

**Department of Agricultural and Biological Engineering
University of Florida
Academic Learning Compacts**

Purpose of Academic Learning Compacts

In addition to the requirements imposed by ABET accreditation, all students in the State of Florida University System must be given an opportunity to achieve the program's self identified Academic Learning Compact. Academic Learning Compacts identify the skills students should acquire if they follow their major's prescribed course of study. These skills, known collectively as Student Learning Outcomes, describe the core learning expectations that UF is required to assess for each baccalaureate degree program.

For detailed Information on the Academic Learning Compact see <http://www.registrar.ufl.edu/catalog/> .

The direct link for the BS Biological Engineering Academic Learning Compacts is:

<https://catalog.ufl.edu/ugrad/current/engineering/ALC/biological-engineering.aspx>

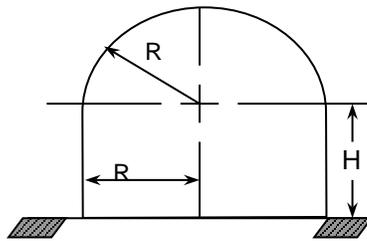
Examples of Assessment Results for Academic Learning Compacts

Student Learning Outcome #1

Apply knowledge of mathematics, science, and engineering.

Description of Direct Assessment (Evaluated in ABE 2012C):

Students used an engineering problem solving approach to acquire the answer to a complex engineering problem. The problem was to specify the dimensions H and R of the water tank shown below, that will result in the minimum cost. The tank is to be constructed to hold 5.00×10^5 L when filled. The shape is cylindrical, with a hemispherical top. The cost is a function of surface area. It will cost $\$300/\text{m}^2$ to construct the cylindrical portion and $\$400/\text{m}^2$ for the hemispherical portion. Ignore the cost to construct the bottom circular area (base) of the cylindrical section.



Student Performance Results:
Complete Mastery: 48%
Acceptable Performance: 45%
Below Expectations: 7%

(Note: Complete Mastery corresponds to a grade of 90-100%; Acceptable Performance corresponds to a grade of 70-89% ; Below Expectations corresponds to a grade below 70%)

Student Learning Outcome #2

Design and conduct agricultural and/or biological engineering experiments and analyze and interpret data.

Description of Direct Assessment (Evaluated in ABE 3612C):

The students were evaluated on the ability to conduct experiments, work in a team, analyze and interpret data and to suggest improvements or modifications to the design of the experiments. Fifteen percent of the grade for each individual was determined on the basis of three criteria: 1) participations in the experimental work, 2) participation in the report for the experiment and 3) contribution to team discussions.

Student Performance Results:

Complete Mastery: 30%

Acceptable Performance: 45%

Below Expectations: 25%

Student Learning Outcome #3

Design an agricultural and/or biological system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.

Description of Direct Assessment (Evaluated in ABE 4043C):

The students' final designs were evaluated by ABE Faculty. With the consideration of the design constraints listed above. The form used by faculty to assist in evaluating final design projects is seen below.

Student Performance Results:

Complete Mastery: 10%

Acceptable Performance: 90%

Below Expectations: 0%

ABE 4043C: BIOLOGICAL ENGINEERING DESIGN II

DESIGN REPORT REQUIREMENTS

A design report should be a comprehensive description of the background and motivation, the design, the methods used, the results of the analysis, and referenced literature. It should describe the problem that the design addressed, indicate the logic used in arriving at the design solution, and document the design in detail such that it can be recreated by another person using only the written description. The format of the report will vary with the firm and client, but a generalized report includes:

1. Cover Page

The title of the project or report should be in 16 point, bold font above the center of the page. The sub-title ("Phase 1," "Final Report," "Mid-Term Report") should be in 14 point font below the center of the page. Toward

the bottom of the page should be the name of the author(s) and/or firm, project or course number, and date in 12 point font.

2. Abstract/Executive Summary

This is a 500-1000 word synopsis of the project. It should include a problem statement, summary of objectives, synopsis of the solution, significance of the results, and cost of completion. The audience for an executive summary is mid- and upper-level non-technical management.

3. Background and Motivation

a. Previous Work by Others

Describe (and cite) published work done by others on which the design was based. If there are more than two authors, the latin phrase "et al" (which means "and others") is used to summarize the authors. When there are two authors or less, each of the authors' last name is listed followed by the year. There are a few different ways to cite a published manuscript:

- Thomas et al (2012) showed that XXX caused YYY.
- Thomas and Jones (2010) indicated that...
- Increases in XX have been shown to cause a decrease in YY (Thomas et al., 2012)

See references section below for format of citations

b. Review of Relevant Regulations

When there are significant permitting and liability considerations, cite the pertinent regulations, laws and court decisions that affect the design and its implementation. Provide properly cited references. You may need to consult with your firm's legal department or an outside attorney to obtain access to the published documents.

4. Problem Statement

a. Description of need

A general description of the problem to be solved from the perspective of the client in lay terminology (usually written in bold). This should be a consensus statement agreed to by all of the individuals involved in the project.

b. Design objectives

A generalized, technical, description of the objectives needed to solve the stated problem (usually one sentence per objective) This is not a detailed description of the methodology.

c. Design criteria

A generalized, technical, quantitative description of the criteria governing the design. These are not the final data from testing the system, but the benchmarks against which system performance is measured.

5. Methodology

a. Design Details

Describe your design in technical detail. This is the section that will be used by the manufacturing engineers, machinists, contractors, users, etc. to actually execute your design, so provide as much detail as is necessary to assure that it will be executed as you planned it. If you purchased any materials, provide the vendor name in parentheses. Also provide technical specifications of the materials, including dimensions and quantities. This section assumes that the readers of this section are technically trained and competent in their field.

b. Governing theory

This section contains the bases of the calculations on which your design was formulated. Stress analysis, ventilation requirements, hydraulics, heat transfer, kinetics, metabolic rates, etc. The detailed calculations should

be in the appendices, but the bases of the calculations (formulae, laws) and the results of the calculations should be shown here.

c. Drawings

The primary means by which design information is passed to machinists and contractors is through drawings. Often the detailed drawings are large and must be submitted as a separate package of documents (in the appendices). However, the methodology section should contain simplified drawings that communicate the basic idea of the design (similar to design drawings used in power point presentations).

d. Metrics and Rubrics

The measures of key concepts central to the decision making process and the framework used to evaluate potential solutions. Rubrics assess the costs and risks of various decisions, as well as the profits and benefits. Equivalent systems analysis is an example of a design metric.

e. Bill of materials

A listing of the materials needed to build the project, broken down by component and/or type of material. The bill of materials typically includes price estimates and suggested suppliers.

f. Material construction

If the project is to be built in a specified way not readily apparent from the drawings, instructions should be given in this section. These types of instructions may include assembly sequences, site-specific problems observed during a site survey, non-traditional applications of technology and critical dimensions.

g. Operating instructions (if applicable)

Information that will have to be conveyed to the end-user of the project to assure that it will perform as designed. In the case of a manufactured product, this would pass into the operator's manual or shop manual. In the case of civil work, it would be part of the documentation used in operator training.

h. Statistical analyses

Any statistical calculations used to analyze data collected should be described in detail.

i. Potential Problems and Alternative Solutions

Describe any realistic alternative solutions that were considered during the development of the design. Briefly describe any alternative solutions which could rationally be used to accomplish the objective(s) if any potential problems arise.

6. Results and Discussion

a. Testing

Describe any results from analysis of the design, prototype, product, component, and/or any model.

b. Modes of Failure

Identify any risks (in detail) with the selected design. Describing modes of failure will help you compare your design to the established criteria and make recommendations regarding acceptance or modification of the design (see the next subheadings)

c. Engineering Economics

Economic analysis should be included, and if relevant, any issues with design scaling should be considered.

d. Analysis

The design performance should be compared to the established criteria and/or standards, and recommendations should be made regarding acceptance or modification.

1. Conclusion and Significance

Describe the expected significance of your design solution in general, non-technical terms. Include as much detail as you feel is appropriate for your audience (assume the audience is the same as the executive significance). Discuss the reasons for the superiority of your design over the existing condition or any other competitive designs.

2. References

Provide an alphabetical listing of all the published work you cited in the text of the paper. This is not the list of every article you found in your research; only include the works you actually cited in the text of your paper. See the PDF handout for examples of the format. Pay close attention to the format, references which do not follow the proper format will not be accepted.

3. Appendices (if applicable)

Describe any details which are not needed to understand your design approach and significance in a separate appendix. Examples may include (but are not limited to): governing theory, equivalent systems analysis, statistical theory, model(s), etc.

Student Learning Outcome #4

Communicate technical data and design information effectively in writing and in speech to other engineers.

Description of Direct Assessment (Evaluated in ABE 4043C):

Design teams presented their final designs in a poster session. Each team was visited by ABE Faculty and practicing engineers who completed evaluations on the design teams. The final written report and poster were available for review, and design team students provided oral presentations to the evaluators.

Student Performance Results:

Complete Mastery: 0%

Acceptable Performance: 100%

Below Expectations: 0%