Medicine Microscopy Core (MMC)
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COLUMBIA
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IRVING MEDICAL CENTER

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Resources and Facilities

Overview

The Medicine Microscopy Core is located on the 8th floor of the William Black Building at Columbia University Irving Medical Center within the Columbia Center for Human Development and Columbia Center for Stem Cell Therapies (CCHD/CSCT). These centers form a multi-departmental research hub focused on tissue regeneration and repair, the developmental origin of human disease, and therapeutic interventions. The microscopy core contains 3 state-of-the-art scanning confocal microscopes, a digital light sheet microscope, 2 tissue/slide scanning wide-field microscopes, numerous smaller systems, and serves over 90 users from 26 laboratories. Dr. John W. Murray is the director of the core, and he provides training and maintenance for all instrument systems and software and engages in collaborative scientific research, including custom image analysis scripting and software engineering, experimental design consultation, and acquisition of images. He also serves as liaison to biotechnology companies and Columbia IT. The primary microscopes are housed in room 828 (352 sq ft) and room 832 (100 sq ft), and there is a 125 sq. ft. office in room 8-801F.

Equipment List

Confocal Microscopes

Zeiss LSM 710 Confocal microscope with 6 laser lines (405, 458, 488, 514, 561, 633 nm) and 3 detectors with 10X, 20X, 40X 1.4 NA and 63X 1.4 NA objectives. Located in room 828.
Leica Stellaris 8 microscope with tunable white light laser (440-800 nm) and 405 nm laser 5 ultra-sensitive Leica HyD detectors, allowing rapid acquisition of 6 or more fluorescence channels, with Lightning near super-resolution adaptive deconvolution, Tausense real-time fluorescence lifetime imaging, LAS X navigator tissue scanning, temperature and CO2 enclosure for live-cell imaging, with 10X, 20X, 25X 0.95 NA immersion, 40X 1.4 NA, 63X 1.4 NA objectives. Located in room 828.

Light Sheet Microscope

Leica DLS SP8 Light Sheet and Confocal microscope that functions as both a high-resolution point scanning microscope and a digital light sheet microscope (DLS) for whole mount tissue imaging. Contains 4 laser lines (405, 488, 552, 638) and 4 detectors, LAS X navigator tissue scanning, 1.6X, 2.5X, 40X 1.3 NA, and 63X 1.4 NA objectives and 5X, 10X, 25X light sheet detection objectives with compatible TwinFlect mirrors. The light sheet mode features 4 fluorescence channel Z scanning (DAPI, Alexa 488, Alexa 568, Alexa 647 equivalent) and a 16-bit Orca CMOS camera for extremely low photobleaching, ultra-rapid Z-scanning of thick, whole mount tissues. Located in room 828.

Wide Field Microscopes

Two, Leica DMi8 wide field microscopes that feature 4 fluorescence channel imaging (DAPI, Alexa 488, Alexa 568, Alexa 647 equivalent fluors) along with bright field for rapid stage scanning with LAS X Navigator, which provides high resolution, multiplex tissue scanning with 2.5X, 5X, 20X, 40X, 100X objectives lenses and 20X and 40X long distance objectives for imaging through culture dishes. Located in room 828 and 832.

Other Instruments

Computing

Aquifer Hive Server and Computer Workstation with Xeon Gold 3.4 GHz, 16 Core CPU, 512 GB RAM, designed for high performance image processing of large image data sets, bioinformatics, and other analyses, and a Dell Precision 3650 tower Intel i7 64 GB RAM Desktop (office workstation).

Various other microscopes and instruments may be available by agreement with the respective laboratories.

Software

The Core provides access, training, and guidance for multiple viewing and image analysis software including Leica Aivia 3D machine learning software (single license), FIJI/ImageJ, CellProfiler, QuPath, CellPose, Leica LASX, and Zeiss Zen, and Python. We provide image analysis pipelines, custom computer scripts, imaging expertise, and project consultation on a collaborative basis.

Budgeting

Instrument, Service	**Hourly Rate**
Zeiss LSM 710 Confocal Microscope	$42.00
Leica Stellaris 8 Confocal Microscope	$40.00
Light Sheet Microscope (Leica SP8-DLS & Confocal)	$30.00
Leica Widefield Microscopes (Dmi8_1, DMi8_2)	$32.40
Training (All Instruments)	$100.00
Staff Image Acquisition	$100.00

There is a 25% discount for off-peak usage (M-F 7pm-7am, Sat and Sun).

Example budgeting

Small project	48 hours x $40 per hr.	= $1920 (3, 2-hr res. per week for 8 weeks)
Medium project	384 hours x $40	= $15,360 (3, 4-hr res. per week for 32 weeks)
Large project	1872 hours x $40	= $74,880 (3, 4-hr res. per week for 156 weeks)

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