Spring 2018 Course Syllabus & Policies for ME 8930 (Mechatronics)

Course: ME 8930 – Mechatronics, 3(3,0)
Mondays at 17:30-20:30 in 201 Dillard (Clemson) and 102 Zucker (Charleston)

Instructor: John Wagner, Ph.D., P.E., Professor of Mechanical Engineering
212 Fluor Daniel, (864)656-7376, jwagner@clemson.edu

Office Hours: Posted outside of office or by appointment (Skype)

Textbook: J. Wagner, Mechatronic System Design Class Notes, January 2018. (slides available on-line)

References:

Catalog Description:
Mechatronics integrates control, sensors, actuators, and computers to create a variety of electromechanical products. Includes concepts of design, appropriate dynamic system modeling, analysis, sensors, actuating devices, and real time microprocessor interfacing and control. Preq: ME 3050 with a C or better.

Student Learning Outcomes1:
1. The student will design an integrated system which includes an actuator, sensor, and microprocessor controller. [(a),(c),(e)]
2. Students will be able to apply modeling principles to mathematically describe dynamic systems. [(a),(c),(e)]
3. Student will demonstrate the ability to numerically simulate dynamic systems. [(a),(k)]
4. The student will be able to select an appropriate type of sensor and actuator for a specified application. [(b),(k)]

ME 8930 Graduate Course Grading:
Tests (2 equally weighted tests) = 40 %
Final Exam = 0 %
Homework (assignments throughout semester) = 10 %
Mechatronics Summary Reports (assignments throughout semester) = 20 %
Design Project = 30 %
Total = 100%

Grading Policy:
All questions and problems regarding grades must be presented in writing within one week (i.e., 7 calendar days) after the test, homework, or project has been returned. It is the student’s responsibility to seek timely discussions with the instructor for re-evaluation of the assigned grade. After that time

1 Letters in brackets refer to ME Program Educational Objectives.
period, special circumstances must exist for consideration. Grades will be assigned based on all the work you have completed during the semester. They will follow the traditional practice of A=90-100, B=80-89, C=70-79, F<70 for ME 8930.

Class Attendance, Participation, and Student Feedback:
Regular class attendance is expected. Students are responsible for all material covered and assigned during the semester. If you anticipate not being able to attend class for a particular reason, it is best to e-mail me with the information. The classroom learning experience depends on both a professional teaching environment and student participation. In the event that the professor is late for the start of class, students are requested to wait fifteen (15) minutes before leaving the classroom.

In this course, all students are expected to read and review the lecture notes plus textbook sections prior to the assigned class period. The lecture time will be used to comment on select learning concepts and engage the class in discussions on key ideas as determined by the instructor, as well as explore pertinent issues associated with mechatronic systems and professional skills.

Tests and Final Exam:
There will be two tests and no final exam (note: in lieu of a final exam, a comprehensive design project will be completed per the class schedule) for this technical elective course. Absence from a test will be excused for medical reasons and/or serious immediate family problems. Students who anticipate missing a test for legitimate Clemson University or professional activities should talk with the instructor at least one (1) week prior to the test date and discuss an acceptable resolution. A grade of zero (0) will be assigned for the missed test unless excused/discussed prior to test with the instructor.

Homework:
Homework is important in learning and understanding the principles of mechatronic systems. Small teams (e.g., 2 students) can be formed to work on the homework problems if desired. Each team member is expected to contribute equally to the assignment. If one person takes the lead on a particular problem, then the other student should check it carefully. The small team's homework should be done neatly and in a fashion reflecting professional engineering standards. A grader has been assigned to this course by the Department of Mechanical Engineering and will grade the homework problems that have been completed in a professional manner.

Academic Honesty:
All work submitted for grading carries an implicit pledge that it is each student’s own work unless otherwise noted on the assignment. Please refer to the Student Handbook and College of Engineering & Science policy on academic dishonesty.

“As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning.’ Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.”

Design Project:
A design project will be assigned during the first week of class and completed throughout the semester. The open-ended project allows individual students to integrate the lecture concepts in a creative and innovative manner. The project is an important aspect of the course and should receive appropriate time and effort from the student since they are heavily emphasized in grades.
Computer Usage:
The software package Matlab/Simulink (The Mathworks) will be used in the homework assignments, examinations, and/or design project for system analysis and simulation throughout the semester. The software utility AMESim (Siemens) may be introduced if time permits.

Learning Disabilities:
Any student with an official Clemson University recognized learning disability is requested to inform the instructor within the first (1) week of class meetings so that arrangements can be made to meet the student’s needs.

Clemson University Title IX:
“Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator and Director of Access and Equity, located at 111 Holtzendorff Hall, 864-656-3181 (voice) or 864-565-0899 (TDD).
ME 8930 - Mechatronics
Spring 2018 Semester – Mondays @ 17:30
Dr. John Wagner, Professor of Mechanical Engineering

Acknowledgment of Course Policies

I, ______________________________, have read and understand the syllabus, policies, (PRINT YOUR NAME)

and schedule for the ME 8930 course as provided by Dr. John Wagner, Professor in the Department of Mechanical Engineering at Clemson University.

_______________________
(SIGNATURE)

_______________________
(DATE)

INSTRUCTIONS: Please sign, date, and return this form to the course instructor before the end of the third week of the semester (i.e., 26 January 2018) as an indication of your attendance and participation in this course.
### ME 4930 & ME 8930 (Mechatronics) - Spring 2018 Class Schedule

M 17:30-20:30, 201 Dillard (Clemson) and 102 Zucker Family Graduate Education Center (Charleston)

Professor John Wagner, PhD, PE

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Lecture Topic</th>
<th>Assignments</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 10</td>
<td><em>(No class- meets on Mondays)</em> Design Project, Mechatronics Introduction</td>
<td>Project Assigned</td>
<td>§1; †1</td>
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<tr>
<td>2</td>
<td>Jan 15</td>
<td><em>(No class - MLK Holiday)</em>, Electronics- Parts I &amp; II</td>
<td>-</td>
<td>§2-3; †5</td>
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*Class meetings on campuses and virtually occur January 22 - April 23, 2018.*

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<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Lecture Topic</th>
<th>Assignments</th>
<th>Reading</th>
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<tbody>
<tr>
<td>3</td>
<td>Jan 22</td>
<td>Electric Circuits, Electronic Amplifiers, Data Acquisition</td>
<td>HW 1</td>
<td>§4-6; †5,11</td>
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<td></td>
<td></td>
<td>4930 Report 1</td>
<td></td>
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<td></td>
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<td>8930 Summary 1</td>
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<td>4</td>
<td>Jan 29</td>
<td>Project Management, Control Systems, Programmable Logic Controllers</td>
<td>HW 2</td>
<td>§7-9; †2, 9</td>
</tr>
<tr>
<td>5</td>
<td>Feb 05</td>
<td>Mechanical Systems, PLM, Transient Response &amp; State Space Descriptions</td>
<td>HW 3</td>
<td>§20, 11-12; †3</td>
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<td>6</td>
<td>Feb 12</td>
<td>System Sensors, Modeling Software, System Actuators</td>
<td>HW 4</td>
<td>§13-15; †6, APP</td>
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<td></td>
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<td>8930 Summary 2</td>
<td></td>
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<tr>
<td>7</td>
<td>Feb 19</td>
<td>Pneumatic Systems, Hydraulic Systems, Review Weeks 1-6</td>
<td>HW 5</td>
<td>§16-17, †7</td>
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<td>8</td>
<td>Feb 26</td>
<td>Test #1</td>
<td>-</td>
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<tr>
<td>9</td>
<td>Mar 05</td>
<td>Electric Power, Electric Motors, Robotic Systems</td>
<td>HW 6</td>
<td>§10,18-19; †8</td>
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<td>4930 Report 2</td>
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<td></td>
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<td>8930 Summary 3</td>
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<tr>
<td>10</td>
<td>Mar 12</td>
<td>Thermal Systems, Team Building Skills, Professional Ethics</td>
<td>HW 7</td>
<td>§21,22,26</td>
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<tr>
<td>11</td>
<td>Mar 19</td>
<td>Spring Break (No Class)</td>
<td>-</td>
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<td>12</td>
<td>Mar 26</td>
<td>Systems Integration – Parts I &amp; II, Procurement &amp; Specifications</td>
<td>HW 8</td>
<td>§23-25</td>
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<td>8930 Summary 4</td>
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<td>13</td>
<td>Apr 02</td>
<td>Case Study Material Handling Systems, Finances, Review Weeks 7-13</td>
<td>HW 9</td>
<td>§27-28</td>
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<td>14</td>
<td>Apr 09</td>
<td>Test #2</td>
<td>-</td>
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<td>15</td>
<td>Apr 16</td>
<td>Human Factors, Leadership Skills, Collaborative Strategies</td>
<td>-</td>
<td>§29-31</td>
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<tr>
<td>16</td>
<td>Apr 23</td>
<td>Mechatronics Summary, Design Project submitted by Friday, April 27 at 11:55AM</td>
<td>Project Due</td>
<td>§32</td>
</tr>
</tbody>
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Reading Assignment Key:
§Wagner, Mechatronic System Design Class Notes, 2018.