

# Geography 115C – Intermediate Remote Sensing Techniques

## Spring 2014

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*Instructor: Bodo Bookhagen ([bodo@eri.ucsb.edu](mailto:bodo@eri.ucsb.edu))*

Geog115C, Intermediate Remote Sensing, M, W 11:00-12:15 pm, EH3621

Lab: W 5-7:50pm, Star Lab, EH 2610

Office hours: Monday 1:00-2:00pm and by appointment, EH 4816

*Teaching Assistant: Mingquan Chen ([mingquan@umail.ucsb.edu](mailto:mingquan@umail.ucsb.edu)),*

*Office Hours: Monday 10-11am or by appointment, Office: EH 3611*

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Class website: <http://www.geog.ucsb.edu/~bodo/classes.php?pg=classes#rs115c>

### Syllabus

1. Mar 31 (M) Review and Introduction to class projects (glacier dynamics, remote sensing of climate change)
2. Apr 2 (W) Radiometric and Atmospheric Correction, Radiance Calibration, and temperature measurements Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 7+8,  
Recommended Reading: *Introductory Digital Image Processing*, J.R. Jensen, 2005, Chapter 7

#### **Lab 1: Atmospheric correction for Landsat TM, ETM+, and OLI (Landsat 8) imagery**

3. Apr 7 (M) Remote sensing properties of snow, ice, and water Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 7+8,  
Recommended Reading: *Introductory Digital Image Processing*, J.R. Jensen, 2005, Chapter 7
4. Apr 9 (W) Georeferencing and Registration (Ground Control Points, Mosaicing), Orthorectification (Relief correction) Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 7+8,  
Recommended Reading: *Introductory Digital Image Processing*, J.R. Jensen, 2005, Chapter 7

#### **Lab 2: Radiance Calibration for Landsat TM, ETM+, OLI (Landsat 8) imagery**

5. Apr 14 (M) Global Navigation Satellite System (GNSS) and Global Positioning System (GPS) (active Remote Sensing).
6. Apr 16 (W) Spatial Transformations (Image Fusion, HSV Transform, filtering, noise reduction) Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 6-8,  
Recommended Reading: *Introductory Digital Image Processing*, J.R. Jensen, 2005, Chapter 7+8

#### **Lab 3: Converting reflectance values to Kelvin (surface temperatures)**

Apr 21 (M) no lecture, continue working on Lab 3 in the Descartes Lab (EH 3610)

Apr 23 (W) no lecture, continue working on Lab 3 in the Star Lab (EH2610)

**Lab 4: Pan-sharpening of Landsat ETM+ and OLI images and georeferencing of ASTER imagery**

7. Apr 28 (M) Spatial and Spectral Transformations (Principal Component Analysis, Image-Cross Correlation Techniques, Spectral Unmixing) Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 4+8
8. Apr 30 (W) Resampling and Interpolation Recommended Reading: *Remote Sensing of the Environment*, J.R. Jensen, 2007, Chapter 6

**Lab 5: Automatic co-registration of Landsat OLI, ETM+, TM, MSS and ASTER imagery**

9. May 5 (M) Introduction to Digital Elevation Models (DEMs) and their Applications Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 7+8
10. May 7 (W) Beyond Multispectral Remote Sensing: Interferometric Synthetic Aperture Radar (InSAR) and Gravimetric measurements

**Lab 6: Supervised Classification**

11. May 12 (M) Remote sensing of weather, water, and hydrologic patterns from space and land (TRMM, NexRAD, GRACE)
12. May 14 (W) Introduction to remote sensing and GIS data types and Vectorization Required Reading: *Remote Sensing*, A. Schowengerdt, 2007, Chapter 4

**Lab 7: NDWI and band ratios to determine lake and snow areas**

13. May 19 (M) LiDAR scanning: Practical Application (meet in the parking lot of Ellison Hall, TBA)  
May 21 (W) Presentation of results from lidar scans and further point-cloud processing tools.

**Lab 8: Change detection & Vectorization (start making your posters)**

May 26 (M) no class, Memorial Day

14. May 28 (W) Lab projects: status reports & presentations (*every group presents for ~10 minutes - presentations must be sent to [bodo@eri.ucsb.edu](mailto:bodo@eri.ucsb.edu) by Tuesday (May 28) at 6pm. No exceptions.*)

**Lab 9: Making posters**

15. Jun 2 (M) Lab projects 2: status reports & presentations (*every group presents for ~10 minutes - presentations must be sent to [bodo@eri.ucsb.edu](mailto:bodo@eri.ucsb.edu) by Tuesday (May 28) at 6pm. No exceptions.*)
16. Jun 4 (W) Review Session

***June 3 (Tuesday) 11:30-1 pm: Poster session and CIRGIS annual meeting at the Corwin Conference Center (UCen). PLEASE NOTE that you will have to print your own posters latest on Friday, May 30.***

June 12 (Thursday), 12-3pm, Final Exam (EH 3621)

End: June 13, Finals week June 9-13 2014