KLAIPĖDA UNIVERSITY

JŪROS TYRIMŲ INSTITUTAS

MARINE RESEARCH INSTITUTE

JŪROS TYRIMŲ INSTITUTAS yra Klaipėdos universiteto padalinys, vykdantis fundamentaliuosius ir taikomuosius jūros ir pakrančių aplinkos bei jūrinių technologijų tyrimus. Institutas siekia įgalinti mokslo, studijų ir verslo bendradarbiavimą, pagrįstą aukšto lygio mokslo žiniomis, išnaudojant Jūrinio slėnio atviros prieigos mokslinių tyrimų infrastruktūros galimybes.

The MARINE RESEARCH INSTITUTE is a subdivision of Klaipėda University, conducting fundamental and applied research on marine and coastal environment and maritime technologies. The Institute aims to facilitate science, study, and business cooperation, based on high-level scientific knowledge and the up-to-date open access research infrastructure of the Marine Valley.

COASTAL ENVIRONMENT AND BIOGEOCHEMISTRY LABORATORY

Modern equipment for observational and experimental research from the gene to the ecosystem level in both aquatic and terrestrial environments.

The laboratory offers the analysis of

- metals and metalloids in a wide range of solutions, including single cells and nanoparticles, elemental analysis in soils, sediments, and biological objects
- persistent and emerging pharmaceutical and other organic pollutants
- phytoplankton pigments
- a variety of anions, primary halogens (SO42-, Cl-, F- and Br-)
- dissolved nutrients (NH4+, NO2-, NO3-, SiO2, PO43-, DON, TN, TP and PSi)
- analysis of nutrient cycling in inland and coastal waters
- dissolved carbon species (DIC and DOC) and alkalinity
- particle size analysis from the sub-micron to the millimetre
- microscopic analysis of bacteria, zoo- and phytoplankton, zoobenthos
- application of molecular markers for the species identification, functional genomics, community structure analysis and microbial source tracking
- application of modern genetic techniques (DNA barcoding/metabarcoding) for biodiversity research and monitoring of non-native species
- analysis of genetic diversity, population genetic structure

Analytical equipment

- Liquid Chromatography – Mass Spectrometry (LC-MS)
- Ultra-High Performance Liquid Chromatography (UHPLC)
- Gas Chromatography – Mass Spectrometry (GC-MS)
- Gas Chromatography with Flame Ionization and Barrier Ionization Discharge Detection (GC-FID+BID)

- Inductively-Coupled-Plasma Mass Spectrometry (ICP-MS)
- X-Ray Spectrometry
- TOC/TN Analyser with Catalytic Oxidation/NDIR Method
- Continuous-Flow Spectrophotometry
- Flow Injection Analyser with conductivity detection
- Ion Chromatography
- UV/VIS Spectrophotometry
- Poteciometric titration

Environmental equipment

- light inverted and epifluorescence microscopes and binoculars
- Flow Cytometer
- Real-Time PCR System
- Quantitative Real-Time PCR
- Gel Electrophoresis and Documentation Systems
- QIAcube (fully automated sample preparation, purification of DNA, RNA, or proteins);
- Microplate Reader
- Laser Grain Size Analyser

Experimental facilities

- pore water extraction by different methods
- incubation systems from 5 ml to 5 l under controlled oxygen, light, and temperature conditions
- microprofiling with microsensors multimeter and motor driven platform
- continuous oxygen measurements with optodes (a contactless method)
- two climate rooms with gas (N2, air and others) supply, LED lighting needed for work in a temperature range from -4 to 40 °C
- growing chambers

General facilities

- extraction facilities (pressurized liquid and solid phase extraction, rotary evaporators, mineralizators)
- biological, sediment, and mineral sample preparation facilities (heavy metal free-milling, ultrasonic and mechanical homogenizers)
- freeze drier, drying ovens, autoclave, balances, centrifuges, shaker table and bath, vortex mixers, multimeters, and well-stocked chemical cabinets
- central vacuum, compressed air and nitrogen supply
- high variety of plumbed scientific gas
- distribution of loop of Millipore Elix, and Mili-Q water supply
- fume-hoods for solvent and acid (HCl, H2SO4, HNO3 and HF) extractions
- a spacious walk-in fridge

WATERBORNE TRANSPORT AND AIR POLLUTION LABORATORY

Research and improvement of waterborne transport efficiency and ecological parameters. Analysis of complete spectre of topics including fuels, engine and hull design and environmental performance.

- Analysis of heavy fuel oil, diesel biofuels and mixtures, wood pellets and similar
  - oxidation stability, density, viscosity, heating value, elemental composition, cetane number and water content
  - cold fuel properties: pour point, filtration and flash point
  - fuel and oil lubrication properties
  - calorific value, elemental composition, ash and moisture content
- Analysis of exhaust gas composition from ships, locomotives, buses, etc.
  - NOx, NO, SOx, CO, CO2 concentration in exhaust gas and exhaust gas opacity
  - NO, NO2 CO, CO2, SO2, VOC, O3 PM10 and PM2.5 concentration in ambient air
  - plume from fuel burning equipment
- Dual fuel engine test bench
  - evaluation of energetic and environmental parameters of alternative fuels
  - analysis and optimisation of use of natural gas in a dual fuel cycle
  - optimization of the engine work cycle according to the nature of the characteristic load
  - analysis of fuel properties and performance

Flow channel

- analysis of fluid dynamics and flow around objects
- coperation process modelling and analysis of vessels and other floating and hydro-engineering objects and equipment
- analysis of washout and wave impact of quays
- analysis on building structures interaction with water flow and waves
- analysis of ship hydrodynamics processes

Equipment

- Vario MACRO CHNS elemental analyser
- Calorimeter IKA C 5003
- Viscometer TV 2500b
- FPP 5Gs Filtering Limit Temperature Analyser
- MOC-120H Shimadzu Humidity Analyser
- PetroOXY Oxidation Stability Analyser
- PetroSpec TD-PPA-I Diesel Fuel Analyser
- SVM 3000 Stabinger Viscometer
- FP93 5G2 Flash Point Analyser
- CPP 5 Gs Puor Point Analyser
- Aquamax Karl Fischer Coulometric Titrator
- HFRR
- Airpointers – Complex Analysers
- Thermo 410i – CO2 Analyser
- Meteorological Sensor “Lufft” WS600UMB
- Trimble Juno 3B / 3D GPS Receiver
- Horiba Apha 370 CH Analyser
- Volvo Penta Dual Fuel Engine With Data Acquisition System
- Caterpillar Diesel Generator
- Testo Maritime Analyser
- Horiba PG 250 Analyser
- Opacimeter MAHA MDO-2 LON
- Flow channel (10 x 1,2 x 0,8 m)

MECHANICAL AND MARINE ENGINEERING LABORATORY

Testing of static and dynamic mechanical properties of materials and structures

- Electromechanical Zwick / Roell servo testing actuator for tensile, bending and compression tests
  - load up to 20 kN, test speed up to 500 mm/min, test area 420 x 700 mm
  - load up to 100 kN, test speed up to 750 mm/min, test area 700 x 850 mm
  - load up to 250 kN, test speed up to 1000 mm/min, test area 650 x 500 mm
- Hydraulic Zwick / Roell equipment for bending and compression tests
  - compression up to 3000 kN load, strain rate up to 200 mm/min, test area 400 x 400 x 500 mm
  - bending up to 200 kN load, strain rate 200 mm / min, test area 1200 x 600 x 1000 mm
- Vickers, Brinell, Rockwell, Knoop hardness tests
- metallographic microscope for metal microstructure testing
- a desk spectroscope for steel chemical composition testing
- 10 channel deformation acquisition system for testing of structures deformation
- electromechanical or electromagnetic Zwick / Roell testing machines for dynamic testing
  - fatigue tests of stiff specimens up to 300 Hz, 250 kN dynamic load, test area 650 x 500 mm
  - fatigue tests of semi-stiff specimens up to 2 Hz, 5 kN dynamic load, equipment can be mounted directly on the structure
  - Charpy impact toughness tests for impact energy determination up to 450 J, initial velocity of 5,3 m/s
  - Charpy/Izod impact toughness and impact tensile tests for fracture energy determination up to 2000 J, with a high initial velocity of up to 20 m/s, using dropping weight equipment

Diagnostics and monitoring of rotating machinery, dynamic rotor balancing and thermovision

- measurement of vibration acceleration, displacement and other technological parameters, monitoring and analysis using multichannel vibration data acquisition system, sampling rate up to 52 kS/s, possibility to measure up to 10 analogue and 12 digital sensors or transducers synchronically
- monitoring and analysis of vibration acceleration and displacement using multichannel vibration data acquisition system, sampling rate up to 52 kS/s, 4 channel
- dynamic balancing of rotors up to 100 kg mass, 800 mm length, 100 mm diameter
- thermal diagnostics of industrial equipment

Digital image recognition technology

- development of equipment for product colour recognition and dimension measurement in direct production flow
- development of video recognition equipment for recognition of live parameters from streaming production lines

Non-destructive testing services

- magnetic particle inspection tests of welded joints and castings (MT)
- determination of surface defects on welded joints and castings using penetrant method (PT)
- ultrasonic welded joint inspection (UT)
- ultrasonic thickness measurements


FESTO
psi
bar

FLEET

- R / V MINTIS – a multipurpose research vessel for the complex oceanographic research and applied marine services. The vessel is equipped with modern hydrographic, geological, geophysical and biological equipment, high accuracy positioning and advanced communication systems.
- Sailing vessel "Brabander" – classical type sailing platform perfectly suitable for sailing training, traditional and scientific sailing campaigns, applicable for professional and recreational diving activities, small scale marine oriented exhibitions and lectures, a classical tool for marine culture representation.
- Sailing boat „Odisėja" – operates as a platform for sailing training, provides services for recreational and educational boating and also takes part in scientific investigations.

SERVICES INCLUDE SAMPLING, LABORATORY ANALYSIS AND EXPERTISE

- Geological investigations of the sea floor. Remote scanning of the sea-bottom, sampling and shallow coring activities for the analysis of type and distribution of superficial sediments and identification of basic geological conditions. Characterization of the geological setting, composition and basic mechanic properties of the sediments.
- Geophysical and geo-engineering investigations onshore, internal waterbodies and open sea. Investigation of the geological structure of the seabed, shallow seismic for engineering purposes, deep seismic for oil and gas exploration industry. Geophysical profiling available in order to identify buried objects – archaeological, military munition, obstacles for underwater infrastructure development projects.
- Investigations of sea bottom morphology. High-resolution full coverage of bathymetric measurements in shallow (up to 40 m) and deep – up to 600 m waters. Inspection of navigation routes and ports, dredging operation control, nearshore sediment balance and dynamics, pre-engineering offshore studies, river and lake bathymetry.
- Investigation of marine biodiversity. Sampling and analysis of water column and benthic communities (both qualitative and quantitative) along with visual inspection of the type and distribution of marine benthic habitats.
- Hydrological investigations. *In situ* measurements of the content of suspended matter, current velocity, turbidity, salinity, pressure, conductivity, temperature, oxygen content. Water sampling for the further analysis at the Coastal Environment and Biogeochemistry Laboratory.