Prepared: Heath Bishop Approved: Corey Meunier

Course Code: Title	GIS422: INTRODUCTION TO REMOTE SENSING
Program Number: Name	4018: GIS-APPLICATION SPEC
Department:	GEOGRAPHIC INFORMATION SYSTEMS
Semester/Term:	17F
Course Description:	The use of remotely sensed data is becoming increasingly prominent in today`s society. Through accessing satellite imagery and aerial photography, the student will gain a theoretical background in remote sensing and solid practical abilities in the PCI Geomatica and ArcGIS software environments. Topics to be covered include: remote sensing physics, data sources, visual imagery interpretation, image enhancement and filtering, multispectral classification, data import and export, change over time analysis, GIS integration, georeferencing and mosaicking aerial photographs, orthorectification and LIDAR imagery.
Total Credits:	5
Hours/Week:	5
Total Hours:	75
This course is a pre-requisite for:	GIS412, GIS430, GIS440
Vocational Learning Outcomes (VLO's): **Please refer to program web page for a complete listing of program outcomes where applicable.**	#1. Understand the general concepts of spatial information and the current methodologies used to input, store, manipulate, and retrieve this type of data in a computer based environment; #2. Understand the typical data structures, algorithms, and computational problems that are encountered in various GIS technologies; #3. Be aware of the variety of sources of spatial data, such as surveying and remote sensing, that feed into a GIS, and the methods by which these data are realized in a GIS system; #4. Understand the ways in which GIS technologies can be applied within specific disciplines (see assumption above), and the advantages, changes in method, developmental problems, and restructuring that may result from the adoption of these technologies; #5. Be capable of designing and executing, in a progressive manner, algorithms and programs to handle spatial data and associated hardware devices in a programmatic environment of a GIS;
Essential Employability Skills (EES):	#1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. #2. Respond to written, spoken, or visual messages in a manner that ensures effective

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	communication. #3. Execute mathematical operations accurately. #4. Apply a systematic approach to solve problems. #5. Use a variety of thinking skills to anticipate and solve problems. #6. Locate, select, organize, and document information using appropriate technology and information systems. #7. Analyze, evaluate, and apply relevant information from a variety of sources. #9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. #10. Manage the use of time and other resources to complete projects. #11. Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, D
Other Course Evaluation & Assessment Requirements:	In addition to a passing grade in the course overall, students must also achieve an average mark of at least 50% on the test components in order to pass the course. Grade Definition Grade Point Equivalent A+ 90 – 100% 4.00 A 80 – 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 – 59% 1.00 F (Fail) 49% and below 0.00 CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar`s office. W Student has withdrawn from the course without academic penalty.
Evaluation Process and Grading System:	**Evaluation Type** / **Evaluation Weight** Assignments / 50% Tests / 50%
Course Outcomes and Learning Objectives:	**Course Outcome 1.**

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1. Explain the foundations of optical remote sensing.

Learning Objectives 1.

1.1 Describe remote sensing energy sources and radiation principles.
1.2 Describe the colour mixing process.
1.3 Describe the electromagnetic spectrum.
1.4 Describe energy interactions with earth surface features.

Course Outcome 2.

2. Describe remote sensing applications and sensors.

Learning Objectives 2.

2.1 Describe high, medium and low resolution satellite sensors.
2.2 Describe the Landsat program including variations between mission technology.
2.3 Identify the differences between imaging sensors and appraise their varying level of appropriateness depending on the project at hand.

Course Outcome 3.

3. Perform visual and spectral image interpretation.

Learning Objectives 3.

3.1 Utilize Google Earth Pro to access and visually interpret high resolution imagery and identify processing anomalies in the imagery.
3.2 Perform spectral image analysis through the use of filters, enhancements and spectral signatures.

Course Outcome 4.

4. Perform statistical processes on optical imagery.

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Learning Objectives 4.

4.1 Create and utilize image histograms and scatterplots to further interpret imagery.
4.2 Apply band mathematics and image transformations (band ratios, vegetation indices and principle component analyses) to imagery.

Course Outcome 5.

5. Perform image classifications.

Learning Objectives 5.

5.1 Collect regions of interest as classification training data.
5.2 Complete a supervised classification.
5.3 Complete an unsupervised classification.
5.4 Transfer classification results to a GIS environment.
5.5 Perform Feature extraction.
5.5 Determine statistical accuracy of classifications.

Course Outcome 6.

6. Perform Georeferencing and Mosaicing.

Learning Objectives 6.

6.1 Explain and undertake georeferencing of an unreferenced image.
6.2 Describe RMS and Residual Error.
6.3 Describe GCPs and their collection methods.
6.4 Collect mosaic cutlines and apply colour balancing.

Course Outcome 7.

7. Interpret and analyze LIDAR data.

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	Learning Objectives 7. 7.1 Describe, load, manage and interpret LIDAR data. 7.2 Explain LIDAR returns and create Bare Earth models using appropriate software. **Course Outcome 8.** 8. Utilize PCI Modeler software for automation purposes. **Learning Objectives 8.** 8.1 Perform image processing through automation. 8.2 Explore the use of batch processing in automation.
Date:	Friday, September 1, 2017
	Please refer to the course outline addendum on the Learning Management System for further information.