

Syllabus
CE 597 (29) Adjustment of Geospatial Observations
Fall 2008

Session	Date	Subject	Textbook
1	Tue 26-Aug	Textbook, class mechanics, introduction, Gauss, errors: random, systematic, blunder, concept of adjustment, vocabulary, model elements, redundancy, functional model, stochastic model, residual, $l+v=lhat$, parameter, counting, examples, weights, linear model, precision, accuracy, maximum likelihood, condition equation	Ch. 1, ch. 3
2	Thu 28-Aug	indirect observations, LS objective function, longhand solution, linear examples, leveling, angle figures	
3	Tue 2-Sep	constrained minimization, lagrange multipliers, observations only, longhand solution	
4	Thu 4-Sep	matlab tutorial, progr, graphics, gui, linear independence/dependence, subspaces, condition number, matrix rank, solution of linear system, inverse	
5	Tue 9-Sep	matrix derivation indirect obs, matrix derivation obs only, matrix naming conventions	
6	Thu 11-Sep	curve fitting, surface fitting, spline	
7	Tue 16-Sep	derive 2D rotation matrix, linear coordinate transformations, 2D conformal, affine transf, polynomial transf	
8	Thu 18-Sep	nonlinear equations/models, newton iteration 1D, nD, jacobian matrix, partial derivative & approximation, convergence	
9	Tue 23-Sep	nonlinear examples, matlab symbolic processing	
10	Thu 25 Sep	2D/3D ranging	
11	Tue 30-Sep	Probability, prob. density funct., distribution function, normal distribution, multivariate normal distribution, random variables, variance, std deviation	

12	Thu 2-Oct	F,chi-sqr,t,n,mvn, critical values, table, calculator, matlab, random vectors	
13	Tue 7-Oct	Covariance, covariance matrix, derive general error prop law, error propagation, covariance propagation	
14	Thu 9-Oct	ind. obs. Qll, Qxx, Qvv, Qlhlh obs. only Qll, Qvv, Qlhlh	
	Tue 14-Oct	No class - October break	
15	Thu 16-Oct	EXAM	
16	Tue 21-Oct	confidence interval, eigenvalue, eigenvector, hypothesis test, global test, F-test, Chi-square test, correlation coefficient	
17	Thu 23-Oct	confidence region, error ellipse, CE/LE, numerical integration	
18	Tue 28-Oct	plane surveying techniques, traverse triangulation, trilateration, azimuth, angle, direction measurement	
19	Thu 30-Oct	generic plane surveying adjustment	
20	Tue 4-Nov	projective transformation, pseudo LS, RPC	
21	Thu 6-Nov	derive 3D rotation matrix, rotation parameters, euler angles, seq. rotations, quaternions, algebraic rotation parameters, direction cosines, axis-angle parameterization, critical geometry	
22	Tue 11-Nov	general LS, mixed model, matrix derivation, error prop Qvv, Qxx, Qlhlh	
23	Thu 13-Nov	curve fit (both coord obs), 3D conformal coord. transf. (lidar merge)	
24	Tue 18-Nov	GPS receiver signal processing acquisition	
25	Thu 20-Nov	GPS receiver signal processing tracking	
26	Tue 25-Nov	GPS pseudorange and adjustment, self calibration, RINEX, error prop., PDOP, HDOP, VDOP, GDOP	
	Thu 27-Nov	No class - TG	
27	Tue 2-Dec	modern software development tools, GUI,	

		VB, matlab, vc++	
28	Thu 4-Dec	Preanalysis, network design, adjustment evaluation: cross validation	
29	Tue 9-Dec	robust estimation, reliability, IRLS, L1-min, data snooping, linear programming, redundancy number	
30	Thu 11-Dec	commercial LS software, starnet, move3, ...	
31	TBD	Final Exam	