

Notes	Topics
01_01	Definitions, skeletal diagrams, mobility, topology, connectivity, tracked excavator, Wanzer needle bar, Grashof criterion (new dwg), dyad driver
01_02	3D joints, skeletal diagrams, McPherson strut, Stewart-Gough platform, 3D four bar
02_01	Working Model (WM) tutorial for slider crank
02_02	Working Model for four bar D mechanism
02_03	Adams tutorial for four bar and slider crank
02_04	SolidWorks (SW) Motion tutorial
03_01	Geometric kinematics for four bar and slider crank
03_02	Complex numbers for planar kinematics, four bar, in-line and offset slider crank, and inverted slider crank, MATLAB code
03_03	Newton-Raphson algorithm, Newton-Raphson for four bar, numerical partial derivatives, MATLAB code
03_04	Polycentric hinge, sewing machine
03_05	Instantaneous centers, velocity transfer, sewing machine, rigid body, Norton mechanisms, centrodes of four bar, instantaneous screw axes, knee ACL and PCL
03_06	Instantaneous screw axis, finite screw axis, axode
04_01	Two-dimensional vector and matrix notation
04_02	Two-dimensional coordinate transformations
04_03	Two-dimensional kinematics
04_04	Two-dimensional constraints
04_05	Two-dimensional position, velocity and acceleration solutions, four bar example, examples for other mechanisms
04_06	D mechanism, MATLAB code
04_07	Two-dimensional autofill constraint vector and Jacobian
05_01	Numerical derivatives using Savitsky-Golay floating cubic interpolants, MATLAB code
05_02	Two-dimensional experimental kinematics, rigid body, MATLAB code
05_03	Three-dimensional experimental kinematics, MATLAB code
06_01	Static force analysis - four bar scalar, four bar superposition, four bar matrix, pushups matrix, slider crank scalar, slider crank matrix
06_02	Virtual work
06_03	Static force analysis – virtual work (skid loader, sewing machine, four bar, pushups)
07_01	Mass moment of inertia quiz, review, disk with slots
07_02	Polygonal approximation of boundary integrals for area, centroid and area moment of inertia, object with holes, MATLAB code
07_03	Measuring mass moment of inertia with simple pendulum, torsional pendulum, centroid location and multiple pivots, MATLAB code
07_04	Vehicle inertial measurements
08_01	Forward versus inverse dynamics, inverse dynamics, printer hammer, matrix

- 08_02 Matrix dynamic analysis for four bar and slider crank (same four bar as kinematics)
- 08_03 d'Alembert's Principle, printer hammer, four bar
- 08_04 Two-mass equivalent link, shaking force for slider crank, in-line two cylinder air compressor, in-line four cylinder engine, in-line six cylinder engine, shaking force for four bar
- 08_05 Multiplanar balancing (flywheel, measure imbalance)
- 08_06 Coulomb friction in prismatic joint, Coulomb friction in revolute joint, free vibration with viscous damping, free vibration with Coulomb friction, Pacejka magic formula
- 08_10 Two-dimensional generalized forces
- 08_11 Two-dimensional inverse dynamics
- 08_12 Two-dimensional forward dynamics
- 08_13 DAE for anthropomorphic manipulator
- 08_15 Automatic generation of EOM
- 08_21 Third order dynamics
- 09_01 Forward dynamics
- 09_02 Lagrangian dynamics for simple pendulum, spring-mass, cylindrical coordinate manipulator, two link anthropomorphic manipulator (double pendulum), three link anthropomorphic manipulator, linear state space model for two link manipulator
- 10_01 State space model for spring-mass-damper and double spring-mass-damper, numerically evaluate linear state matrix
- 10_02 Forward time integration, MATLAB code
- 10_03 Friction reversal and collision, coordinate partitioning, constraint stabilization, Gaussian elimination
- 10_04 Collision detection for polygonal objects, bounding circle, axis aligned bounding box, point in polygon, edge intersection, separating axis theorem, classification of contacts, interpolating time of collision, three-dimensional collision detection, handling collision
- 10_05 Joint compliance, flexible elements
- 11_01 Three-dimensional vector and matrix notation
- 11_02 Chasles angle, Euler parameters, coordinate transformations
- 11_03 Three-dimensional kinematics (change ψ for snap)
- 11_04 Three-dimensional constraints (local joint definition frames, new figures)
- 11_05 Three-dimensional position, velocity and acceleration solutions
- 11_06 Three-dimensional mass moment of inertia
- 11_07 Three-dimensional generalized forces
- 11_08 Three-dimensional dynamics
- 11_11 RSUR geometric method, spherical four bar geometric method
- 11_12 RSUR generalized coordinates
- 11_13 RSUR D-H notation
- 11_14 RSSR generalized coordinates
- 11_15 RSPU geometric method
- 11_16 RSPU generalized coordinates

11_17	RSSP geometric method
11_18	RSSP generalized coordinates
11_19	RCCC generalized coordinates

x_01	Lagrange multiplier
x_02	old polygeom