



University of Manitoba
Faculty of Science
Department of Computer Science

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COURSE DETAILS

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| Course Title & Number: | COMP 7960 : Digital Image Processing |
| Number of Credit Hours: | 3.0 |
| Class Times & Days of Week: | 10:30 – 11:45 M/W |
| Location for classes/labs/tutorials: | EITC E2-360 |
| Pre-Requisites: | Students should have sufficient experience in Mathematics, Statistics, Programming, Data Structures and Algorithms. This implies roughly as a minimum, the completion of the equivalent of MATH 1300, MATH 1500, COMP 2140, COMP 3170 with a good standing in each course. Consult with the instructor if there is any doubt as to whether pre-requisites are met. |

Instructor Contact Information

| | |
|--------------------------------------|---|
| Instructor(s) Name: | Dr. Neil Bruce |
| Office Location: | E2-408 EITC |
| Office Hours or Availability: | Regular office hours will be announced in class, and decided upon based on minimizing scheduling conflicts with other courses. |
| Office Phone No. | 204-474-7313 |
| Email: | bruce@cs.umanitoba.ca |
| Contact: | Students may also contact the instructor by e-mail. Please include [COMP7960] in the header, so that these can be sorted appropriately by e-mail filters. |

Course Description

A detailed study of methods used in image processing. Major topics include image transformations, image enhancement, feature extraction, image analysis, and filtering.

General Course Information

You might want to include some basic information here: the purpose of the syllabus, the components of the syllabus, how you expect students to use it, how this course fits into a broader program of studies (i.e., particularly relevant for professional programs). You can mention how you will review the syllabus with students. This would also be the area to include a departmental or faculty perspective on teaching/learning or the value of this course.

Course Goals

This course begins by discussing a number of introductory topics related to the acquisition, and handling of image data. This includes a high-level overview of optics and electronics relating to digital image acquisition including sampling, quantization, and sources of noise. This also includes a brief overview of data structures used to represent images in memory, and formats for storage on disk.

The balance of the course comprising the core topics, addresses the manipulation of image content towards dealing with various forms of data corruption, signal enhancement, efficient storage, or quality assessment tied to image data. This includes image transforms including point and arithmetic operations, histogram- based transforms, linear and non-linear filtering; basics of linear systems and convolution theory, 2D Fourier transforms; image de-noising, enhancement, restoration, reconstruction and compression; colour image processing and representation; basic feature extraction; visual perception in image processing and image quality assessment; and a selection of advanced topics/applications (e.g. digital image forensics, computational photography, computer vision and image understanding).

Using Copyrighted Material

Example: Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at <http://umanitoba.ca/copyright/> or contact um_copyright@umanitoba.ca.

Textbook, Readings, Materials

No formal text is required. Course notes and content available online should be sufficient for the purposes of the course. For those seeking to supplement this with additional reading, the following may be helpful:

- Digital Image Processing, 3rd Edition, Rafael C. Gonzalez & Richard E. Woods, 2008. (Note: If purchasing this, a used copy of the 2nd edition might be a good option.)
- The Image Processing Handbook, 6th Edition, John C. Russ, CRC Press, 2011.
- Image Processing: The Fundamentals, Maria Petrou, Costas Petrou, John Wiley & Sons, 2010.

Be aware of copyright laws when using readings.

Course Technology

Lecture notes, and announcements regarding the class will appear at the following URL:

www.cs.umanitoba.ca/~bruce/COMP7960/

Assignments will also be made available from this page.

To hand in assignments, you should use the appropriate dropbox on UM Learn. Further details on this are provided in the assignment descriptions themselves.

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

[http://umanitoba.ca/admin/governance/media/Electronic Communication with Students Policy - 2014 06 05.pdf](http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf)

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy

([http://umanitoba.ca/admin/governance/governing_documents/community/electronic communication with students policy.html](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html)). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Academic Integrity

Any academic dishonesty will be dealt with according to the University's discipline bylaw. Assignments and projects should be exclusively based on your own work, and providing work to another student or students is prohibited. While the depth of problems tackled by the course and building on prior knowledge and/or progress made on problems assigned is permitted, any external resources that provide partial solutions to problems should be credited, and special effort made to disambiguate contributions to the overall body of work that are those of the student versus existing publicly available resources. A single blanket honesty declaration must be submitted prior to your first assignment and this will be treated as a contract applied to any and all materials submitted in satisfying the requirements of the course.

In addition to the general policies governing academic integrity and student discipline (Schedule "A" Policies and Resources), for individual work and group work, you should adhere to the following practices:

- (i) Group projects are subject to the rules of academic dishonesty;
- (ii) Group members must ensure that a group project adheres to the principles of academic integrity.
- (iii) Students should also be made aware of any specific instructions concerning study groups and individual assignments;
- (iv) The limits of collaboration on assignments should be defined as explicitly as possible; and
- (v) All work is to be completed independently unless otherwise specified. .

Students Accessibility Services

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

Student_accessibility@umanitoba.ca

Course Evaluation Methods

Assessment is based on 3 assignments, a course project and an in class Term Test. The approximate dates are outlined in what follows. Note that any specific due dates are approximate, and are subject to how the course proceeds.

| Due Date: | Assessment Tool | Value of Final Grade |
|---------------------------|---------------------------------|----------------------|
| October 3 rd | Assignment 1 | 10% |
| October 27 th | Assignment 2 | 10% |
| November 14 th | Assignment 3 | 10% |
| November 21 st | Term Test | 20% |
| November 5 th | Project Proposal | 2% |
| December 12 th | Project Report and Deliverables | 38% |
| In class – last 2 weeks | Project Presentation | 10% |

Assignment Grading Times

Generally assignment grades will be returned within 2 weeks of their due date barring extenuating circumstances.

Assignment Extension and Late Submission Policy

Late Assignments Assignment due dates are firm. Extensions are not provided except for documented medical reasons. However, ONE assignment (assignment only, not thesis proposal) may be handed in late during the term (no questions asked). Penalties apply to this submission:

- less than 12 hrs late: 10 % deduction.
- less than 24 hrs late: 20 % deduction.
- more than 24 hrs late: 100 % deduction.

Assignments submitted more than 24 hrs late receive a grade of zero. This extension may only be used once. Subsequent late assignments receive a mark of zero. There are no exceptions outside of those permitted according to University guidelines (e.g. illness).