Syllabus

Course objective:
In its most basic definition, remote sensing means obtaining information about objects without physical contact. Environmental remote sensing is the art and science of analyzing remotely sensed images. This course will concentrate on digital image processing of optical, or passive, satellites. The outline follows a typical analysis path: from displaying an image for initial evaluation, applying radiometric and geometric corrections, to feature extraction using image transformations and image classification. Exercises in ERDAS Imagine are designed to reinforce the topic currently covered in the lecture.
Upon completion of the course, students should be able to understand the fundamental principles of remote sensing theory and become sufficiently proficient in using ERDAS Imagine in order to independently analyze digital satellite images or scanned aerial photographs.

Course outline:

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topic</th>
<th>Textbook</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug. 24/26</td>
<td>Introduction, Fundamenta</td>
<td>Ch. 1 &amp; 2</td>
<td>Lecture</td>
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<tr>
<td></td>
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<td>l physics of remote sensing</td>
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<tr>
<td>2</td>
<td>Aug. 31/Sept. 2</td>
<td>Basic principles of air photo interpretation</td>
<td>Ch. 9</td>
<td>Lecture</td>
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<tr>
<td>3</td>
<td>Sept. 9</td>
<td>Satellite remote sensing systems</td>
<td>Ch. 4</td>
<td>Lecture &amp; Exercise 1</td>
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<td></td>
<td></td>
<td>Interpretation of satellite images</td>
<td>Ch. 7</td>
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<tr>
<td>4</td>
<td>Sept. 14/16, Sept. 18/19</td>
<td>Image display.</td>
<td>Ch. 5-5.3</td>
<td>Lecture &amp; Exercise 2, Field trip 1</td>
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<tr>
<td>5</td>
<td>Sept. 21/23</td>
<td>Radiometric corrections</td>
<td>Ch. 11</td>
<td>Lecture &amp; Exercise 3</td>
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<tr>
<td>6</td>
<td>Sept. 28/30</td>
<td>Geometric transformations</td>
<td>Ch. 3,6</td>
<td>Lecture &amp; Exercise 4</td>
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<td>7</td>
<td>Oct. 5/7</td>
<td>Review and midterm 1</td>
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<td>Midterm 1</td>
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<td>8</td>
<td>Oct. 12/14</td>
<td>Arithmetic operations &amp; indices</td>
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<td>Lecture &amp; Exercise 5</td>
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<td>9</td>
<td>Oct. 19/21</td>
<td>Neighbourhood operations (filters)</td>
<td>Ch. 5.4</td>
<td>Lecture &amp; Exercise 6</td>
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<tr>
<td>10</td>
<td>Oct. 26/28</td>
<td>Unsupervised classification</td>
<td>Ch. 8.1 – 8.3</td>
<td>Lecture &amp; Exercise 7</td>
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<tr>
<td>11</td>
<td>Nov. 2/4</td>
<td>Supervised classification</td>
<td>Ch. 8.3 – 8.4</td>
<td>Lecture &amp; Exercise 8</td>
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<tr>
<td>12</td>
<td>Nov. 9, Nov. 14 or 15</td>
<td>Accuracy assessment</td>
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<td>Exercise 8, Field trip 2</td>
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<tr>
<td>13</td>
<td>Nov. 16/18</td>
<td>Review &amp; Midterm 2</td>
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<td>Midterm 2</td>
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<tr>
<td>14</td>
<td>Thanksgiving break</td>
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<tr>
<td>15</td>
<td>Nov. 30/Dec. 2</td>
<td>Work on final projects</td>
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<tr>
<td>16</td>
<td>Dec. 7/9</td>
<td>Work on final project</td>
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<td>17</td>
<td>Dec. 18</td>
<td>Final project presentations</td>
<td>Time: 1:30pm – 4:00</td>
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</table>

Textbook:
Tempfli et al. (eds.) 2009: Principles of remote sensing: an introductory textbook
Evaluation:
Exercises: 8*5% = 40%
Final project: 20%
Midterm 1: 15%
Midterm 2: 15%
Field trip reports: 2*5% = 10%

Grade distribution (+/- will be used)
A: 90 – 100%
B: 75 – 89.99%
C: 60 – 74.99%
D: 50 – 59.99%
F: <50%

Exams, assignments, and attendance
If you know that you will miss an exam, please speak to me before the exam. If you miss the exam because of medical reasons or other unforeseen circumstances beyond your control, please be prepared to submit evidence. Exercises are due one week after they have been assigned. For each working day late, one point is deducted. Attendance is strongly recommended, because it most likely will positively affect your performance in the class. Field trips are mandatory and will be on one Saturday or Sunday for each field trip.

Additional literature:
Textbooks (general)

Textbooks (specialized)

Journals
Annual Review of Earth and Planetary Science
Canadian Remote Sensing Journal
Computers and Geosciences
Computers and Geotechnics
GeoInformatica
International Journal of Geographical Information Systems
International Journal of Remote Sensing
ISPRS Journal of Photogrammetry and Remote Sensing
Physics and Chemistry of the Earth, Part C, Terrestrial and Planetary Science
Photogrammetric Engineering & Remote Sensing
Remote Sensing of Environment