# Tentative Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment (EE 130)</th>
<th>Additional Reading (EE 230)</th>
<th>Homework</th>
</tr>
</thead>
</table>
| 1    | 10/3-10/10 | Introduction
Electromagnetic Optics - Wave Nature of Light
- Light waves in a homogeneous medium
- Refractive Index
- Group velocity and group index
- Magnetic field, irradiance, and Poynting vector
- Snell's Law and TIR
- Fresnel Equations | Kasap 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 |                      |                      |
| 2    | 10/13-10/17 | Resonator Optics- Multiple Interference and Optical Resonators
- Resonator Modes
- Finesse, spectral width, loss, & photon lifetime
- The resonator as a spectrum analyzer | Kasap 1.6, 1.7, 1.8, 1.9, 1.10, 1.11,1.12 |                      | HW #1    |
|      |           | More on EM Optics
- Goos-Hanchen shift and optical tunneling
- Temporal and spatial coherence
- Diffraction principles |                      |                      |          |
| 3    | 10/20-10/24 | Dielectric Waveguides and Optical Fibers
- Slab Waveguide, Modes, V-Number
- Modal, Material, and Waveguide Dispersions Numerical Aperture, Coupling Loss
- Step-Index Fiber, Multimode and Single Mode Fibers | Kasap 2.1,2.2, 2.3, 2.4, 2.5 | Agrawal 2.1,2.2,2.3   | HW #2    |
| 4    | 10/27-10/31 | Photons and Atoms:
- The photon
- Atoms, Molecules, and solids
- Interaction of Photons with atoms | Kasap 2.6,2.7, 2.8, 2.9, 2.10, 3.1, 3.2 | Agrawal 2.3,2,4,2.5,2.6,2.7 | HW #3    |
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment (EE 130)</th>
<th>Additional Reading (EE 230)</th>
<th>Homework</th>
</tr>
</thead>
</table>
| 5    | 11/3-11/7 | Midterm #1
Semiconductor Science and Light Emitting Diodes
• Semiconductor concepts and energy bands
• Direct and indirect bandgap semiconductors: pn junction principles
• The pn junction band diagram
• Light-emission processes in semiconductors
• Light-emitting diodes (LEDs) | Kasap 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15 | Agrawal 3.1, 3.2                  | HW #4 |
| 6    | 11/10-11/14 | Stimulated Emission Devices Lasers
Stimulated emission and light amplification
Einstein coefficients
Optical fiber amplifiers
Gas laser and He-Ne Laser
The output spectrum of a gas laser
Lasers
Laser oscillation conditions
Semiconductor lasers, (laser diodes)
Rate equation
Light emitters for optical fiber communications | Kasap 4.1, 4.2, 4.3, 4.4, 4.5 | Kasap, 4.6, 4.7, 4.10, 4.11, 4.12, 4.13, Agrawal 3.3, 3.4, 3.5 4.14, 4.15 | HW #5 |
| 7    | 11/17-11/21 | Semiconductor Detectors - Photodetectors
Principle of the pn junction photodiode
Absorption coefficient and photodiode materials
Properties of semiconductor detectors
The pin photodiodes
Avalanche photodiodes
Solar Cells
Midterm #2 | Kasap 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9 | Kasap 5.1, 5.14                      | Agrawal 4.1, 4.2 |
| 8    | 11/24-11/28 | Receiver structure
Receiver noise
SNR – Signal to Noise Ratio
BER – Bit Error Rate
Receiver Sensitivity – Minimum averaged power
Sensitivity degradation | Agrawal 4.3, 4.4, 4.5, 4.6 |                                                      | HW #6 |
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment (EE 130)</th>
<th>Additional Reading (EE 230)</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>12/1-12/5</td>
<td>Optical Fiber Communication</td>
<td>Agrawal 5.1, 5.2, 5.3, 5.4, 8.1, 8.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiplexing and coupling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• System design and performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• WDM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>12/8-12/12</td>
<td>Final Presentations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12/15-12/18</td>
<td>Final Exam (EE 130)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>