

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Image Analysis using PCI EASI/PACE

CODE NO. : GIS 410 **SEMESTER:** Winter
2001

PROGRAM: Geographic Information Systems Applications Specialist

AUTHOR: Dennis Paradine

DATE: Dec. 2000 **PREVIOUS OUTLINE DATED:** Jan, 2000

APPROVED:

		_____	_____
		DEAN	DATE

TOTAL CREDITS: 4

PREREQUISITE(S): GIS 405 – Introduction to Remote Sensing (ENVI Software)

LENGTH OF COURSE: 4 hrs/wk x
13 wks **TOTAL CREDIT HOURS:** 60

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*For additional information, please contact Kitty DeRosario, Dean
School of Engineering, Technology and Trades
(705) 759-2554, Ext. 642*

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I. COURSE DESCRIPTION:

PCI EASI/PACE is an advanced remote sensing software package. Using EASI/PACE, students will apply principles learnt in previous courses to create GIS data products from remote sensing data. Emphasis will be placed on understanding EASI/PACE software, atmospheric and radiometric correction, hyperspectral, multi-scale and radar image analysis, georeferencing and mosaicking aerial photographs and ordering satellite imagery.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Work within the PCI EASI/PACE Software Environment

Potential Elements of the Performance:

- display, enhance and filter imagery
- create new image files
- exchange image and vector data between remote sensing and GIS software packages

2. Perform atmospheric and radiometric corrections

Potential Elements of the Performance:

- explain atmospheric and radiometric correction
- perform atmospheric and radiometric corrections on remote sensing imagery

3. Perform hyperspectral image analyses

Potential Elements of the Performance:

- describe hyperspectral image analysis theory
- perform a hyperspectral image classification

4. Perform multi-scale image analysis

Potential Elements of the Performance:

- explain multi-scale image analysis and fusion theory
- perform a multi-scale image merge and classification

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5. Order aerial photographs and satellite imagery

Potential Elements of the Performance:

- order aerial photographs and satellite imagery using Internet sources

6. Georeference and mosaic aerial photographs

Potential Elements of the Performance:

- describe aerial photograph scanning, georeferencing, mosaicing and orthorectification theory
- explain different methods used to process aerial photographs
- scan, transfer, georeference and mosaic aerial photographs

7. Photogrammetry

Potential Elements of the Performance:

- describe photogrammetric technical procedures and
- perform photogrammetric analysis
- describe the available photogrammetric software and hardware
- transfer photogrammetric data to remote sensing or GIS software packages

8. Perform radar image analysis

Potential Elements of the Performance:

- describe radar image analysis theory
- perform radar image analysis

9. Program PCI EASI/PACE

Potential Elements of the Performance:

- understand PCI easi programming concepts and syntax
- perform batch processing in the easi programming language
- use the XPACE graphic user interface
- link easi programs to the XPACE GUI

III. TOPICS:

1. Working in the PCI EASI/PACE software environment (4 hours)
 - The EASI/PACE environment and basic commands

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- Image displays, enhancements and filters
 - Saving and printing images
 - Importing and exporting vectors and imagery from ENVI, ArcView and Arc\Info
2. Atmospheric and Radiometric Correction (4 hours)
- Atmospheric, radiometric and bi-directional reflectance theory
 - Atmospheric correction
 - Radiometric correction

Assignment #1. Working within the PCI software environment / atmospheric and radiometric corrections

3. Hyperspectral Image Analysis (6 hours)
- Hyperspectral image analysis theory and practicum
 - Classifying hyperspectral imagery
4. Multi-Scale Image Analysis (6 hours)
- Multi-scale image analysis theory and practicum
 - Image fusion

Practical / Theory Test #1. Topics covered to date

Assignment #2. Hyperspectral and multi-scale image analysis

5. Order satellite imagery and aerial photographs (4 hours)
- Determine the cost and availability of, and order satellite imagery and aerial photographs
6. Georeferencing and Mosaicing Aerial Photographs (8 hours)
- Scanning, georeferencing and mosaicing aerial photographs
 - Orthorectification theory

Assignment #3. Ordering imagery

7. Photogrammetry
- Photogrammetric theory and techniques
 - Hardware and software used in photogrammetry
 - Data transfer to a GIS

Assignment #4. Photogrammetry and processing aerial photographs

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8. Radar image analysis (6 hours)
 - Radar image analysis theory
 - Understanding and processing radar imagery

9. Programming with XPACE and easi (6 hours)
 - The easi applications language
 - Easi command line and system functions
 - The XPACE GUI
 - Programming with easi
 - Linking easi scripts to XPACE

Assignment #5. Radar image analysis and programming with XPACE and easi

Practical / Theory Test #2. Topics covered to date

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IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Lillesand T. and R. Kiefer. 2000. Remote Sensing and Image Interpretation. Wiley Press.

V. EVALUATION PROCESS/GRADING SYSTEM:**Grading System:**

Practical Assignments (5)	65%
Practical and Theory Tests (2)	<u>35%</u>
Total	100%

The following semester grades will be assigned to students in post-secondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.75
B	70 – 79%	3.00
C	60 – 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies & Procedures Manual - Deferred Grades and Make-up</i>).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has been impossible for the faculty member to report grades.	

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VI. SPECIAL NOTES:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following:

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.