ABEN 758 - Applications of Computer Imaging and Sensing

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105 Agricultural and Biosystems Engineering  
701-231-7271  
3 credits  
www.ndsu.edu/aben

Prerequisite(s): Graduate level standing in engineering.

Recent publications, papers, and articles from research journals and magazines.

Course Description: Sensors and non-destructive sensing principles (e.g., computer vision, spectroscopy, imaging, fiber optic sensing) for bioproduction and processing applications. Data/signal acquisition, signal conditioning/analysis techniques, signal interpretation and pattern recognition using statistical, neural networks, and fuzzy logic techniques.

Course Objectives: After completing this course, students will:
- Understand components of sensor systems and learn how to select different components of a sensor for real-world application
- Learn various non-destructive sensing principles and transducers that can be utilized for developing sensors and sensor systems
- Learn the techniques and challenges involved in integrating various components of a sensor system
- Learn the principles of different data processing, data analysis, and pattern recognition techniques for analyzing sensor signals (data) and predicting sensor performance
- Be familiarized with emerging sensor systems, i.e., biosensors, electronic nose.

Academic Honesty: All work in this course must be completed in a manner consistent with NDSU University Policy, section 335, Code of Academic Responsibility and Conduct (http://www.ndsu.edu/fileadmin/policy/335.pdf).

Attendance: According to NDSU Policy 333, attendance in classes is expected. Students are responsible for getting any information or announcements made if class absence is necessary.

Grading:
- One midterm 25%
- Homework and assignments 20%
- Final exam 25%
- Term Project 30%
- 100%
Students will be required to select a term project to work on a problem requiring the application of sensors. Students are encouraged to work on a team consisting of 2-3 people. Each team is required to write a proposal for the project (in the first quarter of the semester) and a final report for the project (at the end of the semester). Each team will also make a technical presentation about their project.

The test may be made up if missed for an acceptable reason, such as a medical or family emergency. Students are encouraged to inform the instructor ahead of time about such activities.

Grades will be assigned as follow:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
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<tbody>
<tr>
<td>90-100</td>
<td>A</td>
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<tr>
<td>80-89</td>
<td>B</td>
</tr>
<tr>
<td>70-79</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
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<tr>
<td>&lt; 60</td>
<td>F</td>
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**Students with Disabilities:** Any students with disabilities or other special needs that need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible.

**Veteran's Preference:** Veterans and student soldiers with special circumstances or who are activated are encouraged to notify the instructor in advance.

**Educational Objectives:**

Educational Objective 1:
Within a few years of graduation, graduates are expected to have established themselves as practicing engineers with the ability to address new and existing engineering challenges in agricultural and closely related biological industries.

Educational Objective 2:
Within a few years of graduation, graduates are expected to have established themselves as practicing engineers who have interpersonal and collaborative skills and the capacity for productive and advancing careers in leadership roles.