

# Student Learning Outcomes Assessment Summary

## *Instrumentation Technology, Certificate*

*UAF Community and Technical College*

**AY 16/17 and 17/18**

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### **1. Assessment information collected**

Note: "Test Results" reflect aggregated data from several test questions, usually from the Final Exam, that reflect the individual SLOA topic.

Percentages reported here represent the percentage of the class that have met the desired outcomes; the minimum target is 75%. Individual topic observations are included in the discussion session.

Note: "Skill Observations" reflect instructor observation of overall class performance on specific activities.

#### **a. SLOA 1: Instrumentation Knowledge**

- i. Test Results from PRT 140 – Instrumentation I – Final Exam 2017:
  - 1. Mechanical aspects of instruments – 69.4%
  - 2. Theoretical aspects of instruments – 73.5%
- ii. Test Results from PRT 140 – Instrumentation I – Final Exam 2018:
  - 1. Instrumentation knowledge – 86.8%
  - 2. Note that PRT 140 shifted to hybrid delivery in 2018. Course material/lecture delivered on-line; scheduled lab times for hands-on work.
- iii. Test Results from PRT 144 – Instrumentation II – Final Exam 2017:
  - 1. Mechanical aspects of instruments – 82.1%
  - 2. Theoretical aspects of control – 86.4%%

#### **b. SLOA 2: Process Controls Knowledge**

- i. Test Results from PRT 140 – Instrumentation I
  - 1. Final Exam 2017: 70.6%
- ii. Test Results from PRT 144 – Instrumentation II
  - 1. Final Exam 2017: 80.9%
- iii. Test Results from ELT 246
  - 1. Mid-Term Exam 2018: 87.5% correct

- iv. Skills evaluation, ELT 246 – Mid-Term 2018
  - 1. 100% of students were able to analyze a programming question and program the result on the test controller programming kit.
- v. Test Results from PRT 240
  - 1. Mid-Term Exam 2018: 100% correct

**c. SLOA 3: Control Valves**

- i. Test results/skill observation from PRT 248 –Valve Maintenance
  - 1. Final Exam 2016/2017: 92.1% correct (combined data)
  - 2. All students taking PRT 248 are given in an in-class lab assignment with the DAC Control Valve Characteristics Trainer #618. The students are asked to identify the distinct flow characteristics of three unidentified valves. During the class period the students gather percent-open data along with actual flow measurements in GPM. The assignment is to complete a graph and identify the previously unknown valve characteristics as equal percentage, linear or quick opening. The students were all able to collect the data and correctly identify the valve with its inherent flow design characteristic. They were required to draw a curve that represented the action of the control valve.

**d. SLOA 4: Fundamentals of AC/DC physics – ELT 101/102**

- i. ELT 102: Test Results, Mid-term Exam, 2018: 77.8% correct
- ii. ELT 102: Test Results, Final Exam, 2018: 88.9% correct
- iii. Circuit Analysis problem: 88.9% of students performed the complete circuit analysis
- iv. Final project: 88.9% of students successfully wired, analyzed, performed troubleshooting, implemented, and demonstrated their projects.

**e. SLOA 5: Functioning control loop**

- i. Skills assessment: ELT 246/PRT 240 project 2018:
  - 1. 100% of students were successful in completing the programmable logic controller (PLC) project. Students developed code to run a process control loop on the portable test environment at the PRT instrument shop. Students were able to successfully wire, troubleshoot, document, and implement a control loop process with at least four process instruments and a controller.

**Conclusions drawn from the information summarized above**

**a. SLOA 1: Instrument Knowledge**

- i. Students demonstrated knowledge of the theory behind process measurement, the mechanical details of process instrumentation, and the dynamics of control (including PID tuning of controllers).
- ii. Note that 2017 PRT 140 results were below expectations; however 2018 results were improved. The course format has been changed to on-line delivery of material, and in-person lab time. The new schedule provides almost twice as much lab time as the previous combined lecture/lab.

**b. SLOA 2: Process Controls Knowledge**

- i. Students demonstrated knowledge of control theory and control loop function. Students demonstrated knowledge of advanced control schemes. Student results indicate that the basics of process control theory are adequately covered in the current curriculum.
- ii. Note that the 2017 PRT 140 results were below expectations. The 2018 results were not evaluated for this report.

**c. SLOA 3: Control Valves**

- i. The in-class exercises with the DAC Control Valve Trainer are very effective in teaching the fundamentals of control valve characteristics.

**d. SLOA 4: Fundamentals of AC/DC Physics**

- i. Students successfully completed hands-on projects, and test results show that they have learned the material.

**e. SLOA 5: Functioning Control Loop**

- i. The hands-on project has been very successful. Student results indicate the basics of control loop construction and function are adequately covered.

**Curricular changes resulting from conclusions drawn above**

**a. SLOA 1: Instrument Knowledge**

- i. Detailed review of the test results shows that there is value in continuing to increase focus on the mechanical details of instrumentation, and to increase hands-on activities with instrumentation.

**b. SLOA 2: Process Controls Knowledge**

- i. The courses are covering the basics of process controls sufficiently. Continued emphasis on advanced control schemes is planned. Although we have trainers to demonstrate most simple control loops, students have commented that it would be helpful to operate a more complex cascading control loop; we are investigating ways to develop one with our existing trainers and operating system.
- ii. Investigate effectiveness of new format in PRT 140. Student responses, and test results in other areas, show that this hybrid format is effective.

**c. SLOA 3: Control Valves**

- i. Control valve work in PRT 248 is very effective – plan to continue with intensive hands-on work.

**d. SLOA 4: Fundamentals of AC/DC Physics**

- i. No changes to recommend at this time.

**e. SLOA 5: Functioning Control Loop**

- i. No changes to recommend at this time.

**Identify the faculty members involved in reaching the conclusions drawn above and agreeing upon the curricular changes resulting**

- a. Brian Ellingson, Associate Professor, Program Coordinator
- b. Robert Hook, Assistant Professor
- c. Teresa Lantz, Assistant Professor

**Has your SLOA plan been updated to include assessment of the program's Communication Plan, as required by Faculty Senate motion?**

N/A for AAS or Certificate programs