

Complete Guidelines on How to Prepare a Classroom Module

Summary

There is a need to develop lecture-based classroom modules for material handling educators. Since it is CICMHE's role to promote material handling education, CICMHE is soliciting submissions of classroom modules, for which CICMHE will distribute a small honorarium (\$500) for all accepted classroom modules. Below, an outline for the structure of lecture-based classroom modules is presented.

Background

Lecture-based classroom modules are intended as a 1-2 lecture experience. In addition to the lecture-based material, homework exercises and pointers to additional resources (e.g., websites, reference material, etc.) will also be included in the lecture-based modules.

Lecture-based classroom modules are intended to be self-contained and at the introductory level. The choice of targeting the introductory level are two-fold: 1) the longevity of the topics at the introductory level, and 2) less instructor-specific concerns with introductory-level material (i.e., more acceptance of the universality of introductory-level material).

The lecture-based classroom modules should be structured around the "Teaching Through the Cycle" paradigm by Harb et al (1991). That is, the module must answer the following four questions: "why?," "what?," "how?," and "what if?"

The "why" question is motivational in nature. Why are we covering this topic? Why is it important to you or your company? The "what" question is information based. What do we need to know? What makes these systems unique? The "how" question is task based. How do I solve this problem? How do I use this concept? The "what if" question is conceptual. What if we change an assumption? What if the problem setting changes?

Authors of lecture-based classroom modules must understand that our goal is to provide an instructor with the modules in a format that allows them to modify the original document. Therefore, all copyrights will be transferred to CICMHE's parent organization (Material Handling Industry of America, Inc.) upon acceptance of the honorarium. Credit will be given to the module author whenever possible.

Prototype (Conveyors)

First, a general introduction to conveyors is needed. Why are studying conveyors? What are they? How are they used (in what situations)? A combination of text, figures, and videos (quick; less than 1 minute) are valuable here.

Next, spend more time on the "why" question. Motivate why studying conveyors is important. Some figures on how many companies use conveyors and the different items that can be conveyed would be useful means here.

After the topic is sufficiently motivated, look towards addressing the "what" question. What are the capabilities of conveyors? What are they good at moving? What aren't they good at moving? What are the application areas of conveyors? Again, utilizing quick videos would be good here. Of course, the economics of conveyors would also need to be addressed at this point.

Another important point to address would be what the key components of a conveyor system are. Here the lesson plan would consider physical, system, and control aspects of conveyor systems. Figures, graphs, or simple mathematical models can be used to illustrate the basic tradeoffs and relationships in these systems. An example from conveyors would likely include a study of the changes in throughput of a conveyor system as carriers are added to the conveyor line.

Once conveyor systems are adequately introduced, discussion of the "how" question will follow. How does a designer solve for the key tradeoffs in the system? How would the student determine the inputs that are needed for the conveyor model? Examples and exercises are necessary at this point. Especially good are spreadsheets that can quickly calculate outputs. Dynamically linking these calculations with graphs can illustrate the behavior of a model and help to develop insight. Again, the author is reminded that the materials that address the how question should be participatory in nature. Even though this is a lecture-based module, there should be opportunity for the students to perform some of the work.

After developing this foundation, the students are now ready to address the more conceptual "what if" question. There are many possibilities for doing so, but an effective method is to develop an integrated model of a system or construct a small design exercise. Predicting the impact of various choices in the system (either changing variables or adding components) is a good way to do this.

Support Needed

In addition to the lecture-based material itself, other supporting information and tools are needed for the module. Homework problems with solutions are needed (two or more problems of each type: Why, What, How, and What If). URLs to good websites (including manufacturers) would be helpful. References to good case studies and other material to supplement additional exposure to the area. Finally, some recommendations to text support and where advanced material is covered.

Summary

Good course modules will be difficult to develop, but will be invaluable to material handling instructors. The hope is that enough educators participate to build a collection of course modules that everyone can utilize to enhance their courses. If you are interested in developing the conveyor module outlined here or another material handling module, please contact Jim Rumpf at the following address.

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Reference

Harb, J. N., Terry, R. E., Hurt, P.K., and Williamson, K. J., Teaching Through the Cycle: Application of Learning Style Theory to Engineering Education at Brigham Young University, Brigham Young Press (1991).