1. Prepared by: _____________________________________________________________

2. Date submitted: _________________________________________________________

3. Date approved: __05/09/08____ Date revised __10/14/14, 12/9/14, 04/08/15________

4. Department/discipline: __________________________________________________

5. Department(s) endorsement(s): ____________________________________________
(Signatures of the person(s) providing the endorsement are required.)

6. Course Title: ___________________________ Remote Sensing of the Environment

Abbreviated course title (25 characters or less): ________________________________

7. Course Designator: __________________ GEOG __________ 8. Course Level: 2030

9. Number of Credits: Lecture ____2____ Lab ____2____

10. Control Number (on site) ____20____ Control Number (online) _____________

11. Catalog/Course description:

This course explores the fundamental concepts and applications of remote sensing. Students will investigate land-cover patterns of physical and social environments spatially and historically through laboratory activities. Course topics include electromagnetic principles, sensors and their characteristics, imagery data sources, image analysis, image classification and interpretation, LiDAR, and integration with GIS. (Meets MnTC goal area 3)

12. Course prerequisite(s) or co-requisite(s): Accuplacer scores/ Other courses

Prerequisite(s):

Co-requisite:

13. Course Materials (Recommended course materials and resources. List all that apply, e.g. textbooks, workbooks, study guides, lab manuals, videos, guest lecturers).

Text: Determined on a yearly basis depending on availability and content, as noted in the syllabus. Remote Sensing of the Environment Laboratory Guide: Provided.

Additional Resources:

GIS Lab (Room 208) with Exelis’ ENVI and Esri’s ArcGIS software installed on networked PCs Plotter for poster printing.

ENVI Tutorials, Exelis Visualizations:
MultiSPEC Tutorials, Purdue Research Foundation: 
https://engineering.purdue.edu/~biehl/MultiSpec/tutorials.html

One-year Student Licenses for Esri’s ArcGIS Desktop (Windows based)

Esri Virtual Campus Courses

Supplemental articles, videos, and case studies

14. **Course Content** (Provide an outline of major topics covered in course)

1. History and applications of remote sensing
2. Electromagnetic spectrum
3. Data collection platforms (i.e. satellites, photographic sensors)
4. Image interpretation and classification
5. Lidar
6. Image resolution
7. Photogrammetry
8. Remote sensing and GIS

15. **Learning Goals, Outcomes, and Assessment**

At FDLTCC we have 4 Competencies Across the Curriculum (CAC) areas. They are as follows:

A. Information Literacy (the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information)
B. Ability to Communicate (the ability to listen, read, comprehend, and/or deliver information in a variety of formats.)
C. Problem Solving (the ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.)
D. Culture (knowledge of Anishinaabe traditions and culture, knowledge of one’s own traditions and culture, knowledge of others’ traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.)

Course learning outcomes will fulfill the identified competencies.

Course Learning Outcomes.

Upon completion of this course, the student will be able to:

1. Demonstrate knowledge of the electromagnetic spectrum (A, B, C) (3-1)
2. Collect, manipulate, and analyze reflectance data (A, B, C) (3-1, 3-2, 3-3)
3. Perform land cover classification (B, C)*
4. Distinguish between different image acquisition platforms (B)
5. Demonstrate the ability to use image analyst software to produce meaningful products (C)
6. Identify real-world applications of remotely sensed images and analysis by organizations such as NASA (A, B, D)
7. Integrate remotely sensed imagery into a GIS (C)
8. Demonstrate the ability to assess the data needs to complete projects in different geographic locations (B, C)*
9. Apply calculations to remotely sensed imagery to create information about the content of the image, such as rendering an NDVI to determine vegetative health (C) (3-1, 3-2)*
10. Compare processed data output with views on landscape and change, such as through a change analysis (C, D) (3-4)*

* These outcomes also directly address a goal area of Spatial Thinking (the ability to visualize and analyze the spatial relationships between objects using one or more of the eight fundamental spatial thinking skills: analogy, association, aura, comparison, hierarchy, pattern, region, transition.)

16. **Minnesota Transfer Curriculum (MnTC):** If this course fulfills an MnTC goal area, state the goal area and list the goals and outcomes below:

See [www.mntransfer.org](http://www.mntransfer.org)

Goal Area(s): 3

Goal and Outcomes:
Goal 3: Natural Sciences 1, 2, 3, 4