**Outcome:** The students will be introduced to the various advanced control strategies utilized in the process industries; etc. cascade, bias, ratio, and override controls. The students will demonstrate their understanding of these strategies as applied to a blending process.

**Lecture:**

1. Instructor lead discussion and demo
   1. Simtronics SPM-1700
      1. Exercise #1 normal operation
         1. Process discussion

**Lab & Homework:**

Simtronics Lab

1. Simtronics SPM-1700
   1. All four process models
   2. Exercise #1 normal operation
      1. Adjust the setpoints to the Feed A flow controller.
      2. Observe and document the process reactions for the other process variables relative to:
         1. Feed B
         2. Final product analyzer
         3. Tank level
         4. Final product flow
         5. Time (dt, Tc)
      3. Write a process control description for each model.
2. Simtronics SPM-1700
   1. Process model: Cascade Control
   2. Exercise #1 normal operation
      1. Adjust the setpoints to AIC-103
      2. Observe and document the process reactions for the other process loops relative to:
         1. Feeds A & B
         2. Final product analyzer
         3. Tank level
         4. Final product flow
3. Simtronics SPM-1700
   1. Process model: Bias Control
      1. Exercise #1 normal operation
      2. Adjust the setpoint on the HIC-201 Bias Controller
         1. Entering both positive and negative setpoints.
         2. Adjust the setpoint on FIC-201
      3. Observe and document the process reactions for the other process loops relative to:
         1. Feed B
         2. Final product analyzer AIC-203
         3. Tank level
         4. Final product flow
4. Simtronics SPM-1700
   1. Process model: Ratio Control
      1. Exercise #1 normal operation
      2. Adjust the setpoint on the HIC-301 Bias Controller
         1. Entering values between 0 and 2.
         2. Adjust the setpoint on FIC-301
      3. Observe and document the process reactions for the other process loops relative to:
         1. Feed B
         2. Final product analyzer AIC-303
         3. Tank level
         4. Final product flow
5. Simtronics SPM-1700
   1. Process model: Auctioneering (Override) Control
      1. Exercise #1 normal operation
      2. Adjust the setpoint on the HS-401 Selector to “<” (low)
      3. Describe the effects of changing the selector.
      4. Observe and document the process reactions for the other process loops relative to:
         1. Feed B
         2. Final product analyzer AIC-403
         3. Tank level
         4. Final product flow
      5. With HS-401 in “<”; adjust the feed “A” flow controller setpoint greater and less than initial setpoint (50GPM, 30GPM).
      6. Observe and document the process reactions for the other process loops relative to:
         1. Feed B
         2. Final product analyzer AIC-403
         3. Tank level
         4. Final product flow
      7. With HS-403 selector set to “>” (Hi) change the feed “A” flow controller setpoint to 100GPM.
      8. Observe and document the process reactions for the other process loops relative to:
         1. Feed B
         2. Final product analyzer AIC-403
         3. Tank level
         4. Final product flow
6. Simtronics SPM-1700
   1. All four process models
   2. Exercises #3-6
   3. Observe and document the process variables, describe the process reactions determine the cause of the process upset.
   4. Does the system compensate for the process upset? Is manual intervention required?
   5. What should you do?

**Documentation:**

1. Simtronics SPM-1700

**Assessment:**

1. Homework
2. Lab Work
3. Lab Safety
4. Quiz(s) & Final Exam