Course: Process Control - 0908545 (3 Credit hours – Elective course)

Instructor: Dr. Adham Alsharkawi  
Office: CH208, Telephone: 5355000 Ext: 23030  
Email: sharkawi.adham@gmail.com  
Office Hours: (Sun, Tue, Thu:11.00-12.00), (Mon, Wed: 09.30-11.00)

Course Website: http://elearning.ju.edu.jo

Catalog Data: This course unit aims to introduce students to the fundamental concepts of applied industrial process control, including cascade, feedforward control and decouples. It also aims to introduce students to the formulation as well as the main implementation details regarding Model Predictive Control (MPC) as well as real-time optimization.

Prerequisites by Course: Control Systems (0908441)

Prerequisites By Topic: Student should have the basic knowledge of programming and the use of Matlab.


Schedule & Duration: 15 Weeks, 44 lectures (50 minutes each) plus exams.

Minimum Student Material: Text book, class handouts, and an access to personal computer with MATLAB


Minimum College Facilities: Classroom with whiteboard and projection display facilities, library, computational facilities with MATLAB and Simulink.

Course Objectives: Students will understand the special characteristics of process dynamics and control. They will be able to use modern and advanced control system tools.
Course Learning Outcomes and Relation to ABET Student Outcomes:
Upon successful completion of this course, a student should:
1. Understand the tools and methods used in industrial process control. [e]
2. Design various process controllers, including single-loop PID, cascade, feedforward, de-couplers and model predictive control. [c]
3. Explain what model predictive control is and how it is applied to multivariable problems. [a, e]
4. Explain the concept of real-time optimization and solve a linear programming problem using graphical methods. [a, e]
5. Tune a PID controller using various tuning rules. [k]
6. Tune MPC controller by selecting values of weights in the corresponding cost function. [k]
7. Use the relevant modelling and design tools for application in other areas. [e, j, k]
8. Use computer based simulation tools to analyze the response of dynamic systems.(Project) [d, f, g, i, k]

Course Topics:

<table>
<thead>
<tr>
<th>Topic Description</th>
<th>Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fundamental Process Control.</td>
<td>6</td>
</tr>
<tr>
<td>2. Enhanced Control.</td>
<td>6</td>
</tr>
<tr>
<td>3. Process Control Hardware.</td>
<td>6</td>
</tr>
<tr>
<td>4. Advanced Control.</td>
<td>6</td>
</tr>
<tr>
<td>5. Optimization.</td>
<td>6</td>
</tr>
<tr>
<td>6. Statistical Inference and Control Charts.</td>
<td>6</td>
</tr>
</tbody>
</table>

Ground Rules:

- **Attendance:**
  Students are expected to attend EVERY CLASS SESSION and they are responsible for all material, announcements, schedule changes, etc., discussed in class. The university policy regarding the attendance will be strictly adhered to.
  - **Make up Examinations**
    There will be no makeup exams for any exam that will be taken during the course.
  Exceptions to this rule is restricted only to the following cases:
    1. Death of only first order relatives (father, mother, sister, or brother).
    2. Hospital entry (in-patient) during the time of the examination.
    *Any other cases will be given the zero mark in the corresponding exam.*

- **Special Notes**
  1. Seating plan will be as given in the attendance sheet.
  2. Students creativity is welcomed and will receive additional marks
**Assessments:** Exams, Quizzes, Projects, and Assignments.

**Grading Policy:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>20 %</td>
</tr>
<tr>
<td>Quizzes and Assignments</td>
<td>10 %</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30 %</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

**Last Updated:** January, 2018