AE 6210 Advanced Dynamics I

1.	**Introduction**	0.5 hours
2.	**Kinematics**	
	Differentiation of vectors	1.0 hours
	Angular velocity	1.5 hours
	Differentiation in two frames	1.5 hours
	Auxiliary frames of reference	1.5 hours
	Angular acceleration	1.5 hours
	Velocity and acceleration	1.5 hours
	Two points fixed on a rigid body	1.5 hours
	One point moving on a rigid body	1.5 hours
	Configuration constraints and generalized coordinates	1.5 hours
	Motion constraints and generalized speeds	1.5 hours
	Partial velocities and partial angular velocities	1.5 hours
3.	**Mass Distribution**	
	Mass center	3 hours
	Inertia scalars, vectors, and dyadics	3 hours
	Parallel axis theorems	3 hours
	Principal axes	1.5 hours
4.	**Generalized Forces**	
	Moment about a point, bound vectors, resultant, couples	1.5 hours
	Equivalence	1.5 hours
	Generalized active forces, noncontributing forces	1.5 hours
	Forces acting on a rigid body	1.5 hours
	Contributing forces	1.5 hours
	Terrestrial gravitational forces	1.5 hours
	Bringing noncontributing forces into evidence	1.5 hours
	Coulomb friction forces	1.5 hours
	Generalized inertia forces	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 or multi-body dynamics program.

Text: at the level of *Dynamics: Theory and Application* by Kane and Levinson.