Program Assurance of Quality – preview –

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Summary of Program and Student Outcomes Assessment Tools

A. Program Outcome Assessment –
   a. Employer evaluation of student performance during their co-op experience. Career Services at EMU requires all employers to fill out an evaluation of the student's performance at the end of 600 hours of paid work. The employer goes over this performance evaluation with the student and then it is sent to the faculty sponsor via Career Services. We are in the process of computing averages of both the numerical scores to quantitative questions as well as collecting qualitative comments. In some cases, the comments are as valuable, if not more so, than the quantitative data. For example, two years ago two co-op employers requested that our students needed to have more experience with Excel. So we have incorporated Excel training into ET 100 and have requested a new course ET 101 Introduction to Engineering Technology Computing which will cover Excel and a mathematics program called Matlab.
   b. Student Co-op evaluation of their performance at the end of their co-op experience. Students typically complete their co-op during their last year or sometimes after they have completed all of their course work. This represents how well the student achieved the student educational objectives.
   c. Survey of Alumni – this provides the best assessment in our view, of how well our students met the program outcomes. We have sent out a survey and are in the process of analyzing the data and following up with students who did not return their survey. There are two portions that are of particular interest to us.
      i. Are they employed in a technology area or did they leave engineering technology?
      ii. Their responses to the curriculum now that they have had a few years to think about what they learned in school.

      This survey is a bit tricky. The program has changed dramatically in the past 5 years or so. The program initially consisted of one faculty member with support from the Physics Dept. Since then, all of the required MET courses have been taught by 2 – 3 SET faculty members.

      A quick glance at the survey information indicates that we may have to break the results into two groups – fairly recent grads versus our graduates from the beginning of the program. ABET is mostly interested in the past 3 years. Our student outcome assessment is only three years old and we may stick to 3 – 5 years of recent alumni and co-op data so that all the assessments are relevant to each other.

   d. Enrollment trends – the enrollment trends for a new program are very important. Our student body is changing from a traditional four year student who starts

school immediately upon graduation from high school and non-traditional students, i.e. the student who is working full-time and going to school part-time. The number of our majors has always been high (~80) but our graduation rate has fluctuated greatly in recent years. We noticed the graduation rate and course enrollment rate started to decline a few years ago. We did not do a formal survey of students, but rather asked students who are currently in our classes what we could do to help them finish their degree in a timelier manner. The response has been overwhelming. Our students who are working understandably do not want to work go part-time since they are often supporting a family, or even quit work to meet our class schedule. So little by little we have moved the courses to the late afternoon and evening. Based upon further conversations with our students, we have scheduled our junior level classes on Mondays and Wednesdays and our senior level courses on Tuesday and Thursdays so that students only have to leave work a little bit early two days a week. This year (2008- 2009) we have seen an increased enrollment in almost all of our courses.

e. Graduation and Retention Trends – Over 125 students typically take ET 100 Introduction to Engineering Technology but most of them do not go into MET or Electronics or Computer engineering technology. Based upon examination of graduate's transcripts, we have found that if a student does not start their EMU career taking intermediate algebra or higher, they do not graduate. We do not have a special admission (like a second admit) to our program but ET 100 is serving as a filter. We are now requiring that students take intermediate algebra or higher, while taking ET 100, to send the message that engineering technology relies on mathematics. Surveys of ET 100 students indicates that they do not take math their first year at EMU, which puts them at least a year or more behind in the program. Other surveys have shown that they do learn about the profession in ET 100, so maybe engineering technology is what they initially sought. The result is that they self select into or out of the engineering technology programs.

f. Employment Trends – This will be assessed through senior exit surveys and through alumni surveys. We want to ensure that our students are competitive and are able to be gainfully employed in a technology job and that they have the skills to advance in technology careers.

g. Industrial Advisory Board – We meet at least once a year with our Industrial Advisory Board. It is made up of employers of our alumni, companies who work with our senior design students, and alumni. We keep minutes of all meetings. They are particularly useful when we are considering changing curriculum. For example, when the general education requirements no longer required our students to take a course in the computer language C++, we asked them what they thought. They felt that the basics of Excel would be far more valuable and, if possible, a course in 3-D solid modeling. We have developed a new course in Introduction to ET Computing. Currently there is no room in the curriculum to *require* students to take 3D solid modeling (a computer aided design course). But

we strongly urge students who transfer into the program from other institutions to take 3 D solid modeling if they already have taken basic CAD courses.

h. Student Outcome Assessment Techniques
   a. Embedded assessment –
      i. Prior knowledge – from courses that generally are prerequisites to a particular course. We want to assess how well students not only learned basic material, but how well they can apply this knowledge to new problems. We pick a question or two from an exam, quiz, or lab and assess how well it meets one or more of the student outcomes listed previously. If there is a serious deficiency, then we review the material. For example, students have to understand statics and dynamics and apply those principles to courses like Fluids or Kinematics of Machines.
      ii. Current course concept knowledge – can be assessed in many forms. The two most common are homework questions and quiz/exam questions. A rubric is typically used to determine the extent that students understand the concept and how to use the concept to solve new problems. The majority of the class must meet a certain level of competence before new topics are introduced.

          Another form of assessment is an essay. In this case students are not solving a technical problem with mathematics but must use a higher level of understanding to describe a real world problem and discuss how they would solve the problem based upon concepts presented in the course. This is a good assessment at the end of the semester. If students do not do well, then the course content of the order of topics in a course are changed for the next time the course is taught.

      iii. Total course knowledge is assessed in the capstone design courses, MET 492 Senior Design I and MET 493 Senior Design II. Students have to use knowledge from prior concepts, concepts learned for the particular project they choose and how well they integrate the information. The assessment is based upon three things 1) their final report, 2) their final presentation and 3) feedback from the instructor(s) and 'customer'. (Usually the projects are based upon needs of community partners.)

   b. Student Performance Based Assessment - Based upon advice from Michigan Technological University's MET program. We have picked their achievement standard that requires that 70% of the students perform at a level of 70% or better on certain course assessments like homework, labs, or exams. What this assessment means is that 70% of our students

passed that particular assessment. Currently we are using final course grades for this assessment.

c. Student Rating of Instruction – we have not used this to make changes to course content because the University's form does not address the questions that help us determine students' perception of course objectives or program outcomes. We are still working on determining how well the standard university rating form assesses student learning outcomes.

d. Senior Reflections – in this assessment we ask graduating seniors how they feel about their educational experience. In addition to general qualitative questions we also ask them specific questions related to the student learning outcomes in a Rikert format. Norfolk State University Electronics Engineering program graciously gave us their senior exit survey which we use for the quantitative portion.

Table 1. Summary of Assessment and its link to program educational objectives (PEO) and student learning outcomes (SLO).

Assessment Technique	PEO1	PE02	PEO3	SLO1	SLO2	SLO3	SLO4	SLO5	SLO6
Co-op Employer Evaluation	x			x	x	x	x	x	x
Student Co-op evaluation	x			x	x	x	x	x	x
Survey of Alumni	x		x				x		x
Enrollment trends			x						
Graduation Trends	x		x						
Employment Trends	x		x						
Industrial Advisory Board		x							
Embedded Assessment	x			x	x		x	x	
Student Course Performance	x			x	x	x		x	
Course Evaluations				x	x	x		x	
Senior Exit Survey	x		x	x			x	x	
Faculty Observation			x	x	x	x	x	x	