Topics for the short course on Mechanics from a geometric view point

	Topic	Note	Slides	Hours	Remarks
	Basic laws of classical mechanics - Galilean space time assumptions and inertial observers, conservation of linear momentum. Other consequences of conservation of linear momentum	1.1, 1.2.1,1.2.2,1.2.3, 1.2.4	1 — 20	1.5	
	Description of motion in moving frames. The meaning apparent forces such as Einstein, Coriolis, Centrifugal, and Euler forces. Example application to the description of the motion of a bead on a hoop.	1.2.6, 1.2.10	21 — 37	1.5	
	Infinitesimal rotations and angular velocity, the space of SO(3), Euler's theorem, the exponential map, the Hoph fibration and the unitquaternion representation of rotations	1.2.7, 1.2.11	41 — 52	2	
	Angular momentum of a collection of particles in a moving frame, derivation of Euler's rigid body equations	1.28, 1.3.1, 1.3.2	53 — 60	1.5	
	Free rigid body motion and the associated laws of conservation, solutions as the intersection the energy ellipsoid and the momentum sphere in the body angular momentum space, stability of rigid body motion	1.3.3, 1.3.4	64 — 68	1.5	
	Rigid body simulation using the discretization of rotation kinematics, rigid body PD control			2	

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