gintilienė, Dovilė Černiauskaitė (Butkienė), Rūta Dragūnevičienė, Assoc. Prof. Dr. Sigita Girdzijauskienė
Author of the original version: David Wechsler

Faculty/Institute, Department, Laboratory
Faculty of Philosophy, Laboratory of Special Psychology

Keywords
Wechsler intelligence scale, child intelligence assessment, test

Description of service, product, technology
WISC-III^{LT} is a Lithuanian adaptation of a standardized individually administered clinical instrument for assessing the intellectual abilities of individuals aged 6 to 16 years.

Purpose

For psychological assessment purposes, when making decisions on the individual's education plan, program or referral to special education institutions, identifying special needs. It may be applied for a clinical or neuropsychological evaluation. It can also be used for research purposes.

Field of application, use

Educational and training institutions, health care facilities (primary health care centres, mental health centres, and hospitals)

Characteristics, technical information

WISC-III^{LT} allows reliably assessing 6-16 year old individual's intellectual abilities by determining the Verbal, Performance and Full Scale IQ as well as Verbal Comprehension, Perceptual organization, Freedom from Distractibility, and Processing Speed scores, allows evaluating individual's intellectual strengths and weaknesses. WISC-III^{LT} consists of 13 subtests.

A complete WISC-III^{LT} set consists of the following:

- 1 WISC-III^{LT} Guide;
- WISC-III^{LT} Stimulus materials;
- 25 WISC-III^{LT} Record Forms.Duration of assessment is approximately 1.5 h.

Development level

Adapted and standardized to use in Lithuania, implemented in the market

Patents

According to Publication and Distribution Agreement (Nr. ATTS-250000-1576, effective from June 15, 2007), NCS Pearson, Inc., the copyright and intellectual property rights holder of translated and culturally adapted Wechsler intelligence tests grants to Laboratory of Special Psychology of Vilnius University (Faculty of Philosophy) limited, exclusive, non-transferable license to distribute WISC-IIILT to qualified users on the territory of member states of the European Union and provide services related to WISC-IIILT.

Possible, required cooperation forms

Product sale

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Wechsler Intelligence Scale for Children (WISC-III ^{LT}, Lithuanian Version)

Authors

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Author of the original version: David Wechsler

Faculty/Institute, Department, Laboratory

Faculty of Philosophy, Laboratory of Special Psychology

Keywords

Wechsler intelligence scale, child intelligence assessment, test

Description of service, product, technology

WISC-III^{LT} is a Lithuanian adaptation of a standardized individually administered clinical instrument for assessing the intellectual abilities of individuals aged 6 to 16 years.

Purpose

For psychological assessment purposes, when making decisions on the individual's education plan, program or referral to special education institutions, identifying special needs. It may be applied for a clinical or neuropsychological evaluation. It can also be used for research purposes.

Field of application, use

Educational and training institutions, health care facilities (primary health care centres, mental health centres, and hospitals)

Characteristics, technical information

WISC-III^{LT} allows reliably assessing 6-16 year old individual's intellectual abilities by determining the Verbal, Performance and Full Scale IQ as well as Verbal Comprehension, Perceptual organization, Freedom from Distractibility, and Processing Speed scores, allows evaluating individual's intellectual strengths and weaknesses. WISC-III^{LT} consists of 13 subtests.
A complete WISC-III^{LT} set consists of the following:

- 1 WISC-III^{LT} Guide;
- WISC-III^{LT} Stimulus materials;
- 25 WISC-III^{LT} Record Forms.Duration of assessment is approximately 1.5 h.

Development level

Adapted and standardized to use in Lithuania, implemented in the market

Patents

According to Publication and Distribution Agreement (Nr. ATTS-250000-1576, effective from June 15, 2007), NCS Pearson, Inc., the copyright and intellectual property rights holder of translated and culturally adapted Wechsler intelligence tests grants to Laboratory of Special Psychology of Vilnius University (Faculty of Philosophy) limited, exclusive, non-transferable license to distribute WISC-IIILT to qualified users on the territory of member states of the European Union and provide services related to WISC-IIILT.

Possible, required cooperation forms

Product sale

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OPEN ACCESS CENTERS

Open Access Centers

Open access centers are up-to-date laboratories located in Vilnius University (VU) that are working on the basis of an open access principle, i.e., modern laboratory equipment and top-level scientific research services are accessible not only for researchers, students or visiting scientists of Vilnius University, but also for researchers and students from other research institutions and business enterprises.

Open Access Centers (OAC) at Vilnius University:

- Joint Life Sciences OAC consists of the following:
  - Center of Biotechnology;
  - Center of Biomolecular Structure;
  - Center of Bioinformatics;
  - Center of Plants and Microorganisms Genomic Research;
  - Center of Biocatalysis;
  - Proteomics Center;
  - Center of Biomodels;
  - Center of Molecular Medicine;
  - Center of Human Genome Research.
- Information technologies OAC
- Lasers center "Naglis" OAC
- Physical and Technology Sciences OAC consists of the following:
  - Center of High Performance Computing "HPC Saulėtekis";
  - Center of Spectroscopic Characterization of Materials and Electronic/ Molecular Processes "VU Spectroversum";
  - Center of Synthesis and Characterization of Inorganic Functional Materials;
  - Center of Synthesis and Characterization of Organic Materials;
  - Center of Research and Characterization of Organic Materials;
  - Center for Semiconductor Technologies and Characterization;
  - Center for Testing of Lighting and Electronics Systems;
  - Innovative Chemistry Open Access Centre (INCHEMAS).

Joint Life Sciences Open Access Center

Joint Life Sciences OAC integrates modern laboratories, instrumentation and top level researchers of VU Institute of Biotechnology, VU Institute of Biochemistry, VU Institute of Oncology, Faculty of Natural Sciences and Faculty of Medicine.

Number of researchers: 400

Main fields of research:

- Investigation of structure and functions of biomolecules;
- Human, plant and microbial genome research;
- Recombinant viral proteins and development of monoclonal antibodies;
- Proteomic analysis;
- Structural biology and bioinformatics.

• Center of Biotechnology

(Prof. Habil. Dr. Saulius Klimašauskas, Dr. Aurelija Žvirblienė, Dr. Gintautas Žvirblis)

Research activities:

- Generation and investigation of recombinant viral proteins and other recombinant proteins of biomedical relevance;
- Development and application of new diagnostic test systems;
- Generation of new hybridoma cell lines;
- Investigation and application of monoclonal antibodies.

Services:

- Mass-spectrometric analysis of biomolecules;
- Cell Imaging;
- Generation of hybridomas;
- Bacteria or yeast fermentation.

• Center of Biomolecular Structure

(Prof. Dr. Virginijus Šiksnys)

Research activities:

A major focus is on the understanding of structure-function correlations with the aim to develop new enzymes for biotechnology applications and novel drugs. X-ray structure determination of proteins, protein-nucleic acid and protein-drug complexes.

Services:

- Crystal growth;
- Isolation and purification of proteins and protein-nucleic acid complexes;
- X-ray structure determination.

• Center of Bioinformatics

(Dr. Česlovas Venclovas)

Research activities:

- Genome and proteome analysis;
- Protein three-dimensional structure analysis and modeling;
- Development and application of methods for protein three-dimensional structure prediction.

Services:

- Protein sequence comparison and homology detection;
- Protein three-dimensional structure analysis and modeling;
- Analysis of genomes and proteomes.

• Center of Plants and Microorganisms Genomic Research

(Prof. Habil. Dr. Saulius Klimašauskas, Prof. Dr. Edita Sužiedelienė)

Research activities:

The research on the mechanisms of pathogenesis and drug resistance of microorganisms, small RNA's and their functions in the regulation and pathogenesis will be carried out.

Services:

- Preparation of DNA for sequencing;
- DNA sequencing;
- Determination of pathogenic bacteria and antibiotic resistance genes;
- Pathogenic bacteria genotyping.

• Center of Biocatalysis

Department of Bioelectrochemistry and Biospectroscopy

(Dr. Gintaras Valinčius)

Research activities:

- Spectroelectrochemistry of proteins and biologically relevant redox species;

- Self-organizing lipid systems, including phospholipid bilayer membranes and interaction with proteins;
- Development of measurement techniques: electrochemical impedance spectroscopy, modulated surface stress, sum-frequency generation, and surface enhanced Raman spectroscopy.

Services:

- Self-assembled phospholipid systems and periphery devices for protein/membrane interaction studies.

Department of Bioanalysis
(Habil. Dr. Valdas Laurinavičius)

Research activities:

- Investigation of bioelectrochemical properties of biomolecules and electron transport in biomolecules;
- Creation of biosensors and bioreactors;
- Investigation of the mechanism of action of biomolecules and cells in heterogeneous systems and mathematical modeling.

Department of Xenobiotics Biochemistry
(Habil. Dr. Narimantas Čėnas)

Research activities:

- Molecular mechanisms of enzymatic activation, detoxification, biodegradation, and cytotoxicity of redox active xenobiotics;
- Studies of the explosives and other high energy compounds of nitroaromatic and nitroaliphatic structure.

Services:

- Metal layer formation by magnetron sputtering;
- Surface enhanced Raman measurements of adsorbed molecules, self-assembled monolayers, conducting polymers, biomolecular structures and redox conversion products;
- Raman microscope system (using the service);
- Thin membrane coating centrifuge device;
- Measurement by atomic force microscopy;
- Service of 405 nm continuous wave diode laser;
- Service of 266/532/457 nm continuous wave solid state laser;
- Surface modification Langmuir-Blodgett deposition trough;
- Service of UV and visible wavelength region diode pumped solid state laser;
- Contact angle measurement;
- Micropipettes manufacturing.

• Proteomic Center

(Dr. Mindaugas Valius)

Research activities:

Sample preparation and comprehensive analysis of proteins using mass spectrometry methods for protein-marker discovery and validation as well as de novo peptide sequence identification.

Services:

- Protein identification from gels and cell lysates;
- De novo protein peptide sequencing;
- Targeted protein identification by separate reaction monitoring in protein mixtures;
- Identification and relative quantitation of protein phosphorylation;
- Label-free high throughput differential proteomics analysis;
- Intracellular protein analysis by confocal microscopy combined with microinjection and micromanipulation.

• Center of Biomodels

(Dr. Virginija Bukelskienė)

Research activities:

- Basic stem cell research and feasibility study on cytotherapy;
- Artificial tissue construction using model systems *in vitro* and *in vivo*.

Two model systems – laboratory animals (*in vivo*) and cell cultures (*in vitro*), are used.

Experiments on animals carried out in accordance with EU Directive 2010/63/EC and Lithuanian State Food and Veterinary Service Director Order No. B1-866, 2012-10-31.

Services:

- Breeding of the laboratory animals (mice, rats, rabbits) for the sale;
- Maintenance of laboratory animals (mice, rats, rabbits) during the experimentation;
- Toxicological tests using animals and cell cultures;
- Study of the biological activity and biocompatibility of materials using laboratory animals and cell cultures;
- Lending of surgical equipment;
- Postoperative animal care;
- Preparation of primary stem and cancer cell lines;
- Evaluation of the hematoproliferative activity by using laboratory animals.

• Center of Molecular Medicine

(Prof. Dr. Osvaldas Rukšėnas, Prof. Habil. Dr. Zita Aušrelė Kučinskienė)

Research activities:

- Multiparameter investigation of disease affected cytomes composition and function at the level of nucleus, cytoplasm and cell surface;
- Non-invasive recording of brain potentials and cardiac-vascular system and other physiological parameters, investigation of visual system.

Services:

- Flow cytometric cell study;
- Cell culture studies;
- Recording and analysis of physiological and psychophysiological parameters of EEG, ECG, EDA, eye movements, psychological tests, steroid hormone concentration.

• Center of Human Genome Research

(Prof. Dr. Sonata Jarmalaitė, Prof. Habil. Dr. Vaidutis Kučinskas)

Research activities:

- Quantification of SNP, mutations, epigenetic changes;
- Large-scale studies of gene and miRNa expression;
- Direct and bisulfate-based sequencing with next generation sequencers;
- Analysis of VNPs, microsatellite polymorphisms, DNA confirmation changes, etc.

Services:

- Chromosome studies;
- Quantitative analysis of changes in DNA sequence;
- Sequencing of human genome;
- Quantitative analysis of chemicals;
- Gene and miRNA expression analysis.

Contacts:

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Information Technologies Open Access Center (ITOAC)

Information Technologies Open Access Centre (ITOAC) houses 2 supercomputers, which are dedicated for scientific experiments and research, and education purposes, available also for other academic and business institutions. A supercomputer can manage massive amounts of information and do scientific calculations that model complex processes faster at a speed of nanoseconds (nuclear reactions, biochemical processes, genetic analysis, and data mining for medical purposes).

Number of researchers: 130

Main fields of research:

- Computer modeling;
- Verification and automated testing;
- Massive data and data mining;
- Distributed computing.

Supercomputer:

- 1920 cores
- 3,6 TB RAM
- 620 TB data storage
- Peak performance 25 TFLOPS

Software:

- OpenMPI; Octave; R; Gaussian; SciPy; Hadoop; Dalton; LAPACK; GAMESS-US

ITOAC services:

- **Creation of data analysis models in HPC environment.** Initiation of data analysis process; data preparation for data analysis; development and experimental evaluation of algorithms suitable for data analysis. Algorithms of data filtering, discovery of outliers, classification, clustering, and association rule mining and time series. Programs used: R, Weka, Qctave and others.
- **Optimization and creation of analytical algorithms in HPC environment of business process data visualization and analysis.** Visual analysis of generated data for business processes applying common visualization methodologies of data analysis and processes in HPC environment. Structural, visual and descriptive analysis considering data multidimensionality and complexity of the process in applied business process environment. Programs used: R, Weka, Octave, Gaussian, Gamess and others.

- **Creation of massive data management and analysis algorithms using cloud computing.** Creation, experimental usage and evaluation of "Big data" or even massive data databases in HPC and cloud computing environments. Programs used: NoSQL, Hadoop, BigTable and others.
- **Development of management and analytical algorithms of sensors and stream data in HPC and cloud computing.** Implementation of algorithms of constantly evolving and regularly updated data models and similarity of time series. Application of essential temporal properties in research and algorithms for sensorial and geographic data. Programs used: PostgreSQL, TPR indexes, streaming DB and others.
- **Relocation and data analysis of business processes in cloud computing.** Customization and experimental evaluation of Business Systems for transition to cloud computing environments. Consulting and installation of commercial or open-source cloud computing environment. Programs used: S3, OpenNebula, OpenStack, VMware (ESXi), Hyper-V, XenServer, KVM, OpenVZ, VirtualBox and others.
- Calculations and creation of algorithms for video and audio processing. Extraction of properties for conventional (photo and video) and medical images. The development of efficient algorithms for content image search and massive processing. Programs used: FFTW, WT, POV-Ray and others.

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Web pages: http://mif.vu.lt/lt2/itapc; http://www.supercomputing.vu.lt

Laser Research Center "Naglis" Open Access Center

The laboratories at Laser Research Center "Naglis" Open Access Center are fully equipped with state of the art laser systems and experimental instrumentation.

Number of researchers: 18

Main fields of research:

- Laser 3D micro/nanostructuring;
- Nonlinear optics;
- Femtosecond laser fabrication;
- Ultrafast spectroscopy;
- Optics characterization and laser damage testing.

Laser Nanophotonics Laboratory

3D polymeric structures, formed by LDW method, have multiple uses, from compact optical systems development by introducing hybridic or integrated optical elements on optical fiber tip to research of cell behavior in micro scale, understanding which will let develop artificial tissues for cardiovascular surgery.

Services:

- Numerical modeling, laser formation, geometry and optical properties (focus, collimation, phase modulation) description of multifunctional (refractive/diffractive) and integrated (on the optical fiber tip) micro-optical elements (10-100 μm);
- Artificial three-dimensional frames laser formation for cell biology and tissue engineering applications;
- Laser formation of nanophotonic elements in polymers and transparent material. Numerical modeling of these items and characterization of their light control properties.

High- intensity Laboratory

Optical system with ultrafast Yb:KGW laser "Pharos" is used for development of laser facility, which could generate <10 fs duration and TW power pulses. This high-intensity system would be useful for attosecond resolution spectroscopy and visualization of nanometric objects.

Services:

- Ultrashort pulses seed source for further laser radiation power increase;
- Femtosecond laser pulse source for parametric amplifier pumping;
- Femtosecond laser pulses contrast measurement.

Ultrashort Light Pulses Laboratory

Deeper research of processes in different materials and materials themselves require new testing methods and light sources with specific new parameters. We use femtosecond Ti:Sapphire laser systems in these research directions: femtosecond light filaments and their dynamics, white-light continuum generation in transparent materials and optical extreme waves.

Services:

- Investigation of spatial, spectral and temporal characteristics of ultrashort pulses in transparent nonlinear materials in spectral range from UV to MidIR;
- Characterization of properties of nonlinear materials.

Ultrafast Spectroscopy Facility

Studies of organic photochromic compounds, which have attracted significant attention for their potential applications in optoelectronic devices, such as photo-induced molecular switches.

Services:

- Analysis of chemical and biological materials and semiconductor properties by applying ultrafast absorption spectroscopy methods at room and liquid nitrogen temperatures;
- Investigation of materials and necessary tools handling (dosage, dilution, dissolution and fixation).

Optical Characterization Laboratory

For high power laser technologies, it is inevitable to understand physical processes that limit their capabilities and further progress.

Service:

- Testing of optical coatings and optical components, which is critically important for development and construction of any laser devices.

Femtosecond Laser Microfabrication Laboratory

By combining femtosecond laser pulses together with accurate beam positioning systems, we perform material processing with outstanding precision. High intensity and extremely short laser pulses can be used for treatment of a wide variety of different materials and are capable to invoke unique material properties and expand the range of laser-assisted material processing.

Services:

- Formation of metal masks;
- Drilling of transparent material;
- Topographic analysis of structure surface, processed by laser radiation.

Contact:

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VU Laser Research Center, Saulėtekio Av. 10, LT-10223 Vilnius

Physical and Technology Sciences Open Access Center

Vilnius University Open Access Center for Physical Sciences and Technologies is a part of single-sited research infrastructure of National Center of Physical and Technology Sciences located in the "Sunrise Valley". The Centre is a top class multidisciplinary research institution with a concentration of research excellence, students, high-quality infrastructure, premises and open access labs for scientists, industry and business. It is producing 1/3 of scientific research results in Lithuania. In close collaboration with academia, scientists and knowledge-intensive businesses can create innovations, new technologies, prototypes and establish new technology-oriented businesses. It consists of the following:

- Center of High Performance Computing "HPC Saulėtekis"
- Center of Spectroscopic Characterization of Materials and Electronic/ Molecular Processes "VU Spectroversum"
- Open Access Center for Synthesis and Characterization of Organic Materials
- Open Access Center for Testing of Lighting and Electronics Systems
- Open Access Center for Semiconductor Technologies and Characterization
- Innovative Chemistry Open Access Centre (INCHEMAS)

Number of researchers: 800.
Leading researchers: Prof. Habil. Dr. Artūras Žukauskas, Prof. Habil. Dr. Arūnas Krotkus, Prof. Habil. Dr. Gytis Juška, Prof. Habil. Dr. Gintautas Tamulaitis, Prof. Habil. Dr. Saulius Juršėnas, Prof. Dr. Kęstutis Arlauskas, Prof. Habil. Dr. Vytautas Balevičius, Prof. Dr. Juozas Šulskus, Prof. Dr. Valdas Šablinskas, Prof. Habil. Dr. Aivaras Kareiva, Prof. Habil. Dr. Sigitas Tumkevičius,Prof. Habil. Dr. Arūnas Ramanavičius, Prof. Dr. Ričardas. Makuška.

Research activities:
Research in material sciences, quantum physics and chemistry fields from technological approach to process simulations with supercomputer:

- Inorganic and organic material fabrication, characterization and applications for industry;
- Light-emitting technologies, devices and applications;
- Epitaxial III-V group compound technologies for optoelectronic and microwave electronics;
- Nanostructures, growth, control and characterization of their optical and electrical properties;
- Development of thin-film semiconductor structures for sensors, transducers and photovoltaic cells;

E-mail: mokslas@cr.vu.lt

- Comprehensive characterization of materials using various standard and unique methods of interaction of electromagnetic radiation with matter in ultra-wide spectral range.

Resources:

- 7000 m^2 laboratory space;
- 1800 m^2 cleanroom facilities (ISO 8, 7, 6, 5);
- More than 100 sets of technological equipment (MBE, MOCVD, CVD and other);
- More than 300 various characterization sets (EPR, NMR, XRD, AFM, SNOM, FE-SEM, SEM, EBIC, EDX, TGA/DSC, spectrometers (UV-VIS-NIR, FTIR, FT, FIR, FFT), nanosecond and femtosecond lasers and other measurement sets, temperature from 3 K).

Services:

- Open access to laboratories;
- Open access to equipment;
- Joint research;
- Consultations;
- Collaboration for creating technologies, prototypes and knowledge.

• High Performance Computing "HPC Saulėtekis" OAC

"HPC Saulėtekis" is created for material science, quantum chemical, astrophysical and other high resources demanding research.

Research activities:

- High performance computing;
- Parallel computing;
- Material sciences;
- Quantum mechanics;
- Quantum chemistry;
- Hydrometereology;
- Astrophysics.

Equipment:

- Distributed memory cluster "Physics" (1032 Intel x86_64 computing cores, 87 computing nodes, 6 CUDA GPU (3 nodes), 4 TB RAM overall cluster (4 GB RAM per core), PBS Pro management, Rmax (all system): 9.537e+03 Gflops, SMP Rmax (1 node): 1.155e+02 Gflops)
- Supercomputer "Altix UV 1000" (120 Intel x86_64 Cores, 2.5 TB RAM, Rmax: 1.160e+03 Gflops)

- Software:
- Compilers, debugers – Intel, PGI, Gnu, Allinea DDT, MPI, OpenMP
- Computations/programming – OpenMP, MPI (with and without GPU)
- Quantum chemistry* - *Gamess*, *NwChem*, *Dalton*, *WebMO*, *Gausian09*, *WebMO*
- MD/QM * - *Amber12*, *Crystal*
- Quantum chemistry/QD* - *Molcas*, *Molpro*, *VASP*, *Qchem*, *WebMO*
- *MATLAB* - Simulink, Parallel Computing Toolbox, Symbolic Math Toolbox
- Linux environment.

* User license restrictions

Services:

- OpenMP and MPI type computations with an arbitrary number of computing nodes and RAM in Linux environment;
- New specific software (hydrometeorology).

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• Spectroscopic Characterization of Materials and Electronic/Molecular Processes "Spectroversum" OAC

The center provides service of comprehensive characterization of materials using various methods of interaction of electromagnetic radiation with matter in an ultra-wide spectral range.

Research activities:

- NMR and EPR spectrometry (Prof. Habil. Dr. Vytautas Balevičius);
- Microwave and terahertz spectrometry (Prof. Habil. Dr. Jūras Banys);
- Raman and absorption in a wide spectral range (UV-FIR) spectrometry (Prof. Dr. Valdas Šablinskas);
- Technology of inorganic and organic structures and their spectrometry (Prof. Dr. Kęstutis Arlauskas);
- Noise and optical spectroscopy of semiconductor devices (Dr. Jonas Matukas);

- Sum Frequency Generation (SFG) spectrometry* (Prof. Dr. Ilja Ignatjev);
- Raman spectrometry of biological objects* (Prof. Gediminas Niaura);
- Spectrometry of electronic states* (Prof. Habil. Dr. Vidmantas Gulbinas);
- Mass spectrometry* (Prof. Dr. Vidmantas Remeikis).

* Collaboration with Center for Physical Sciences and Technology/VU Institute of Biochemistry.

Resources:

- Wide spectral range (UVVIS, NIR, MIR, FIR, Raman, FT-Raman) spectrometers;
- NMR and EPR spectrometers;
- Teraherz spectrometers;
- Microwave spectrometers;
- Ultrafast absorption and luminescence spectrometers;
- Mass spectrometer;
- Nonlinear spectral devices.

Services:

- UV-VIS spectroscopy, Raman and FT-Raman spectroscopy, NIR spectroscopy, MIR spectroscopy, FIR spectroscopy, Non-linear optical spectroscopy, Mass spectrometry.Examples of applications: investigation of chemical composition and morphology of inorganic derivatives formed in living organisms, identification of tumor tissue in biopsy samples, characteristics of optical coatings, structure of the ordered allotropic form of carbon, purity determination, non-destructive investigation of mineral type and quality (e.g., jewels), chemical composition of primers and dye of the paintings, characteristics of polymers, thin films and silicon wafers used in solar cells, spectral studies of nanostructures (IR, Raman spectroscopy) and molecules isolated in inert medium.

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• Open Access Center of Synthesis and Characterization of Functional Materials

The center provides services of synthesis of multifunctional, nano-structural materials and characterization of their properties.

Research activities:

Synthesis and characterization of inorganic functional materials, quantitative and qualitative chemical analysis, multifunctional materials, nano-structural polymers

Resources:

- Medium resolution equipment for morphology analysis, mini analyzer, electronic analytical equipment for evaluation of elemental composition, equipment for thermal analysis, equipment for synthesis in inert or specialized atmosphere;
- Scanning electrochemical microscopy complex, atomic absorption spectrophotometer with graphite furnace and flame atomization with atomic plasma emission, ultra-performance liquid chromatography coupled with PDA detector, triple quadrupole and ion trap mass spectrometers, low current, high sensitivity electrochemical analyzer and electrochemical zeta-potential meter, confocal laser scanning microscope;
- Size Exclusion Chromatography complex with tetra detection, particle size analyzer, spectrofluorimeter (UV, VIS and near infrared range), gas chromatographic-mass spectrometric equipment, quadrupole time-of-flight mass spectrometer, tensiometer.

Services:

- Surface imaging, coating with conductive layer, surface texture analysis;
- Elemental analysis, analysis of microstructure;
- Possibility to work in dry (~1 ppm) inert atmosphere (oxygen ~1 ppm);
- Measurements and visualization of local electrochemical properties;
- Quantitative analysis of metals, alloys, organic compounds, determination of purity;
- Evaluation of characteristics and interaction of thin biological films;
- Evaluation of electrochemical system properties;
- Fluorescence imaging of marked cells and other transparent objects;
- Absolute molecular weight of polymers, polydispersity index, intrinsic viscosity, size, conformation, Mark-Houwink parameters;
- Particle, colloid and protein size (hydrodinamic radius), zeta potential and molecular weight measurements;
- Quantitative and qualitative analysis of organic compounds;

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- Molecular mass measurement, structural investigations, investigation of non-covalent interactions;
- Surface and interface of two liquids tension, surfactant diffusion coefficient, interface surface sorption, critical micelle formation concentration, contact angle, liquid density, sedimentation rate of solid particles in liquid, surface energy of powders and solid body.

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• Open Access Center for Synthesis and Characterization of Organic Materials

Open Access Center for Synthesis and Characterization of Organic Materials is a part of Vilnius University Open Access Center for Physical Sciences and Technologies and also a part of National Center of Physical and Technology Sciences of the "Sunrise Valley". The high quality and pure organic materials are synthesized and characterized for various research and industry needs. The main business partners are the following ones: KISCO Tokyo Ltd., Japan, SYNTHON Chemicals GmbH & Co. KG, Germany, and others.

Number of researchers: 30.
Leading researchers: Prof. Habil. Dr. Saulius Juršėnas, Dr. Povilas Adomėnas, Dr. Karolis Kazlauskas.

Research activities:

- Material research for OLED, OPV, organic laser applications;
- Synthesis and photophysics of organic optoelectronic materials;
- Structure-property relationship of organic electronic compounds;
- Fluorescence sensors;
- Fluorescent organic nanoparticles;
- New synthetic methods for nitrogen and sulphur heterocycles, highly branched aromatic compounds.

Resources:

- 400 m^2 laboratory space;
- 130 m^2 cleanroom facilities (ISO 7);

- Organic electronic device fabrication by vacuum deposition and solution-processing;
- Delayed luminescence measurement system (iCCD);
- Hamamatsu spectrometer PMA-11 with integrating sphere;
- UV-VIS-NIR spectrophotometer;
- Charge and size measurement device for colloids and nanoparticles.

Services:

- Synthesis of organic compounds, working out of synthesis routes and processes suitable for scaling;
- Measurements of absorption, fluorescence and phosphorescence spectra of organic compounds;
- Fluorescence and phosphorescence quantum yield determination using integrating sphere and by comparing with etalon material methods;
- Excited state lifetime determination using time correlated single photon counting technique or a steak camera;
- Determination of optical parameters at 8-300 K temperature;
- Measurements of ionization potentials and HOMO energy levels using cyclic voltammetry method;
- Exciton diffusion coefficient and diffusion length determination in organic compounds;
- Photostability determination;
- Consultations;
- Collaboration for creating technologies, prototypes and knowledge.

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• Open Access Center for Semiconductor Technologies and Characterization

Open Access Center for Semiconductor Technologies and Characterization is a part of Vilnius University Open Access Center for Physical Sciences and Technologies and also a part of National Center of Physical and Technology Sciences located in the "Sunrise Valley". The Center specializes in semiconductor

technologies, structures production and their structural, optical and electrical and physical properties measurements for various research and industry applications.

Number of researchers: 140.
Leading researchers: Prof. Habil. Dr. Artūras Žukauskas, Prof. Habil. Dr. Arūnas Krotkus, Prof. Habil. Dr. Gytis. Juška, Prof. Habil. Dr. Gintautas Tamulaitis, Prof. Habil. Dr. Saulius Juršėnas, Prof. Dr. Kęstutis Arlauskas.

Research activities:

- Evaluation of chemical composition in materials and their composites;
- Analysis and technology of thin and nanoscale structures;
- Epitaxial III-V group compound technologies for optoelectronic and microwave electronics;
- Nanostructures, growth, control and characterization of their optical and electrical properties;
- Development of thin-film semiconductor structures for sensors, transducers and photovoltaic cells;
- Measurement of parameters of semiconducting crystals, structures and their defects;
- Investigation of stationary and time resolved photoluminescense.

Resources:

- 4000 m^2 laboratory space;
- 500 m^2 cleanroom facilities (ISO 8, 7, 6, 5);
- MOCVD reactor for growth of III-nitride epitaxial layers;
- Molecular beam epitaxy (MBE);
- Scanning electron microscope (SEM) with Oxford X-max energy dispersive X-ray spectrometer (EDX), and Gatan Digiscan electron beam induced current measurement setup (EBIC);
- Reactive ion etching equipment with thermal annealing;
- Multifunctional microscopy system: atomic force microscope (AFM), confocal and scanning near-field optical microscope (SNOM);
- HERA – DLTS System FT 1030 spectrometer;
- Hyped-sounding and dynamic diffraction grating test stand.

Services:

- MOCVD epitaxy of III nitrides;
- Spatial chemical composition analysis with energy dispersive X-ray spectrometer;
- Dry etching for various inorganic semiconductors mesa structures;
- Deep level photo-ionization spectroscopy;
- Investigation of molecule optical poling;

- Measurements of the barrier parameters in junction structures and devices made of Si, Ge, GaAs, GaN, Cu-CdS and Si solar-cells;
- Characterization of surface morphology with atomic force microscope (AFM);
- Contactless determination of free carrier lifetime and diffusivity in semiconductors and devices;
- Consultations;
- Collaboration for creating technologies, prototypes and knowledge.

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• Open Access Center for Testing of Lighting and Electronics Systems

Open Access Center for Testing of Lighting and Electronics Systems is a part of Vilnius University Open Access Center for Physical Sciences and Technologies and also a part of National Center of Physical and Technology Sciences located in the "Sunrise Valley". The Center specializes in solid-state lighting systems for research and industry applications.

Number of researchers: 30.

Leading researchers: Prof. Habil. Dr. Artūras Žukauskas, Dr. Prančiskus Vitta and Prof. Dr. Rimantas Vaicekauskas.

Research activities:

- Investigation of optical, electrical and thermal properties of the solid-state lighting systems and components (LEDs);
- Spectral engineering and optimization of solid-state lighting;
- Investigation of the circadian effects of lighting for humans;
- Tunable colour rendition quality light sources for museums, retail, etc.;
- Fluorimetry and bio-sensing using deep UV LEDs.

Resources:

- 150 m^2 laboratory space;
- Set of equipment for prototyping and R&D of solid-state lighting systems to perform SMT assembly in small quantities. Three-dimensional milling machine allows performing mechanical prototyping of mechanical parts;
- Set of equipment for investigation of optical electrical and thermal properties of light sources. This equipment is primarily focused on the solid-state light sources (LEDs) and other LED devices, but it can also be used for common light sources (incandescent lamps and discharge lamps).

Services:

- Optical, electrical, and thermal properties measurements for light sources and devices to carry out a full characterization of light sources. This service is primarily focused on the semiconductor light sources (LEDs) and other LED devices, but it can also be used for common light sources (incandescent lamps and discharge lamps);
- Optimization of spectral parameters for specific tasks in lighting systems. This service includes multicolour light source spectral power distribution optimization with the aim to meet certain pre-defined conditions, e.g., optimizing some initial colour source to achieve maximum luminous or mesopic luminous efficiency, the highest or lowest photobiological effect on humans or the lowest photochemical damage for illuminated painting;
- The authors have developed statistical color rendering evaluation method, which allows optimization of the spectral power distributions of the light source according to the color dulling, saturating and/or distortion indices. While using advanced modeling, optimization techniques and extensive experience allows solving multidimensional optimization problems in a reasonable amount of time. It is possible to study illuminated scene with imaging photometer-colorimeter and optimize spectral power distribution according to colour.

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• Innovative Chemistry Open Access Centre (INCHEMAS)

It is a part of Vilnius University Open Access Center for Physical Sciences and Technologies and also a part of National Center of Physical and Technology Sciences located in the "Sunrise Valley".

Number of researchers: 45.

Leading researchers: Prof. Habil. Dr. Aivaras Kareiva, Prof. Habil. Dr. Sigitas Tumkevičius, Prof. Habil. Dr. Arūnas Ramanavičius, Prof. Dr. Ričardas Makuška.

Research in Organic Chemistry:

Head of Department: Prof. Sigitas Tumkevičius

- Design and synthesis of novel carbocyclic and heterocyclic materials for optoelectronics and biochemical investigations;
- Development of efficient and/or green synthetic methods and catalyst systems for their production;
- Investigation of structure, aggregation and self-assembly of the synthesized compounds by spectroscopic, X-ray diffraction and computational methods;
- Study of their photophysical, semi-conductive and biological properties;
- Crystal engineering of organic materials.

Research in Physical Chemistry:

Head of Department: Prof. Habil. Dr. Arūnas Ramanavičius

- Biosensor and biofuel cell design and development. The effect of different enzyme, conducting polymers, nanocomposites and electron transfer mediators on the efficiency of electrochemical catalytic glucose biosensors;
- Metallic and polymeric nanoparticle synthesis, characterization and application for improvement of biosensors performance;
- Analysis of biological surfaces and biomodified interfaces using different methods;
- Investigation of different antibody and DNA immobilization techniques for biosensing;
- Evaluation of kinetic parameters of biorecognition surfaces;
- Development of biosensing based on molecularly imprinted polymer;
- Synthesis, characterization and bioapplication of gold and magnetic ferric oxide nanoparticles of different sizes as well as of conducting polymers, in particular polypyrrole, polyaniline and polycarboxypyrrole.

Resources:

- 150 m^2 laboratory space;
- 500 m^2 cleanroom facilities (ISO 8, 7, 6, 5);

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- Multi-detector GPC/SEC system (TDA-Max with 4 detectors, Viscotek);
- Differential scanning calorimeter (DSC 8000, Perkin Elmer);
- Freeze dry system (FreeZone Plus 2,5 L, Labconco Corporation);
- X-ray diffractometer (D8 Advanced, Bruker);
- Ultra-high-resolution analytical FE-SEM (SU70 with EDS and EBSD and turbo-sputtering, Hitachi);
- Ultra performance liquid chromatographer with PDA and q-TOF MS detectors (Acquity UPLC + micro TOF-QII, Waters/Bruker);
- Ellipsometer (M-2000, J.A. Woollam Co);
- Microwave reactors, refrigerating equipment, Liquid Chromatography/ Mass Spectrometry (LC/MS).

Services:

- Absolute molecular weight, molecular size, intrinsic viscosity, molecular conformation;
- Biomolecules interaction determination;
- Layer thickness measurement;
- Measuring and imaging surface electrochemical properties measuring in liquid phase: response current – probe position over surface. Probe (Pt or Au) diameter from 10 to 100 μm;
- Metals and alloys quantitative analysis;
- Carbon, hydrogen, nitrogen, sulphur and oxygen determination;
- Surface morphology and elemental analysis (crystallographic orientation) by scanning electron microscopy;
- Synthesis of various organic materials and polymers for optic, opto-electronic, lasers technology, biotechnology, medicine and other applications.

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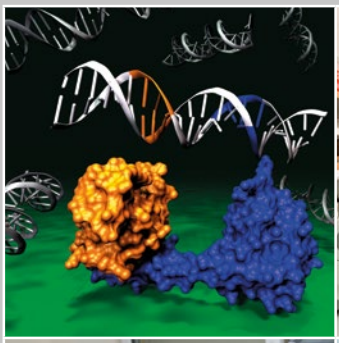

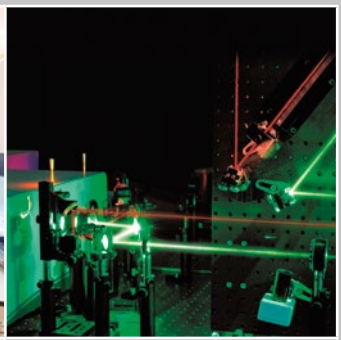
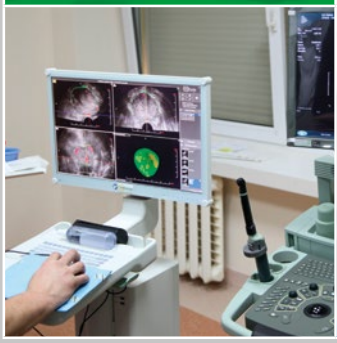
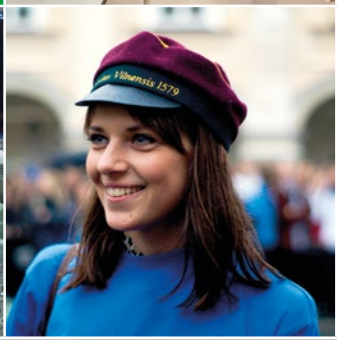

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