SATELLITE REMOTE SENSING – SIO 135/SIO 236

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

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4 Units
Lecture TuTh 11:00p - 12:20p, 4301 IGPP
Lab Tu 12:30-1:50p
or F TBA
Eckhart lab access and rules

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%

SYLLABUS

Date	Topic	Reading	Homework	Lecturer
LAB 0	Review MATLAB or PYTHON			
02APR	Introduction to course, labs, term papers Overview of remote sensing	Rees 1.1-1.4 Appendix		
04APR	Platforms and orbits Use of color in RS	Rees 10.1-10.4 notes on orbits	HW1	
LAB 1	Matlab basics, plotting			
09APR	Electromagnetic radiation, polarization	Rees 2.1-2.2		
11APR	GPS and the Ionosphere Fourier transform introduction	Rees 2.3 EM Summary notes on fourier	HW2	
LAB 2	1-D and 2-D Fourier transforms			
16APR	Spectra and fourier transforms Diffraction	Rees. 2.3-2.7 notes on diffraction		
18APR	Thermal radiation	Rees. 2.5-2.6 notes on radiation	HW3	Sandwell
LAB 3	Data Types			

23APR	Propagation, dispersion, and scattering	Rees 3.1, 3.3, 3.5 notes on scattering		
25APR	Image processing - 1	Rees 11.1-11.2 notes1 notes2 convolution.m	HW4	Fricker
	NO LAB			
30 APR	Review and go over HW 1-4 Practice Midterm			
02MAY	MIdterm	Bring: 1-page/1-side "cheat sheet", homeworks/solutions, calculator		
LAB 4	Google Earth			
07MAY	Image Processing - 2 Optics, stereo	Rees 5.1-5.3	Term Paper - Part 1 Due (grad students)	
09MAY	optics, stereo, image classification 10:00 listen to NASA Decadal report	Rees 11.3-11.4	HW5	Fricker
LAB 5	Image Processing			
14MAY	Radar and laser altimetry	Rees 8.1 - 8.3 notes		Fricker
16MAY	Passive microwave systems and applications	Rees 7.1-7.4 notes1 notes2	HW6	Fricker
LAB 6	Image Classification			
21MAY	Scattering and Synthetic Aperture Radar (SAR)	Rees 9.1-9.3 Scatterometry SAR Summary SAR Image Interpretation	Term Paper - Part 2 Due (grad students)	
23MAY	Radar Interferometry	Rees 9.4-9.5 InSAR Theory (not on final exam)	HW7 - Due June 5 KMZ-helper	
LAB 7	Laser and Radar Altimetry			
28MAY	Earthquakes and Volcanoes			
30MAY	Remote sensing of the cryosphere			
LAB 8	Radar Interferometry	(optional lab)		
04JUN	Grad. Student Presentations			
06JUN	Grad. Student Presentations Review for Final Exam	**LAST DAY TO TURN IN ALL HOMEWORK AND LABS**		
11JUN	Final Exam 11:30 - 1:30 PM	The final exam will include questions from the graduate student presentations. The exam will have questions	Term Paper - Part 3 Due (grad	

		from the entire course. Bring: 1-page/1-side "cheat sheet", homeworks/solutions, calculator	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.