

# STRUCTURAL HEALTH MONITORING USING STATISTICAL PATTERN RECOGNITION

Time	Topic
09:00-10:00	<b>1. Introduction</b> <ul style="list-style-type: none"> <li>- Motivation for SHM, (NDE vs SHM)</li> <li>- Fundamental Axioms</li> <li>- Statistical pattern recognition paradigm</li> <li>- Historical Overview: Aerospace /Civil/Mechanical Application</li> <li>- Operational evaluation</li> </ul>
10:00-11:00	<b>2. Data Acquisition I</b> <ul style="list-style-type: none"> <li>- Sensor network components</li> <li>- Sensor performance metrics</li> <li>- Signal conditioning issues</li> <li>- Sensor network paradigms</li> <li>- Sensor Fusion</li> <li>- Excitation</li> </ul>
<b>11:00-11:15</b>	<b>Break</b>
11:15-12:15	<b>3. Data Acquisition II</b> <ul style="list-style-type: none"> <li>- Piezoelectric Active sensing</li> <li>- Guided Wave Propagation</li> <li>- Fiber Optics</li> <li>- MEMS</li> <li>- Emerging Sensing Technologies</li> <li>- Energy Harvesting</li> </ul>
12:15-13:15	<b>4. Damage Sensitive Features</b> <ul style="list-style-type: none"> <li>- Feature selection criteria</li> <li>- Summary of features reported in the literature</li> <li>- Waveform Comparisons</li> <li>- Physical model parameters</li> <li>- Data-Based model parameters</li> </ul>
<b>13:15-14:30</b>	<b>Lunch</b>
14:30-15:30	<b>5. Data Normalization</b> <ul style="list-style-type: none"> <li>-Environmental/ operational effects on SHM</li> <li>-Parametric modeling environmental effects</li> <li>-Look-up table technique</li> <li>-Machine learning techniques</li> <li>-Experimental design</li> </ul>
<b>15:30-15:45</b>	<b>Break</b>
15:45-16:45	<b>6. Statistical Classification: Supervised and Unsupervised learning Techniques</b> <ul style="list-style-type: none"> <li>- Supervised and unsupervised learning techniques</li> <li>- Hypothesis testing</li> <li>- Group Classification</li> <li>- Outlier Detection</li> <li>- Regression modeling</li> <li>- Machine learning approaches</li> </ul>
<b>16:45-17:00</b>	<b>Break</b>
17:00-17:45	<b>7. Examples</b> <ul style="list-style-type: none"> <li>- Aerospace Applications</li> <li>- Rotor craft application</li> <li>- Civil Engineering Applications (bridges)</li> <li>- Mechanical Systems Applications (telescope)</li> <li>- Reliability approaches to prognosis</li> </ul>
17:45-18:00	<b>8. Closing Remarks and Survey</b> <ul style="list-style-type: none"> <li>- Recap the statistical pattern recognition paradigm</li> <li>- Fundamental Axioms of SHM</li> <li>- Getting Started</li> <li>- Other sources of information</li> <li>- Course Survey</li> </ul>