



Student Learning Outcomes Assessment Plan

College: **The William States Lee College of Engineering**

Department: **Mechanical Engineering and Engineering Science**

Name of Certificate Program: **Graduate Certificate in Precision Metrology**

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Student Learning Outcome 1 (knowledge, skill or ability to be assessed)

Students will demonstrate knowledge of the underlying principles of measurement, as they relate to mechanical measurement, electronic instrumentation, and thermal effects.

Effectiveness Measure: Identify the data collection instrument, e.g., exam, project, paper, etc. that will be used to gauge acquisition of this student learning outcome and explain how it assesses the desired knowledge, skill or ability. A copy of the data collection instrument and all scoring rubrics associated with this student learning outcome are to be attached to the plan.

The evaluation of this learning outcome will utilize questions given in course exams. The questions will specifically address:

- Metrology terms and the SI units
- Analog instruments and electrical measuring circuits
- Digital instruments, A/D and D/A conversion
- Measurement of Geometric quantities / attributes
- Measurement of Thermal quantities

Methodology: Describe when, where and how the assessment of this student learning outcome will be administered and evaluated. Describe the process the department will use to collect, analyze and disseminate the assessment data to program faculty and to decide the changes/improvements to make on the basis of the assessment data.

The formal evaluation of this learning outcome will be performed at the conclusion of MEGR6181/8181 (Engineering Metrology) every two years. In addition to the normal grading of the exams, a report summarizing the quantitative success of the students, trends in student success, and recommended changes will be made by the course instructor. This report will be reviewed and, if necessary, acted upon by the faculty supporting the certificate program, in coordination with the program director.

Performance Outcome: Identify the percentage of students assessed that should be able to demonstrate proficiency in this student learning outcome and the level of proficiency expected. *Example: 80% of the students assessed will achieve a score of “acceptable” or higher on the Oral Presentation Scoring Rubric.*

At least 80% of the students will achieve scores of 70% or greater on the exam questions used to evaluate this learning outcome.

Student Learning Outcome 2
(knowledge, skill or ability to be assessed)

Students will demonstrate the ability to perform measurements (of, for example, the geometric errors of machine tools) and record both the details of the measurement procedure and the data in an appropriate manner, i.e. so that the experiment could be repeated based solely on the records that are kept.

Effectiveness Measure: Identify the data collection instrument, e.g., exam, project, paper, etc. that will be used to gauge acquisition of this student learning outcome and explain how it assesses the desired knowledge, skill or ability. A copy of the data collection instrument and all scoring rubrics associated with this student learning outcome are to be attached to the plan.

The evaluation of this learning outcome will utilize the student's laboratory notebook, where all data from the laboratory component of a course are to be kept. Successful students will have a clear description of each experiment, the data collected, and the conclusions that can be drawn from the data.

Assessment of the laboratory notebooks will be performed by the course instructor and laboratory instructor. An example of the guidance given to students is attached to this plan.

Methodology: Describe when, where and how the assessment of this student learning outcome will be administered and evaluated. Describe the process the department will use to collect, analyze and disseminate the assessment data to program faculty and to decide the changes/improvements to make on the basis of the assessment data.

The formal evaluation of this learning outcome will be performed at the conclusion of MEGR7182/8182 (Machine Tool Metrology) every two years. In addition to the normal grading of the notebooks, a report summarizing the quantitative success of the students, trends in student success, and recommended changes will be made by the course instructor. This report will be reviewed and, if necessary, acted upon by the faculty supporting the certificate program, in coordination with the program director.

Performance Outcome: Identify the percentage of students assessed that should be able to demonstrate proficiency in this student learning outcome and the level of proficiency expected. *Example: 80% of the students assessed will achieve a score of "acceptable" or higher on the Oral Presentation Scoring Rubric.*

At least 80% of the students will achieve a score of 70% or greater on the semester-end evaluation of their laboratory notebooks.

Appendix: example of laboratory notebook requirements

LABORATORY NOTEBOOKS – ADVANCED COORDINATE METROLOGY

***** (READ THIS SECTION CAREFULLY, IT CORRESPONDS TO THE PROCEDURES USED IN MACHINE TOOL METROLOGY) *****

The laboratory notebooks will be kept according to standard industrial practice. That is,

- Each page will be labeled, signed, and dated.
- For each experiment, the complete setup should be described with drawings, references to the equipment used, and a detailed procedure. If the set-up, procedure, etc. have been adequately described in the literature or in other published material, you do not need to redraw and rewrite, only properly reference and note any deviations from the written procedure. **The general rule is that the data supplied in a lab book should be sufficient to allow another person of similar education to reproduce the experiment and the experimental results.** A laboratory notebook is not a lab report.
- The procedure for handling computer programs and output is not yet well established. I currently recommend planning to include a disk or USB drive as well as a table of the device's contents. Graphs may be securely fastened into the notebook using tape. Other ideas will be welcome.
- The book should contain tables of all data taken in the course of the experiment, other relevant parameters (such as times, temperatures, etc.), and, if applicable, graphs of the results.
- A summary of the experimental results should be provided for each laboratory.

Laboratory notebooks will be examined, at random and according to procedures set up by the laboratory instructor, during the course of the semester and then turned in for grading before finals week.