Course Announcement – Spring 2015

ASE 389P 4-METHODS ORBIT DETERMINATION (unique: 13397)

TTH - 200 to 330p; GDC 2.402, BETTADPUR, S

Background:

This class bridges between the basics of orbital mechanics and orbit determination, and the topics encountered in professional engineering practice and research applications of astrodynamics & space-flight mechanics. It is assumed that you have a graduate-level understanding on the two-body problem (CM), of orbit perturbations (e.g. Geodesy or Applied Orbital Mechanics), and of the use of differential corrections for orbit determination (Stat OD).

Course Topics:

The Orbit Determination (OD) Problem

- OD: Intro; Framework and Requirements; Orbit & the Observer
- Relevance, requirements, and basics of Preliminary and Precise OD
- Covariance Analysis & its applications
- OD Problem Geometry and Formulation:
  - LEO (brief review) & planetary objects
  - Interplanetary artificial satellites

The Prediction Problem

- Mean orbital elements, Two-Line Elements (TLEs) and the SGP4
- Applications to modern (Space Situational Awareness) problems

Orbit Measurement Methods

- Historical survey
- Clocks and Oscillators: Principles, models & relevance to OD
- Radiometric and Laser tracking methods
  - Measurement Technology and Observation Parametrization
  - Survey of the error sources and the state of the art
**References:** There is no textbook for this course. The following books, however, contain all of the information for this class, and more.


**Satellite Orbits,** Oliver Montenbruck & Eberhard Gill, Springer (2005), corrected 3rd printing.


**Mathematical Formulation of the Double Precision Orbit Determination Program (DPODP),** Theodore Moyer, JPL Technical Report 32-1527 (1971). As NASA CR 118673, this is available in PDF from the NASA/NTRS. The Wiley Interscience books by Moyer (above) are a more complete form of this document.