

Tentative Schedule and Suggested Reading

I Newtonian Dynamics		
A One-dimensional motion	• K&K Ch:2.1-2.5, 2.7-2.9	<i>Sep 9, 14</i>
B Three-dimensional motion 1. Vectors, inner products, $\vec{F} = m\vec{a}$ 2. Coordinates and examples 3. Circular motion 4. Changing basis vectors 5. Moving coordinate systems 6. Universal gravitation	• K&K Ch:1.1-1.4 • K&K Ch:1.5-1.11, 3.1-3.2 • K&K Ch:2.10 • K&K Ch:3.4 • K&K Ch:2.6 • K&K Ch:3.3	<i>Sep 14</i> <i>Sep 16, 21</i> <i>Sep 21</i> <i>Sep 21, 23</i> <i>Sep 28</i> <i>Sep 28</i>
C Momentum 1. Definition, examples 2. Center of mass, impulse	• K&K Ch:4	<i>Sep 28</i> <i>Sep 28</i>
D Energy 1. 1-dim., kinetic, potential, work 2. 3-dim., line integral, gradient 3. Gravitational potential 3. Stokes' theorem, 2-dim. 4. Stokes' theorem, 3-dim. cross product, curl 5. Collisions	• K&K Ch:5.1-5.2 • K&K Ch:5.3-5.8, Note 5.2 • K&K Ch:6.5	<i>Sep 28</i> <i>Sep 30</i> <i>Sep 30</i> <i>Oct 5</i> <i>Oct 5, 7</i> <i>Oct 12, 14</i>
E Simple harmonic motion 1. Introduction 2. Complex numbers 3. Damped SHM 4. Forced SHM	• K&K Ch:3.7, 6.2, 6.3, 11.1, 11.2 • K&K Note 11.1 • K&K Ch:11.3 • K&K Ch:11.4-11.6	<i>Oct 14</i> <i>Oct 14</i> <i>Oct 19</i> <i>Oct 19, 26</i>
Midterm		Oct 21
II Special Relativity		
A Introduction	• K&K Ch:12.1-12.3	<i>Oct 28</i>
B Lorentz transformations 1. Derivation 2. Four-vectors 3. Doppler effect 4. Invariant length and causality 5. Dynamics	• K&K Ch:12.4-12.9 • K&K Ch:14.1-14.4 • K&K Ch:13, 14.5, 14.6	<i>Oct 28, Nov 4</i> <i>Nov 4</i> <i>Nov 9</i> <i>Nov 9, 11</i> <i>Nov 11, 16</i>
III Rigid body motion		
A Fixed axis rotation	• K&K Ch:7.1-7.4	<i>Nov 18</i>
B Angular momentum	• K&K Ch:7.5-7.10	<i>Nov 23</i>

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C Motion in 3 dimensions	• K&K Ch:8	<i>Nov 30</i>
IV Electrostatics		
A Coulomb's law	• Purcell Ch:1.1-1.8	<i>Dec 2</i>
B Gauss' law	• Purcell Ch:1.9-1.15	<i>Dec 7</i>
C Gauss' theorem	• Purcell Ch:2	<i>Dec 9</i>
D Scalar potential	• Purcell Ch:2	<i>Dec 9</i>
Final		Dec 16
E Conductors	• Purcell Ch:3.1-3.4	<i>Jan 18, 20</i>
F Capacitance	• Purcell Ch:3.5-3.8	<i>Jan 25</i>
G Ohm's law and circuit theory	• Purcell Ch:4	<i>Jan 25, 27</i>
H Numerical Electrostatics		<i>Feb 3</i>
V Electrodynamics		
A Maxwell's equations, Lorentz force	• Purcell Ch:5, 6.1, 6.7	<i>Feb 1, 3</i>
B Magnetostatics		
1. Ampere's law	• Purcell Ch:6.2	<i>Feb 3, 8</i>
2. Biot-Savart law	• Purcell Ch:6.3-6.9	<i>Feb 8</i>
3. dipole expansion		<i>Feb 8, 10</i>
4. Larmor precession		<i>Feb 10</i>
5. Cyclotron motion		<i>Feb 10</i>
Below is from Spring 2021:		
C Changing fields		
1. Maxwell's displacement current	• Purcell Ch:9.1, 9.2	<i>Feb 9</i>
2. Faraday's Law	• Purcell Ch:7.1-7.4	<i>Feb 11</i>
D Inductance	• Purcell Ch:7.5-7.10	<i>Feb 16, 18</i>
E AC circuits	• Purcell Ch:8	<i>Feb 18, 23</i>
F Light waves	• Purcell Ch:9	<i>Feb 25</i>
Midterm		Feb 25
VI Quantum Mechanics		
A Overview		<i>Feb 25</i>

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<p>B Angular Momentum</p> <ol style="list-style-type: none"> 1. States and complex vector space 2. J_z and Stern Gerlach 3. Linear operators 4. J_x, J_y and rotation 5. Spin-1/2 	<ul style="list-style-type: none"> • F&T 1-1 thru 1-5, 10-1 thru 10-3 • F&T 1-6 thru 1-12 	<p><i>Feb 25, Mar 9</i> <i>Mar 9</i> <i>Mar 9, Mar 11</i> <i>Mar 11</i> <i>Mar 16</i></p>
<ol style="list-style-type: none"> 6. Time translation, Schrödinger equation 7. Measurement, composite states and tensor product <p>C Position</p> <ol style="list-style-type: none"> 1. Definition, uncertainty principle 2. Uncertainty, gedanken experiments <p>D One-dim QM</p> <ol style="list-style-type: none"> 1. Ehrenfest relations 2. Simple harmonic oscillator 3. Quantum tunneling <p>E Quantum Computing</p> <p>E Quantum Field Theory</p>		<p><i>Mar 18</i> <i>Mar 23</i> <i>Mar 25</i> <i>Mar 30</i> <i>Apr 1</i> <i>Apr 6</i> <i>Apr 6</i> <i>Apr 8, 13</i> <i>Apr 15</i></p>