

Photo-2 CE69700-005 CRN:12790
 Exploitation of Spaceborne Imaging Systems (Satellite Photogrammetry)
 Spring 2010
 Syllabus and Schedule

SESSION NO.	DATE	LECTURE TOPIC	TEXTBOOK REF.
		Introduction, syllabus, history	
		SPOT review	
		Radiometry 1, solar illumination, radiance, irradiance, telescope and focal plane	3.1 – 3.6
		Radiometry 2, detector/CCD specs, satellite camera/mission design, auxiliary sensors	3.1 – 3.6
		Matlab demo	
		Two body problem, orbit mechanics, kepler elements	Apx. F
		Coordinate systems, kepler \leftrightarrow XYZ transformation	Apx. F
		ECF \leftrightarrow ECI, astro almanac, norad TLE	
		Image registration: warp, physical model, replacement model (RPC)	
		Pushbroom scanning: synchronous and asynchronous	
		Rotation matrix by axis-angle, quaternions	Apx. E.2
		Worldview-1 data and metadata description for basic, level 0, 1B	
		WV1 projection equations, I2G, G2I, unknown parameters, kepler vs. dense ephemeris, numerical inversion, systematic errors	
		Least squares estimation fundamentals linear & nonlinear, error propagation	Apx. B
		Lagrange interpolation, spline interpolation	
		Midterm Exam	
		WV1 resection, adjustable parameter selection,	
		Rational polynomial coefficients, RPC estimation, triangulation, adjustable parameters, error propagation	
		Spring Break	

		RPC use, rectification, map generation	
		LS error propagation, CE & LE numerical computation	
		Star cameras, attitude only resection	
		DEM generation	
		Radar and SAR intro, range and azimuth resolution, real aperture, synthetic aperture	
		ERS description, strip mode acquisition, spotlight mode acquisition	
		SAR signal, 1D ranging, range compression, matched filter, cross correlation & fourier transform, phase preservation	
		Doppler centroid estimation	
		SAR azimuth compression	
		SAR image formation (range-doppler)	
		SAR geopositioning, G2I, I2G	
		SAR interferometry	
	TBD	FINAL EXAM OR PROJECT	

Notes:

- Text: *Introduction to Modern Photogrammetry*, Mikhail et al, Wiley 2001, ISBN 0-471-30924-9
- Important Dates:
- Mon Jan 18 MLK
- Mon Jan 25 last day to drop
- Mon Mar 15- Fri Mar 19 spring break
- Fri Apr 30 classes end
- Mon May 3 final exam week