

SATELLITE REMOTE SENSING – SIO 135/SIO 236

(<http://topex.ucsd.edu/rs>)

David Sandwell; 1102 IGPP; dsandwell@ucsd.edu; Ph. 858 534-7109
Helen Fricker; 3202 IGPP; hafricker@ucsd.edu; (858) 534-6145

TA: Eric Xu; sddyxxh@gmail.com

4 Units
Lecture TuTh 12:30p - 1:50p, IGPP 4301
Lab Th 3:30p - 5:00p or F 12:30-3:30p, IGPP 1102

Office Hours: by appointment, send e-mail

Grades: undergrad HW/Labs (50%), Midterm (20%), Final (30%)
grad HW/Labs (50%), Midterm (20%), Final (1%), [Term Paper \(29%\)](#).

Late HW/Labs: 20% reduction first day and 10% second + days. Very late is still worth up to 70%

Special MATLAB/OCTAVE Classes? Saturday sometime between 1 and 5 PM?.

SYLLABUS

Date	Topic	Reading	Homework	Lecture
LAB 0	get matlab or octave running	installing Octave		
31MAR	Introduction to course, labs, term papers Overview of remote sensing	Rees 1.1-1.4 Appendix		Sandwell
02APR	Platforms and orbits Use of color in RS	Rees 10.1-10.4 notes on orbits	HW1	Sandwell
LAB 1	Matlab basics, plotting			Xu
07APR	Electromagnetic radiation, polarization Ionosphere	Rees 2.1-2.2		Fricker
09APR	Fourier transform introduction	Rees 2.3 notes on fourier	HW2	Sandwell
LAB 2	1-D and 2-D Fourier transforms			Xu
14APR	Spectra and fourier transforms Diffraction	Rees. 2.3-2.7 notes on diffraction		Sandwell
16APR	Thermal radiation	Rees. 2.5-2.6 notes on radiation	HW3	Fricker
LAB 3	Data Types			Xu
21APR	Propagation, dispersion, and scattering	Rees 3.1-3.3 Ocean scattering web site		Fricker
23APR	Image processing	Rees 11.1-11.2 notes	HW4	Sandwell
LAB 4	Google Earth			Xu
			Term Paper - Part 1	

28APR	Review and go over HW 1-4		Due (grad students)	Fricker
30APR	Midterm			Sandwell/Fricker
LAB 5	Image Processing			Xu
05MAY	Optics, stereo and electro-optical systems	Rees 5.1-5.3		Sandwell
07MAY	MODIS , image classification	Rees 11.3-11.4	HW5	Sandwell
LAB 6	Image Classification			Xu
12MAY	Passive microwave systems and applications	Rees 7.1-7.4 notes1 notes2		Sandwell-classification passive-microwave
14MAY	Radar and laser altimetry	Rees 8.1 - 8.3	HW6	Fricker
LAB 7	Laser and Radar Altimetry			Xu
19MAY	Scattering and Synthetic Aperture Radar (SAR)	Rees 9.1-9.3 SAR Image Interpretation	Term Paper - Part 2 Due (grad students)	Sandwell
21MAY	Remote sensing of the solid earth	Rees 9.4-9.5 SAR Summary	HW7 KMZ-helper	Sandwell
LAB 8	Radar Interferometry			Xu
26MAY	Remote sensing of the oceans			Gille
28MAY	Remote sensing of the cryosphere			Fricker
02JUN	Grad. Student Presentations		InSAR - Westdahl volcano - Zelenak Microwave - Arctic sea ice - Ruth LIDAR - Marine Terraces - Derosier LIDAR - Movie - Derosier	
04JUN	Grad. Student Presentations Review for Final Exam	LAST DAY TO TURN IN ALL HOMEWORK AND LABS	InSAR - Permafrost - Neely GOES - Solar forecasting - Alimohammadi	
08JUN	Final Exam (will include questions from grad. student presentations) 11:30 - 1:30 PM			Sandwell/Fricker
12 JUN	All three components of grad. student term paper due		Term Paper - Part 3 Due (grad students)	

SIO 236 REQUIRED TEXT:

Rees, W. G. TITLE **Physical principles of remote sensing SECOND OR THIRD EDITION**, Cambridge University Press, 2013., 440 p., ISBN 978-0-521-18116-7 (Paperback)

WEB MATERIAL:

[Textbook web site](#)

[NASA Missions](#)
[NASA Science](#)

OTHER TEXT BOOKS:

Massom, R., D. Lubin, Polar Remote Sensing, V II: Ice Sheets, Springer Verlag, 426 pp., 2006.

[King, M. D., C. L. Parkinson, K. C. Partington, and R. G. Williams, TITLE Our Changing Planet: The View From Space, PUBLISHED Cambridge, UK, Cambridge University Press, 390 pp. ISBN 9780521828703, 2007.](#)

[Figures from Changing Planet: The View From Space.](#)

Elachi, Charles TITLE **Introduction to the physics and techniques of remote sensing** /Charles Elachi. PUBLISHED New York : Wiley, c1987. DESCRIPTION xvii, 413 p., [16] p. of plates : ill. (some col.) ; 26 cm. SERIES Wiley series in remote sensing. NOTE "A Wiley-Interscience publication." Includes bibliographies and index. ISBN 0471848107.

Stewart, Robert H. TITLE **Methods of satellite oceanography** / Robert H. Stewart. PUBLISHED Berkeley : University of California Press, c1985. DESCRIPTION viii, 360 p., [16] p. of plates : ill. (some col.) ; 27 cm. SERIES Scripps studies in earth and ocean sciences. 1. NOTE Includes index. Bibliography: p. [329]-351. ISBN 0520042263. SUBJECT Astronautics in oceanography.

Gonzalez, Rafael C. TITLE **Digital Image processing using MATLAB** / Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins. Upper Saddle River, N. J. : Pearson Prentice Hall, c2004. UCB Engin TA1632 .G66 2004

Gonzalez, Rafael C. TITLE **Digital image processing** / Rafael C. Gonzalez, Richard C. Woods. PUBLISHED Reading, Mass. : Addison-Wesley, c1992. DESCRIPTION xvi, 716 p.. [8] p. of plates : ill. (some col.) ; 24 cm. NOTE Includes bibliographical references (p. 683-703) and index. ISBN 0201508036. SUBJECT Image processing --Digital techniques. AUTHOR Woods, Richard C.

Richards, J. A. (John Alan), 1945- TITLE **Remote sensing digital image analysis : an introduction** / John A. Richards. EDITION 2nd rev. and enlarged ed. PUBLISHED Berlin ; New York : Springer-Verlag, c1993. DESCRIPTION xx, 340 p. : ill. (some col.) ; 25 cm. NOTE Includes bibliographical references and index. ISBN 3540548408 (Berlin : acid-free paper) 0387548408 (New York : acid-free paper) SUBJECT Remote sensing.
