INSY 5840/6840/6846 Control of the Manufacturing Floor and Processes

1. **Course:** INSY 5840/6840 Control of the Manufacturing Floor and Processes  
   **Department:** Industrial and Systems Engineering  
   **Credit Hours:** 3 hours total – 2 hours lecture, 3 hour lab  
   **Designation:** Elective; INSY 5840 required for Automotive Design and Manufacturing Minor  
   **Prerequisites:** None  
   **Web site:** Course website is maintained on WebCT  
   **Date Prepared:** 15 October 2006 (by Lewis N. Payton)

2. **Instructor(s):** Lewis N. Payton  
   207 Dunstan Hall  
   payton@auburn.edu  
   844-2716

3. **Course Time:** Lecture Tuesdays and Thursdays: 9:00 – 9:50 (Lecture) in Dunstan 202  
   Lab: Per WebCT (up to 2 sections are offered, limited to 15 students each)

4. **Textbooks and class materials:**  
   An extensive course package is maintained on WebCT along with lecture slides and lab handouts.

5. **Course Description:** “Auburn Bulletin: Control of the Manufacturing Floor and Processes.” 3 hours credit (Lecture (2), Lab (3)). Students work within multidisciplinary teams to apply the principles of Computer Aided Manufacturing and the Toyota Production System (TPS) on the modern automated production floor.

6. **Course Objectives:** Students will understand the basic concepts of push versus pull manufacturing systems, cellular manufacturing and group technology. Key concepts in Designing for Manufacturing Assembly (DFMA) will be explored from traditional western and far eastern viewpoints. Students will learn to program CNC machines and Programmable Logic Controllers. Students will also learn troubleshooting methods for electrical, electronic and servo-hydraulic equipments in a series of laboratory experiments and demonstrations.

7. **Course Requirements/Evaluation:** Students will be evaluated based on the following:  
<table>
<thead>
<tr>
<th>INSY 5840</th>
<th>INSY 6840/6846</th>
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<tbody>
<tr>
<td>15 Labs</td>
<td>750 Points</td>
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<tr>
<td>Home works</td>
<td>225 Points</td>
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<tr>
<td>Weekly Quizzes</td>
<td>450 Points</td>
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<tr>
<td>Examinations</td>
<td>450 Points</td>
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<tr>
<td>Team Project</td>
<td>275 Points</td>
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<tr>
<td>Final Exam</td>
<td>150 Points</td>
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<td>Total Possible Points</td>
<td>2250 Points</td>
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   Course grades will be assigned based upon points obtained in course (10 percent scale)  
   
   => 90 A
   => 80 B
   => 70 C
   => 60 D

   Student grades are posted continuously on WebCT throughout the term. You can always calculate your current grade by applying the 10 percent scale to the current points graded for the term.

8. **Class Policy Statements:** Course attendance is recommended, but will not be evaluated as part of the course grade. The University academic honesty policies will be strictly enforced. Students will sign the attached honesty affirmation.
9. **Disabilities:** Any student with a disability needing special accommodation should notify the instructor and contact Dr. Kelly Haynes, Director of the Program for Students with Disabilities, located in 1244 Haley Center.

10. **Topics and Schedule:** Examples from local industry, including the many tier one automotive suppliers located in the region, are extensively used. Lecture focuses on classic and automated control systems, along with the Toyota Production System. Laboratory features CNC controls, Programmable Logic Controls (PLC) and the KANBAN system. Students will become familiar with DELMIA CATIA and MasterCAM.

11. All lectures meet for 50 minutes. All labs meet for 150 minutes.

Following Topics are covered (at a minimum).

   a. Enterprise Resource Planning (ERP) – Week 1
   b. Material Resource Planning (MRP) – Week 1
   c. Industrial Robots – Week 2
   d. Automated material handling (AMH) – Week 2
   e. Automatic Guided Vehicles (AGV) – Week 2
   f. Automatic Storage and Retrieval – Week 3
   g. Proprietary versus Open System Interconnect Software – Week 3
   h. Device Control – Week 3
   i. Programmable Logic Controllers (PLC) – Week 4
   j. PLC Types – Week 4
   k. Relay Ladder Logic – Week 4
   l. Computer Numerical Controls – Week 5
   m. DELMIA Software and control systems – Week 5
   n. Troubleshooting control systems – Week 5
   o. Competing through Cellular Manufacturing and Group Technology – Week 6
   p. A Closer Look at Cells: What They Are and the Forms They Take – Week 6
   q. Why Cells Improve Performance – Week 6
   r. The Planning and Implementation of Cellular Manufacturing System – Week 6
   s. Detailed Planning -- One Cell at a Time – Week 6
   t. Understanding Cell Performance Using Modeling – Week 7
   u. Determining the Economic Value of Cells – Week 7
   v. Performance Measurement for Cells – Week 7
   w. Cost Accounting and Cellular Manufacturing – Week 8
   x. Manufacturing Planning and Control Systems for Cells – Week 8
   y. Planning for Cell Implementation and Managing the Change – Week 9
   aa. Improvement and Evolution of Cells – Week 9
   bb. Automatic Tracking of Inventory and Production – Week 10
   cc. Network Communications – Week 11
   dd. Traditional Manufacturing Processes – Week 12
   ee. Non-traditional Manufacturing Processes – Week 12
   ff. 5S Visual Systems – Week 13
   gg. Value Stream Mapping (VSM) – Week 13
   hh. Rapid prototyping – Week 14

12. **Contribution to Meeting the Professional Component**

   This course introduces the students to the control of systems at an automotive manufacturer’s level. It teaches teamwork and basic troubleshooting skills within the structure of controlling the modern factory manufacturing floor.

13. **Relationship to Program Outcomes**

   This course supports the following ABET outcomes:
   
   (d) An ability to function on multidisciplinary teams
   (l) Be able to design, develop, implement and improve integrated systems that include people, materials, information, equipment and energy.

14. **Justification for Graduate Credit**
In addition to completing all the undergraduate requirements for this course, graduate students will design and implement a single cycle automatic machine based upon either CNC or PLC controls.

14. Special Considerations for COE Distance Education Courses

Methods of Delivery: The AU College of Engineering (COE), through its Graduate Outreach Program (GOP), offers selected graduate-level course work to off-campus students by various means, primarily streaming video delivered via the Internet or DVDs. Standard VHS video tape can also be produced. On-campus classes are held in specialized classrooms and are recorded each class day. Streaming video is available within a few minutes. DVDs (or tapes) are shipped the same day. Handout material made available to on-campus students is posted on the Internet or sent to off-campus students along with the tapes or DVDs.

Instructor/Student Communication: Typically, students and professors communicate via telephone and e-mail, and by exchanging documents via various means. Internet sites and discussion groups may be used to facilitate communication among the students as well as with the instructor.

Exam/Test Security: All off-campus students are required to have test proctors. These proctors serve on behalf of the instructors to maintain the integrity of the program. Proctors must be approved at the departmental level and by the Director of the GOP. Ideally, the proctor is someone in the human resources, personnel, or training and development section of the company, or agency, where the student is employed. On occasion, other personnel ranking at least one administrative level above the student serve as the proctor. In special cases, local librarians, or college testing services personnel may serve as the proctor. Responsibilities of proctors are clearly defined and, prior to approval, all proctors must agree to abide by rigorous rules related to the receipt, handling, administration, and return of tests and examinations.

Special Accommodations: Students needing special accommodation will be handled privately between the instructor and the student in accordance with Auburn University policies. Please contact the instructor as early in the course as possible.
Academic Honesty: All portions of the Auburn University student academic honesty code (Title X11) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Violations include, but are not limited to:

**Cheating on an examination.** This includes such things as copying from another’s paper, using unauthorized notes, calculators, etc., or giving or receiving unauthorized aid, such as trading examinations, whispering answers, passing notes, or using electronic devices to transmit or receive information. This includes cell phones, blue-tooth and/or wireless. Notes stores on a PDA, laptop/pen tablet, calculator or cell phone are also prohibited.

**Plagiarism.** This is using someone else’s work without giving credit. It is, for example, using ideas, phrases, papers, laboratory reports, computer programs, data - copied directly or paraphrased - that you did not arrive at on your own. Sources include published works such as book, movies, web sites, and unpublished works such as other students’ papers or material from a research service. In brief, representing someone else’s work as your own is academically dishonest. *The risk of plagiarism can be avoided in written work by clearly indicating, either in footnotes or in the paper itself, the source of any major or unique idea or wording that you did not arrive at on your own. Sources must be given regardless of whether the material is quoted directly or paraphrased.*

*Copying another student's assignment and putting your name on it is plagiarism.*

*Copying an answer key from an instructors guide is plagiarism.*

*Copying work from a previous semester of the class is plagiarism.*

*Electronic submission of another person’s electronic original is plagiarism.*

**Unauthorized collaboration.** This is working with or receiving help from others on graded assignments without the specific approval of the instructor. *If in doubt, seek permission from the instructor before working with others.* Students are encouraged to learn from one another: Form study groups and discuss assignments, but each assignment must be individual work unless specifically stated and turned in as a group assignment.

You are encouraged to talk to one another about your assignments, however, all assignments must be done by the student(s) whose name is (are) on it!

**Multiple submission.** This means using the same work to fulfill the academic requirements in more than one course. *Prior permission of the instructors is essential.*

I have read and understand the departmental and university academic honesty policy.

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Name, date