

Memorial University



Overview

Memorial University, founded in 1925 in Newfoundland, was elevated to degree granting status in 1949. Outstanding research and scholarship, extraordinary teaching and learning, and a focus on public engagement are the university's hallmarks. Since 1992 research has exceptional growth at Memorial University with research income growth of approximately 7% from the previous year and the number of research sponsors has increased from approximately 450 to more than 1200 in 2010-11. Genesis Research is the Technology Transfer and Industry Liaison Office of Memorial University. Genesis Group is a separately incorporated entity, wholly owned by Memorial and governed by a board of directors representing industry, academia, and government. Genesis supports faculty, students and staff engaged in research, development and outreach.

Research Capabilities

Engineering

- Marine Environment Research Laboratory for Intelligent Vehicles (MERLIN)
 - Automated underwater vehicles
 - Ocean environmental monitoring
 - Scientific survey
 - Resource exploration in the Atlantic and Arctic
 - Underwater/Seabed Imaging (sonar and cameras)
 - Water quality
 - Vehicle dynamics testing
 - Particle Imaging Velocimetry system
 - Measure velocities and related fluid properties
 - Hydrodynamic research
 - Instantaneous flow structure
 - Velocity fields and measurement around ships, underwater vehicles, propellers and marine risers

Life Sciences

- Genomics and Proteomics Facility (GaP)
 - Bimolecular Analysis and DNA Sequencing
 - Genomics
 - 4 and 48 – capillary DNA Analyzers
 - microsatellites, AFLP, SNP analysis, mutation detection as well as sequencing
 - Software to analyze data

- Sequencing Analysis v5.2 – Designed to base-call; assign quality values; trim, display, and edit DNA sequencing data.
 - Seqscape® v2.5 – Allows the user to perform reference based analysis such as mutation detection and analysis, SNP identification, allele identification, and sequence confirmation.
 - GeneMapper® v4.0 – Enables automated allele calling and includes tools for SNPlex™ data analysis
- Bio-Rad gel systems
 - Bio-Rad Sub-Cell GT and Mini Sub-Cell GT
 - allow for analysis of up to 96 nucleic acid samples on a single gel
- Gel Logic 200 Imaging system
 - The Kodak Gel imaging system
 - visualization, imaging and quantitative measurements of nucleic acid and protein in stained gels.
- LI-COR 4300
 - Third generation instrument based on LI-COR's highly sensitivity infrared technology.
 - view data on true gel images
 - used microsatellite, AFLP analysis, reverse genetics and DNA sequencing.
 - LI-COR software packages for data analysis.
 - E-seq – Controls electrophoresis, sequences electrophoresis image files, and produces reports for data base submission.
 - Align-IR – Designed to provide sequencing alignment and assembly functions.
 - SagaGT – Automates electrophoresis, lane finding, location of standards, calibration of band sizes, and allele scoring.
 - Sagamx AFLP – Automates electrophoresis through band scoring.
- Nanodrop ND-1000
 - A full spectrum (220-750nm) spectrophotometer
 - measure 2 ul nucleic acids, protein and cell culture samples with high accuracy and reproducibility
 - utilizes sample surface tension to hold the sample in place
- Pall Life Sciences Multi-Well Plate Manifold
 - Used with multi-well filter plates for the concentration, fractionation, desalting and buffer exchange of up to 96 samples at a time.
- PCR Machines
 - 6 96-well PCR machines.
 - Four GeneAmp PCR system 9700's are specifically designed for amplification of nucleic acids to be analyzed on the ABI DNA Analyzers.
 - BioRad C1000 thermal cycler has a gradient feature that saves time by optimizing annealing temperatures in a single run.
- Proteomics
 - protein identification
 - the identification of protein post-translational modifications

- peptide de novo sequencing
- protein quantitation
- metabolite identification.
- Instrumentation:
 - Qstar XL LC/MS/MS System
 - a NanoSpray ion source, an IonSpray ion source and an APCI heated nebulizer ion source.
 - oMALDI 2 ion source available and a ProBot fraction collector allowing automated MALDI plate spotting from the nanoLC.
 - Available data processing software includes:
 - BioAnalyst
 - ProID
 - Pro ICAT
 - Pro BLAST
 - Pro QUANT
 - Metabolite ID
 - MASCOT and a fast MASCOT database
 - DIONEX UltiMate 3000 Nano and Capillary LC System
 - interfaced with the QSTAR XL.
 - LC-MS, LC-MS/MS and LC/LC-MS/MS analysis of complex protein mixtures.

Ocean Sciences

- Aquatic Research Cluster (ARC)
 - Fish Evolutionary Ecology Research
 - Lab Services
 - Conceptual design, feasibility and budgeting.
 - Full design and documentation of all aspects of aquatic systems and related facilities and infrastructure.
 - Full design and documentation of life support systems and husbandry support areas.
 - Design and documentation of artificial environments.
 - Design and documentation of aquarium specialized lighting.
 - Construction services (design/construct if required).
 - Design checks and reviews.
 - System testing.
 - Field Services
 - maintains a variety of Scuba gear for cold-water year-round diving
 - benthic trawls and drags, seines, plankton nets, niskin bottles, CTD, underwater video camera and a portable air compressor and generator
 - 4 m zodiac
 - 7 m Boston Whaler
 - 5 ton multi-purpose vehicle with aeration and recirculating seawater holding tanks (2500 L) suitable for transporting live specimens long distance
 - Aquatic Research Center

- Hatchery
 - Brood stock
 - First Feeding
 - Live Feed
 - Seawater conditioning system
- Seal Lab
 - 3 Harp Seals (*Phagophilus groenlandicus*)
 - Studies involving senescence, perception, diet, behavior and physiology
- Ocean Image and Data Analysis facility
 - Digital microscopy cameras
 - Analysis software for morphometric measurement
 - High performance compute tools for rapid numerical data analysis
 - Visualization and imagery manipulation.

Physical Sciences

- Centre for Chemical Analysis, Research and Training (C-CART)
 - Nuclear Magnetic Resonance (NMR)
 - X-Ray Crystallography (XRD)
 - Mass Spectrometry
 - Materials Characterization
 - Optical Spectroscopy.
- Computing, Simulation and Landmark Visualization Facility (CSLV)
 - Computing engines for imaging
 - Modeling and simulation
 - 3D immersive large-screen visualization room
 - Large format plotters.
- Micro Analysis Facility, Inco Innovation Centre (MAF-IIC)
 - High-resolution imaging
 - In-situ micro beam chemical analysis
 - Age dating of minerals and other materials such as environmental and archaeological samples
 - R&D projects on ore characterization for metallurgy and advanced mineral exploration
- The Earth Resources Research and Analysis Facility (TERRA)
 - Chemical and physical analyses utilizing a large variety of instrumentations
 - ICP-MS, XRF, XRD, Microprobe, radiogenic isotope, stable isotope, gamma detector, multisensor core logger and CT scanner instruments.
- Land and Seabed Imaging (LSIF)
 - Geological and geophysical equipment for imaging and mapping the Earth's crust
 - Land Acquisition Systems
 - 288-channel seismic reflection system
 - a ground-penetrating radar
 - a terrain conductivity unit
 - a resistivity profiler
 - a mag/vlf unit
 - Marine Acquisition Systems

- a multibeam echo sounder
- two separate high-resolution seismic reflection systems
- 48-channel marine seismic acquisition system
- piston and gravity corers.

Cryogenics

- Cryogenics Facility (Cryo-F)
- Produces and provide nitrogen and helium to Memorial research

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