



CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE

| COURSE TITLE: Fundamentals of optical microscopy | | | |
|---|---|---------------------|--|
| Course | MDGE 632 | | |
| Pre/Co-Requisites | Permission of instructor | | |
| Faculty | Cumming School of Medicine, Graduate Science Education | | |
| Instructor Name(s) | Pina Colarusso Grant Gordon | Email | gcolarus@ucalgary.ca gordong@ucalgary.ca |
| Office Location | HSC2829 | Office Hours | By appointment |
| Instructor Email Policy | Instructor will respond to emails with 2-3 business days | | |
| Telephone No. | Please do not contact by phone | | |
| Class Term, Days | Monday, September 16 Wednesday, September 18 Monday, September 23 Wednesday, September 25 Wednesday, October 2 Wednesday, October 9 (presentations) Note no class Monday, October 7 | | |
| Class Times | 1:30-3:30 pm | | |
| Class Location | HSC2829 | | |

| COURSE INFORMATION/DESCRIPTION OF THE COURSE |
|--|
| The Light Microscopy Module is targeted to students who have little formal training in optical microscopy. Key concepts such as the optical light path, spatial resolution, and sampling will be emphasized. In addition, students will have the opportunity to assemble basic bright-field and fluorescence microscopes using optical "lego." |
| LEARNING RESOURCES/REQUIRED READING |
| All materials provided online (creative commons license or through University of Calgary library resources) |

COURSE OBJECTIVES/LEARNING OUTCOMES

- Identify the parts of a standard brightfield microscope
 1. Trace the light path of a standard brightfield microscope from the source to the detector
 2. Set up Koehler illumination and explain why it is important for optimizing image quality of an optical microscopy
 3. Describe image formation for simple convex lenses using the ray model
 4. Describe how the objective and the eyepiece or the objective and the projection lens work together to form magnified images in a compound microscope
 5. Define and identify conjugate planes in a microscope
 6. Define and describe numerical aperture and its link to spatial resolution
 7. Differentiate between the magnification and the numerical aperture and to explain which is more important when considering the spatial resolution of a microscope objective
 8. Explain how the different types of objective features influence image quality
 9. Trace the light paths of a widefield fluorescence system identify the components of the light path, and describe the purpose of each component
 10. List the acquisition settings such as lamp intensity, binning, and exposure time and describe how these settings influence the image quality

CUT POINTS FOR GRADES

This course adheres to the grading system outlined in the University of Calgary, Faculty of Graduate Studies Calendar. Grades of A+ and A are not distinguished in the calculation of GPAs. Percentage/letter grade conversion used for this course is as follows

| Grade | Grade Point Value | Percentage Conversion | Graduate Description |
|-------|-------------------|-----------------------|--|
| A+ | 4.00 | 95-100 | Outstanding |
| A | 4.00 | 90-94 | Excellent – superior performance showing comprehensive understanding of the subject matter |
| A- | 3.70 | 85-89 | Very Good Performance |
| B+ | 3.30 | 77-84 | Good Performance |
| B | 3.00 | 72-76 | Satisfactory Performance |
| B- | 2.70 | 68-71 | Minimum Pass for Students in the Faculty of Graduate Studies |
| C+ | 2.30 | 63-67 | All grades below 'B-' are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements |



Assessment Components: The University policy on grading related matters is outlined in the [2019-2020 Calendar](#).

| Assessment Methods | Description | Weight % | Due Date and Time |
|--------------------|--|----------|------------------------------------|
| Assignments | Short answers; essay format; numerical problems. | 50 | September 25 and October 2 by 6 pm |
| Talk | Short presentation on an application of wide-field fluorescence microscopy | 25 | October 9 |
| Paper | Report on same topic as talk | 25 | October 16 by 6 pm |

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS:

Must attend all classes.

GUIDELINES FOR SUBMITTING ASSIGNMENTS:

All assignments should be submitted electronically.

FINAL EXAMINATIONS:

No final exam

EXPECTATIONS FOR WRITING:

Assignments and final paper require short answer and essay format.

LATE AND/OR MISSING ASSIGNMENTS:

5% per day deduction.

Is a passing grade on a particular component essential to pass the course as a whole?

NO

| COURSE TIMETABLE | | | |
|---------------------------|----------------------------|------------------|--|
| Course Schedule Date | Topic & Reading | Instructor | Assignments/Due Dates & Times |
| September 16-September 25 | Microscope image formation | Colarusso/Gordon | Assignment 1 due on September 25 |
| September 30-October 2 | Fluorescence microscopy | Colarusso/Gordon | Assignment 2 due on October 2 |
| October 9 | Presentations | Colarusso/Gordon | Talk slides due October 8 Talk presented on October 9 |
| | | | Paper due October 16 |



INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION

Cell phones must be turned off in class unless otherwise arranged with the instructor.

The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. Students are to refrain from accessing websites that may be distracting for fellow learners (e.g. personal emails, Facebook, YouTube). Students are responsible for being aware of the University's Internet and email use policy, which can be found at

<https://www.ucalgary.ca/policies/files/policies/electronic-communicationspolicy.pdf>.

MEDIA AND RECORDING IN LEARNING ENVIRONMENTS

Media recording for lesson capture

The instructor may use media recordings to capture the delivery of a lecture. These recordings are intended to be used for lecture capture only and will not be used for any other purpose. Although the recording device will be fixed on the Instructor, in the event that incidental student participation is recorded, the instructor will ensure that any identifiable content (video or audio) is masked, or will seek consent to include the identifiable student content to making the content available on University approved platforms.

Media recording for assessment of student learning

The instructor may use media recordings as part of the assessment of students. This may include but is not limited to classroom discussions, presentations, clinical practice, or skills testing that occur during the course. These recordings will be used for student assessment purposes only and will not be shared or used for any other purpose.

Media recording for self-assessment of teaching practices

The instructor may use media recordings as a tool for self-assessment of their teaching practices. Although the recording device will be fixed on the instructor, it is possible that student participation in the course may be inadvertently captured. These recordings will be used for instructor self-assessment only and will not be used for any other purpose.

Student Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

ACADEMIC ACCOMMODATIONS

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit



www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>

IMPORTANT INFORMATION

Any research in which students are invited to participate will be explained in class and approved by the appropriate University Research Ethics Board

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may NOT be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

COPYRIGHT LEGISLATION

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

ACADEMIC INTEGRITY

The Cumming School of Medicine expects intellectual honesty from its students. Course participants should be aware of University policies relating to Principles of Conduct, Plagiarism and Academic Integrity. These are found in the printed Faculty of Graduate Studies Calendar, or online under Academic Regulations in the Faculty of Graduate Studies Calendar, available at [Faculty of Graduate Studies Academic Regulations](#)

ACADEMIC MISCONDUCT

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

EMERGENCY EVACUATION AND ASSEMBLY POINTS

Assembly points for emergencies have been identified across campus. The primary assembly points for South Campus (Health Science Centre (HSC); Health & Research Innovation Centre (HRIC); Heritage Medical Research Building (HMRB) and Teaching, Research and Wellness (TRW)) are:

- HSC and HMRB: HRIC Atrium (alternate assembly point is Parking Lot 6)
- HRIC: HMRB Atrium (alternate assembly point is Parking Lot 6)
- TRW: McCaig Tower (alternate assembly point is HMRB – Atrium)

APPEALS



If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section N of the Faculty of Graduate Studies Calendar. Students must follow the official process and should contact the Student Ombuds Office (<http://www.ucalgary.ca/provost/students/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct

THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY (FOIP) ACT

This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP) and students should identify themselves on written assignments (exams and term work.) by their name and ID number on the front page and ID on each subsequent page. Assignments given by you to your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission

WELLNESS AND MENTAL HEALTH RESOURCES

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre), <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services> and the Campus Mental Health Strategy website <https://www.ucalgary.ca/mentalhealth/>

SUPPORTS FOR STUDENT LEARNING, SUCCESS, AND SAFETY

Student Ombudsman: The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union: The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives can be found here: <https://www.su.ucalgary.ca>

Graduate Student's Association: The GSA Vice-President Academic can be reached at (403) 220- 5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: <https://gsa.ucalgary.ca>

SAFEWALK

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit <http://www.ucalgary.ca/security/safewalk>. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.