# Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Lab</th>
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<tr>
<td>1</td>
<td>Nuclear Magnetization&lt;br&gt;Bloch Equation&lt;br&gt;Excitation&lt;br&gt;The NMR Signal</td>
<td>Scanner Safety&lt;br&gt;Collect 2D image data, reconstruct image&lt;br&gt;Collect and transform an FID&lt;br&gt;Make a B1 map</td>
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<td>2</td>
<td>Frequency Encoding&lt;br&gt;Sampling&lt;br&gt;Chemical shift</td>
<td>1D imaging&lt;br&gt;Sampling, bandwidth, resolution, FOV&lt;br&gt;Chemical shift</td>
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<td>3</td>
<td>Phase encoding&lt;br&gt;K-space</td>
<td>2D imaging&lt;br&gt;Motion artifact</td>
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<td>4</td>
<td>RF pulses</td>
<td>Design and test an RF pulse&lt;br&gt;Spatial-Spectral Pulses</td>
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<td>5</td>
<td>Echo Planar Imaging</td>
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<td>6</td>
<td>Echo formation&lt;br&gt;Spin echoes&lt;br&gt;Gradient echoes</td>
<td>Generate an interferogram&lt;br&gt;Frequency dependence of balanced SSFP</td>
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<td>7</td>
<td>Multidimensional pulses</td>
<td>2D pulse coding</td>
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<td>8</td>
<td>RF Coils (b)</td>
<td>RF Coil construction (b)</td>
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<td>9</td>
<td>Cardiac Imaging (a)</td>
<td>Test Cartesian 3D pulse</td>
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<td>10</td>
<td>Parallel Imaging</td>
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**Due on Wednesdays at 2PM:**

Week 7: Lab 6 - Coherence Pathways and balanced SSFP  
Week 8: nothing  
Week 9: RF coils (group b)  
Week 10: Cardiac Imaging (group a)

**Finals Week:**  
Parallel Imaging (Wed 2PM) and Final Project (Friday 2PM, 40 points)

Group a is welcome but not required to come to group b classes, and vice versa.