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Course Name

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Code No.

## **I. COURSE DESCRIPTION:**

PCI Geomatica Prime is an advanced remote sensing software package. Using Geomatica Prime, students will apply principles learnt in previous courses to create GIS data products from remote sensing data. Emphasis will be placed on understanding this software, atmospheric and radiometric correction, hyperspectral, multi-scale and radar image analysis, georeferencing and mosaicing 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. Georeference and mosaic aerial photographs

Potential Elements of the Performance:

- describe georeferencing, mosaicing and orthorectification theory
- scan, transfer, georeference and mosaic aerial photographs

2. Understand photogrammetric analysis

Potential Elements of the Performance:

- describe photogrammetric procedures and perform analyses
- describe available photogrammetric software and hardware

3. Order aerial photographs, satellite imagery and maps

Potential Elements of the Performance:

- order aerial photographs, satellite imagery and maps
- determine appropriate images and maps for a given application

4. Work within the PCI Geomatica environment

Potential Elements of the Performance:

- perform image analysis operations in PCI Geomatica Focus and Imageworks
- atmospherically and radiometrically correct imagery
- exchange image and vector data between remote sensing and GIS software packages
- create a cartographically correct image-based map composition

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- use the XPACE, Modeler, EASI and Algorithm Librarian interfaces
5. Perform multi-scale and multi-temporal image analysis

Potential Elements of the Performance:

- explain multi-scale image analysis and fusion theory
  - explain multi-temporal image analysis theory
  - perform a multi-scale or multi-temporal image merge and classification
6. Perform hyperspectral image analyses

Potential Elements of the Performance:

- describe hyperspectral image analysis theory
- perform a hyperspectral image classification
- collect spectral signatures using a spectroradiometer

7. Perform radar image analysis

Potential Elements of the Performance:

- describe radar image analysis theory
- perform radar image analysis

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### III. TOPICS:

1. Georeferencing and Mosaicing Aerial Photographs (10 hours)
  - Scanning, georeferencing and mosaicing aerial photographs
  - Orthorectification theory
  - GCPWorks and Orthoengine
2. Photogrammetry (6 hours)
  - Photogrammetry theory, hardware, software and techniques
  - Interpreting an aerial photograph

#### **Laboratory #1. Georeferencing, Mosaicing, and Photogrammetry**

3. Order satellite imagery, aerial photographs and maps (4 hours)
  - Determine the cost and availability of, and order satellite imagery, aerial photographs and maps

#### **Laboratory #2. Map and Image Ordering / Business Proposal**

4. Working in the PCI Geomatica Prime environment (12 hours)
  - The PCI Geomatica Focus environment and Imageworks
  - Image analysis functions
  - Atmospheric, and radiometric correction theory and practicum
  - Creating a map composition in Geomatica Focus
  - XPACE, EASI, Modeler and the Algorithm Librarian
5. Multi-Scale and Multi-Temporal Image Analysis (6 hours)
  - Multi-scale image analysis theory and practicum
  - Multi-temporal image analysis theory and practicum

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### **Laboratory #3. Change Detection**

6. Hyperspectral Image Analysis (8 hours)

- Hyperspectral image analysis theory and classification
- Spectroradiometers and collecting spectral curves
- Airborne lasers

### **Laboratory #4. Hyperspectral and High Spatial Resolution Image Analysis**

7. Radar image analysis (6 hours)

- Radar image analysis theory
- Understanding and processing radar imagery

### **Laboratory #5. Radar Image Analysis**

**Practical / Theory Test. All course topics**

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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 (1)	<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 &amp; 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.