



MONASH University
Information Technology

FIT3081
Image processing

Unit Guide

Semester 1, 2013

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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Table of Contents

<u>FIT3081 Image processing - Semester 1, 2013</u>	1
<u>Mode of Delivery</u>	1
<u>Contact Hours</u>	1
<u>Workload requirements</u>	1
<u>Unit Relationships</u>	1
<u>Prohibitions</u>	1
<u>Prerequisites</u>	1
<u>Chief Examiner</u>	1
<u>Campus Lecturer</u>	1
<u>Sunway</u>	1
<u>Tutors</u>	2
<u>Sunway</u>	2
<u>Academic Overview</u>	3
<u>Learning Outcomes</u>	3
<u>Unit Schedule</u>	4
<u>Assessment Summary</u>	4
<u>Teaching Approach</u>	5
<u>Assessment Requirements</u>	6
<u>Assessment Policy</u>	6
<u>Assessment Tasks</u>	6
<u>Participation</u>	6
<u>Examinations</u>	7
<u>Examination 1</u>	7
<u>Learning resources</u>	7
<u>Reading list</u>	7
<u>Feedback to you</u>	7
<u>Extensions and penalties</u>	8
<u>Returning assignments</u>	8
<u>Assignment submission</u>	8
<u>Online submission</u>	8
<u>Required Resources</u>	8
<u>Prescribed text(s)</u>	8
<u>Examination material or equipment</u>	9
<u>Other Information</u>	10
<u>Policies</u>	10
<u>Graduate Attributes Policy</u>	10
<u>Student services</u>	10
<u>Monash University Library</u>	10
<u>Disability Liaison Unit</u>	11
<u>Your feedback to Us</u>	11

FIT3081 Image processing - Semester 1, 2013

This unit covers fundamental techniques in image processing. Topics include image representation and enhancement, thresholding, image algebra, neighbourhood operations on images, Fourier methods, edge detection, feature extraction and representation, shape, texture, segmentation, classification, restoration, image compression, and colour and multiband image processing.

Mode of Delivery

Sunway (Day)

Contact Hours

2 hrs lectures/wk, 1 hr laboratory/wk, 1 hr tutorial/wk

Workload requirements

Students will be expected to spend a total of 12 hours per week during semester on this unit as follows:

- Lectures: Two 1 hour lectures
- Lab Session: 2 hour session starting Week 2

and up to an additional 8 hours in some weeks for completing lab and project work, private study and revision.

Unit Relationships

Prohibitions

CSE3314

Prerequisites

FIT2004 (or CSE2304) and FIT2014 (or CSE2303)

Chief Examiner

Mr Loke Kar Seng

Campus Lecturer

Sunway

Dr Loke Kar Seng

Consultation hours: Mon 2-5, Wed 3-5

Tutors

Sunway

Dr Loke Kar Seng

Consultation hours: Mon 2-5, Wed 3-5

Academic Overview

Learning Outcomes

At the completion of this unit students will have -Developed the ability to:

- understand the processes of image formation, acquisition, processing and analysis;
- develop programs for manipulating grey level, colour and multi-spectral images; and
- use standard image processing software;
- undertake computer analysis of medical, remotely-sensed, document, and other images.

Developed attitudes that enable them to:

- understand the role of visual information processing and analysis; and
- apply the theory and methods in practical problem solving.

Developed the skills to:

- write programs to carry out basic image processing tasks such as image denoising, image filtering and segmentation of an image in its constituent parts or objects;
- write programs to carry out advanced image processing and analysis tasks such as image segmentation, image, image classification, image data mining, and robotic vision; and
- build a software system for processing and analysis of image data.

Demonstrated the communication and teamwork skills necessary to:

- function as an image processing specialist in a group which is involved in developing a major software system; and
- produce appropriate documentation.

Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Image Processing Fundamentals; Arithmetic Operations on Images	
2	Introduction to Image Enhancement Techniques; Linear Stretching	
3	Spatial Filtering Methods; Sharpening Filters	
4	Histogram Equalization; Line and Edge Detection	
5	Image Thresholding; Image Segmentation Methods	
6	Clustering-Based Image Segmentation; Region Growing; Splitting and Merging	Assignment 1 due Friday this week
7	Texture Characterization; Co-occurrence Matrices; Entropy-Based Thresholding	
8	Image Filtering in Frequency Domain	
9	Image Data Compression	
10	Image Representation and Description	
11	Image Recognition I	
12	Image Recognition II	Assignment 2 due Friday this week
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Assessment Summary

Examination (3 hours): 70%; In-semester assessment: 30%

Assessment Task	Value	Due Date
Assignment 1	10%	Week 6, Friday
Assignment 2	20%	Week 12, Friday
Examination 1	70%	To be advised

Unit Schedule

Teaching Approach

Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://www.infotech.monash.edu.au/resources/staff/edgov/policies/assessment-examinations/unit-assessment-hu>)

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at

<http://lib.monash.edu/tutorials/citing/>

Assessment Tasks

Participation

- **Assessment task 1**

Title:

Assignment 1

Description:

Programming and Analysis for Image Processing Tasks

Weighting:

10%

Criteria for assessment:

1. Satisfactory implementation according to the requirements of the assignment.
2. Structure, modularity and efficiency of code
3. Ease of use of program user interface
4. Evidence of testing

Due date:

Week 6, Friday

- **Assessment task 2**

Title:

Assignment 2

Description:

Programming and Analysis for Image Processing Tasks

Weighting:

20%

Criteria for assessment:

1. Satisfactory implementation according to the requirements of the assignment.
2. Structure, modularity and efficiency of code
3. Ease of use of program user interface
4. Evidence of testing

Due date:

Week 12, Friday

Examinations

• Examination 1

Weighting:

70%

Length:

3 hours

Type (open/closed book):

Closed book

Electronic devices allowed in the exam:

None

Learning resources

Reading list

R. C. Gonzalez and R. E. Woods, Digital Image Processing using MATLAB, Prentice Hall, 2004.

A. K. Jain, Fundamentals of Digital Image Processing, Prentice-Hall, 1990.

W. Niblack, An Introduction to Digital Image Processing, PHI, 1986.

D. H. Ballard and C. M. Brown, Computer Vision, Prentice-Hall, 1982.

M. D. Levine, Vision in Man and Machine, McGraw-Hill, 1995.

R. Jain, R. Kasturi, and B. G. Schunck, Machine Vision, McGraw-Hill, 1995.

C. Watkins, A. Sadun, and S. S. Marenka, Modern Image Processing: Warping, Morphing, and Classical Techniques, Academic Press, 1993.

H. R. Myer and A. R. Weeks, The Pocket Handbook of Image Processing Algorithms in C, Prentice-Hall, 1993.

S. E. Umbaugh, Computer Vision and Image Processing: a practical approach using CVIPtools, Prentice Hall PTR, 1998.

Monash Library Unit Reading List

<http://readinglists.lib.monash.edu/index.html>

Feedback to you

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process:

<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>.

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Assignment submission

It is a University requirement

(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html>) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at <http://www.infotech.monash.edu.au/resources/student/forms/>. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz).

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Required Resources

Please check with your lecturer before purchasing any Required Resources. Limited copies of prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

Software

- Java Development Kit
- Netbeans

These are freely available from:

JDK - <http://www.oracle.com/technetwork/java/javase/downloads/jdk6-jsp-136632.html>

Netbeans - <http://netbeans.org/>

Prescribed text(s)

Limited copies of prescribed texts are available for you to borrow in the library.

Gonzalez and Woods. (2001). *Digital Image Processing*. (2nd Edition) Prentice-Hall.

Assessment Requirements

Examination material or equipment

Writing tools.

Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:

www.policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Plagiarism;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html>
- Assessment in Coursework Programs;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-po>
- Special Consideration;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.ht>
- Grading Scale;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>
- Discipline: Student Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>
- Academic Calendar and Semesters; <http://www.monash.edu.au/students/dates/>
- Orientation and Transition; <http://intranet.monash.edu.au/infotech/resources/students/orientation/>
- Academic and Administrative Complaints and Grievances Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.h>
- Code of Practice for Teaching and Learning;
<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-teac>

Graduate Attributes Policy

<http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.h>

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at <http://www.monash.edu.au/students>. For Sunway see <http://www.monash.edu.my/Student-services>, and for South Africa see <http://www.monash.ac.za/current/>.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to www.lib.monash.edu.au or the library tab in [my.monash](#) portal for more information. At Sunway, visit the Library and Learning Commons at <http://www.lib.monash.edu.my/>. At South Africa visit <http://www.lib.monash.ac.za/>.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

Website: <http://www.monash.edu/equity-diversity/disability/index.html> Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway Email: dlu@monash.edu Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

www.monash.edu.au/about/monash-directions and on student evaluations, see:
www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html