

# Mount Allison University

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## Overview

Mount Allison University (MT A) is primarily an undergraduate university that continuously attracts strong students from across the country and around the world. MT A offers a very strong science program which prepares students for success at the graduate and professional level because of the experiential learning opportunities afforded by access to leaders in research and to high quality equipment and field sites

## Research Capabilities

### Chemistry & Biochemistry

- Protein dynamics and environmental biochemistry
- Development and testing nanoparticles and nonparticle-containing thin films as well as liquid crystalline films
- Use of gold nanoparticles for a variety of applications
- Liquid crystals and nonparticles as platforms for sensing
- Equipment
  - Atomic force microscope
  - Epi-fluorescent microscope
  - Synthetic preparative equipment and surface preparation tools

### Biology

- Modelling of human genetic and metabolic conditions
  - Understanding on a cell basis of conditions
    - Hermansky-Pudlak syndrome
    - Neurological and cancer-related epigenetic disorders
  - Cell Culture Facility
    - Ability to conduct experiments and tests on many different cell culture lines
    - Biohazard Level 2 Certification
    - A Sanyo Model MCO-19AICUVH CO2 Direct Heat, Air Jacketed Incubator CO2 incubator
    - A non-CO2 incubator
    - A biological safety cabinet (the Baker SterilGARD® III)
    - A full suite of molecular and microscopy equipment for supporting molecular analysis and cell imaging
  - Capabilities and methodologies established to handle a wide range of organic and inorganic compounds
- Fish ecology and aquaculture
  - Endangered species ecology
  - Fish sperm research
  - Development of alternate species for aquaculture

- Equipment
  - Digital Microscopy Facility with SEM and AxioImaging capacities
  - Gas Chromatograph Mass Spectrometer, FT-IR Spectrometer, and Atomic Spectrometer
  - Versamx Microplate reader
  - VersDoc Imaging for genetic research
  - Microinjection facility equipment
  - 6,000 litre tank system for rearing juvenile fishes including sturgeon
  - 57 tank recirculation racksystem for rearing zebrafish and for microinjection
  - 19' Carolina Skiff boat with 70 hp and trailer
  - Argo Amphibious Vehicle and trailer
  - Hoverguard 700 Hovercraft with fly-on fly off trailer

### Mathematics and Computer Science

- Development of computational decision support tools for high-risk decision making
  - focus is the facilitation of clinical diagnostic characterization of muscular disease state
- Projects requiring collection of and/or analysis of EMG data can be supported access to the Sierra Wave II (Cadwell Laboratories)
- Development of 3 key softwares
  - "DQEMG" is used to decompose EMG data for quantitative analysis
  - "Muscle simulator" is used to provide "gold standard" validation data for electromyographic decomposition and analysis based on a physiologically based complete muscle model, including progressive involvement models for several types of muscular disease
  - "Fuzzy Pattern Discovery" is used for information-based modeling and decision-making based from quantitative data

### Centre for Aquatic Biosciences

- Ecophysiology of fish
  - mechanism of thermal tolerance in fish
  - the interactions of abiotic stress and environmental contaminants. In 2010 her
- Equipment and infrastructure:
  - Holding tanks of various dimensions and volumes with environmental controls, wet tables, tide chambers, proportional diluter and analytical instrumentation
  - Two RT-RT-Q-PCR machines
  - Three CCD molecular imagers
  - Two spectrofluorometer/ spectrophotometer plate readers
  - Molecular cloning facilities
  - Deconvolution fluorescence microscope
  - Cell transfection system, cell free overexpression systems, algal cell culture facilities, and ancillary instrumentation
- Offer analyses and solutions to
  - Design and validation of immunoquantitations for profiling environmental functions
  - Mechanisms of thermal stress tolerance in fish

- Practical applications in bio-fuel development industry, water treatment and conservation
- Solutions to climate change and carbon sequestration;
- Immunodiagnostic development for use in crop science, aquaculture and fish health, and bioscience.

## Digital Microscopy

- Traditional (tungsten emitter) scanning electron microscopy (SEM)
- Energy dispersive x-ray spectroscopy (EDS)
- Optically sectioned fluorescence microscopy (Zeiss AxioImager.Z2/Apotome)
- Image processing and analysis
- Broad range of sample preparation equipment for biological, geological and materials science specimens
- Equipment:
  - JEOL JSM-5600 scanning electron microscope with:
    - PC control with functions accessible using the mouse (screenshot) or traditional knobset
    - 3.5 nm resolution
    - accelerating voltage from 0.5 to 30 kV
    - magnification from x18 to x300,000
    - secondary and backscattered electron imaging modes
    - eucentric goniometer stage for specimens up to 15 cm in diameter
    - Deben X/Y/rotation axis stage automation and custom transecting/position mapping software
    - transmitted electron adapter for analysis of thin films, sections and particles
    - 90 degree tilt rotary adapter for 360 degree views of specimens
    - digital image acquisition (640 x 480, 1280 x 960 or 2560 x 1920 pixels) and storage in a variety of standard formats
    - real time video capability
    - hardcopy options of laser printer or HP PhotoSmart photo printer
    - transfer of images via network or disk (DVD, CD, memory stick, etc.)
    - a full range of image processing software
  - Oxford Inca Energy 200 energy dispersive spectrometry (EDS) system with:
    - 138 eV resolution Pentafet detector
    - SATW window for detection of Boron and all heavier elements
    - Autocolumn for control of SEM functions (magnification, beam current, focus, etc.) from Inca console
    - software for qualitative, semi-quantitative and quantitative analyses (screenshot)
    - SmartMap of a "virtual specimen" allowing mapping of any element from stored data (screenshot)
  - Zeiss AxioImager.Z2 compound fluorescence light microscope with:
    - Apotome optical sectioning system
    - Colibri fast, high intensity monochromatic illumination system with 365 nm, 470 nm , 590 nm and neutral white LEDs
    - Full automation of objectives, apertures, filter cubes, illumination, specimen stage, etc.
    - AxioCam MRm high sensitivity 12-bit monochrome camera
    - AxioCam ICc3 12-bit RGB camera
    - Fluorescence, DIC and brightfield illumination

- Fluorescence filter cubes 20, 44, 49 and 62HE
- AxioVision 4.8 software
- Xeon Quad-Core host computer
- Kinetic Systems VibraPlane anti-vibration table
- Support equipment including:
  - Hummer 6.2 cold process plasma sputtering system
  - Denton DV-502A high vacuum evaporator
  - Denton DCP-1 Critical Point Dryer
  - Homebrew Freeze Dryer
  - stereomicroscope for specimen preparation

### Social Sciences

- Geospatial Modelling Lab
- Species distribution modelling
- Environmental monitoring and assessment
- Simulation modelling
- GIS
- Projects
  - Tantramar Dyke Risk
  - American Black Duck Mapping
  - Atlantic Beached Bird Analysis
  - Coastal Wetlands Institute
  - Marine Macroecology and Biogeochemistry Lab
  - Ecological, evolutionary and biogeochemical phenomena in oceans
  - Effect of climate change on marine organisms (focus on phytoplankton)

### Dendrochronology Lab

- Tree-ring chronologies in the Atlantic region.
- Researching annually-resolved proxy climatic records for the Atlantic region
- Dating historic structures in Maritime Canada.
- Equipment
  - Sanders, saws and drying ovens
  - Tree-ring measuring equipment and software
  - Velmex Stage System (Camera and microscope)
  - Image analyzing system

### Contact

Cassidy Weisbord  
 Industry Liaison Officer  
 (506) 866-3469  
[cweisbord@mta.ca](mailto:cweisbord@mta.ca)