AE 6211 ADVANCED DYNAMICS II

LIST OF TOPICS

1. **Energy** — 3 hours

2. **Equations of Motion**

Dynamical equations	1.5 hours
Secondary Newtonian frames	3 hours
Additional dynamical equations	1.5 hours
Linearization of dynamical equations	1.5 hours
Other special cases of dynamical equations	3 hours

3. **Extraction of information from equations of motion**

Integrals of equations	1.5 hours
Energy integral	1.5 hours
Momentum integrals	3 hours
Exact closed-form solutions	1.5 hours
Numerical integration	1.5 hours
Checking function*	3 hours
Constraint forces and torques	1.5 hours
Real solutions of nonlinear algebraic equations	1.5 hours
Generalized impulse, momentum	1.5 hours
Collisions	3 hours
Linear systems	1.5 hours

4. **Methods for Representation of Finite Rotation***

Orientation angles	1.5 hours
Rodrigues parameters	3 hours
Euler parameters	3 hours

Quizzes/exams	3 hours
Total	45 hours

Note: the time allotted to each topic includes coverage in lecture as well as discussion of problems solved by students in assigned exercises, review, and discussion of quizzes. Students are expected to solve problems by hand as well as by using Autolev or any other symbolic multi-body dynamics program.

Text: at the level of *Dynamics: Theory and Application* by Kane and Levinson. Certain advanced topics (marked with *) are covered from *Spacecraft Dynamics* by Kane, Likins, and Levinson and published papers by Kane and Levinson.