

This is a tentative syllabus. Slides, handouts, and updates will be available through the course web page.

Week of	Tue	Thu
Week 1 Aug 26	<p><b><u>Introduction (Machine Learning)</u></b></p> <ul style="list-style-type: none"> <li>• <a href="#">Course Information</a></li> <li>• Reading: Chapter 1</li> <li>• <a href="#">Homework #1</a></li> </ul>	<p><b><u>Introduction</u> (uncertainty -- probability theory, Decision Theory)</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Matlab tutorial</a></li> </ul>
Week 2 Sept 2	<p><b><u>Introduction (entropy -- Information theory)</u></b></p> <ul style="list-style-type: none"> <li>• Chapter 1</li> <li>• HW#1 due</li> <li>• <a href="#">Homework#2</a></li> </ul>	<p><b><u>Probability Distributions</u></b> Non-parametric methods (probability density estimation)</p> <ul style="list-style-type: none"> <li>• Reading: Chapter 2</li> <li>• <a href="#">Project #1: curve fitting using linear regression</a></li> </ul>
Week 3 Sept 9	<p><b><u>Linear Regression (partial)</u></b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 3</li> <li>• HW#2 due</li> </ul>	<p><b><u>Linear Regression (cont.)</u></b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 3</li> <li>• Project 1 Due</li> </ul>
Week 4 Sept 16	<p><b><u>Linear Classification</u></b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 4</li> <li>• Project #2: Fisher discriminant classifier</li> </ul>	<p><b><u>Linear Classification (Fisher)</u></b></p> <ul style="list-style-type: none"> <li>• Fisher discriminant criteria <a href="#">derivation</a></li> <li>• Reading: <a href="#">Matrix manipulation notes (Tom Minka)</a></li> <li>• Reading: Chapter 4</li> </ul>
Week 5 Sept 23	<p><b><u>Linear Classification (cont.)</u></b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 4</li> <li>• Case-study: <a href="#">Facial Asymmetry</a> <ul style="list-style-type: none"> <li>◦ <a href="#">A new biometric (2001)</a></li> <li>◦ <a href="#">Human Identification (2003)</a></li> <li>◦ <a href="#">Expression Classification (2004)</a></li> <li>◦ <a href="#">Statistics Journal (2007)</a></li> </ul> </li> </ul>	<p><b><u>Dimension Reduction: PCA and LDA</u></b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 12</li> <li>• <a href="#">Eigenface</a> versus <a href="#">FisherFace</a></li> </ul>
	<p><b>Dimension Reduction (cont.): <u>Feature Selection</u></b></p>	

<p>Week 6 Sep 30</p>	<p><u><a href="#">Selection</a></u></p> <ul style="list-style-type: none"> <li>• <a href="#">additional material on feature selection</a></li> <li>• Feature selection papers <ul style="list-style-type: none"> <li>◦ <a href="#">Human Identification</a></li> <li>◦ <a href="#">on-line feature selection for tracking (slides)</a></li> </ul> </li> <li>• <a href="#">Project 2 Due</a></li> </ul>	<p><u><a href="#">Feature Selection (cont.)</a></u></p> <ul style="list-style-type: none"> <li>• <b>Project 3</b></li> <li>• Additional reading: JMLR 2003</li> <li>• Feature selection papers <ul style="list-style-type: none"> <li>◦ <a href="#">Neuroimage classification</a></li> <li>◦ <a href="#">Cellular image analysis</a></li> </ul> </li> </ul>
<p>Week 7 Oct 7</p>	<p><u><a href="#">Clustering</a></u></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 2, Chapter 9</li> <li>• <a href="#">additional reading</a></li> </ul>	<p><u><a href="#">Term Projects</a></u></p> <ul style="list-style-type: none"> <li>• <b>Project 3 Due</b></li> <li>• <a href="#">Project 4 (Final Term project)</a></li> </ul>
<p>Week 8 Oct 14</p>	<p><b>Dimension Reduction (cont.):</b> <u><a href="#">Locally Linear Embedding (LLE)</a></u> <b>Guest Lecture: Dr. David Capel</b></p> <ul style="list-style-type: none"> <li>• <a href="#">locally linear embedding</a></li> </ul>	<p><b>Review</b></p> <ul style="list-style-type: none"> <li>• <a href="#">projects review (project #2 and #3)</a></li> <li>• <a href="#">in-class quiz</a></li> <li>• course feedback</li> </ul>
<p>Week 9 Oct 21</p>	<p><b>Student Course-Project Proposal Presentation</b></p> <ul style="list-style-type: none"> <li>• 6 random samples (5 min/person)</li> <li>• Course Project Proposal Due</li> </ul>	<p><u><a href="#">Kernel Methods Introduction and Support Vector Machines</a></u></p> <ul style="list-style-type: none"> <li>• Reading: Chapters 6, and 7 (selectively)</li> </ul>
<p>Week 10 Oct 28</p>	<p><u><a href="#">Support Vector Machines (cont.)</a></u></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 7</li> <li>• <a href="#">Homework #3</a></li> </ul>	<p><b>Student Term Project -- Update #1</b></p> <ul style="list-style-type: none"> <li>• Project update (6 random samples, 5 min/person)</li> </ul>
<p>Week 11 Nov 4</p>	<p><u><a href="#">EM</a></u></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 9</li> </ul>	<p><u><a href="#">Graphical Models</a></u> <u><a href="#">Markov Random Fields</a></u></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 8</li> <li>• <a href="#">Homework #3 Due</a></li> </ul>
<p>Week 12 Nov</p>	<p><u><a href="#">Graphical Models</a></u> <u><a href="#">Markov Random Fields</a></u></p> <ul style="list-style-type: none"> <li>• Reading: chapter 8</li> <li>• Student Term Project: updates (2 random samples)</li> </ul>	<p><b>Belief Propagation</b></p> <ul style="list-style-type: none"> <li>• Reading: chapter 8</li> <li>• Student Term Project: updates (2 random samples)</li> </ul>
<p>Week 13</p>	<p><b>Hidden Markov Models</b></p> <ul style="list-style-type: none"> <li>• Reading: Chapter 13</li> </ul>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>Project Updates (6 random samples)</b></p> </div>

Nov 18	<ul style="list-style-type: none"> <li>• Student Term Project: updates (2 random samples)</li> </ul>	Project Updates (6 random samples)
Week 14  Nov 25	<b>THANKSGIVING BREAK (NO CLASS)</b>	--
Week 15  Dec 2	<u>Sampling Methods</u> <b>MCMC</b> <ul style="list-style-type: none"> <li>• Reading: Ch11</li> </ul>	<b>Advanced Topics:</b> <u>Combining Models</u> <ul style="list-style-type: none"> <li>• Reading: Chapter 13,14</li> </ul> OR <b>Variational Inference (Guest Lecture)</b> <ul style="list-style-type: none"> <li>• Reading: Chapter 10</li> </ul>
Week 16  Dec 9	<b>Project Presentation</b>	<b>Last Class: Project Presentation</b>
Week 17  Dec 15	--	Final project writeups (hard copy) due, Friday Dec 19