# AC 2011-1754: DEVELOPING AN APPLICATION TO MANAGE AND VIEW ABET COURSE MATERIAL

**Scott J. Schneider, University of Dayton**

SCOTT J. SCHNEIDER is an Associate Professor of Electrical and Computer Engineering Technology at the University of Dayton. Schneider has extensive industrial experience in the areas of software development, embedded real-time system design, and automotive technologies. He also performs research in the areas of computer and software engineering pedagogy.

# Developing an Application to
# Manage and View ABET Course Material

## Abstract

Electronic storage of student assignments for use during an ABET accreditation visit is becoming more prevalent. This paper introduces a pair of computer applications for managing and viewing student material stored in an electronic catalog. The system was developed to assist ABET Program Evaluators (PEVs) during their review of course materials, as well as, to facilitate the audited institution's assemblage and maintenance of the submitted materials. All student course materials were scanned or originally submitted in electronic form and named according to a defined naming convention. This naming convention specifies the assignment's associated course, term, and chronological submission order for cataloging within a database. An ABET catalog creator application was developed to enter each assignment into a master database along with key assignment attributes that can assist the PEVs in searching for particular supporting material. An ABET catalog viewer application was also developed that allows the PEVs to retrieve and view the assignment files. The PEVs are able to search for courses and their associated assignments according to academic program and/or program and ABET outcomes supported. Comments and survey results from the faculty, staff, and PEVs working with these applications are also presented within this paper. Finally, lessons learned and future features of the developed application will be presented.

## Background

The ABET 2010-2011 Accreditation Policy and Procedure Manual details the materials that the institution requesting accreditation must provide during the accreditation review process. Section II.E.3.c.(10) of this manual details that the host institutions must provide representative samples of student work during the on-site visit portion of the review process. The student work presented must demonstrate a range of grades, assignment types and demonstrate support of program outcomes.[1]

Historically, student material would be collected and copied for presentation during an ABET on-site visit. The copying of student material can consume a large amount of time and money, resources often in short supply within an academic department. To reduce the copying cost and copying time, some universities are switching to electronic storage of student material. Typically, the scanned student material is provided during the on-site visit in electronic folders similarly to how hard-copies of student material had been displayed in binders. In an effort to improve upon this trend towards electronic storage of the material, a computer application is developed that allows a PEV to search a catalog of the electronically stored student materials according to a particular course, engineering program, or ABET outcome.

## Software Application Design

The first step in defining the software application for reviewing scanned student work was the development of a student assignment naming convention that would allow all material to be cataloged according to its associated course and engineering program. The developed naming

convention for a student assignment is "*AAA_BBBBBB_CDD*", where "*AAA*" represents the academic semester the material was collected, "*BBBBBB*" represents the course abbreviation and number, "*C*" represents the assignment type, and "*DD*" represents the assignment number. For each student assignment the instructor completes a coversheet that includes the course material name using the developed naming convention. The coversheet also indicates which program and ABET outcomes the material satisfies. The standard coversheet developed is show in Figure 1, and indicates the approved academic semester and course type abbreviations.



**Figure 1: Student material coversheet**

A staff member is responsible for scanning the student material for each assignment, where each individual student's work is saved as a unique pdf file. The files are named according to the

naming convention followed by an incrementing student number to uniquely identify it. Student number 00 is reserved for the original assignment handout. For example, the file with the assignment name "*09FA_ECT224_H01_03.pdf*" stores the first homework assignment for student 3 in the Fall 2009 ECT224 course. All student material, regardless of the associated course, is stored in the same directory. Once the student material has been scanned, it can be returned to the students by the instructors. The original coversheet is kept so that the information can be input into the ABET catalog creator application.

The ABET catalog creator application is developed to allow a staff member to easily create a database of all student materials that can be searched according to course name, program name, and program and ABET outcomes. An associated ABET catalog viewer application is also created to provide easy retrieval of student material from the developed database. Both applications are developed using the LabVIEW programming language. LabVIEW is typically used for data acquisition and control applications. However, since it allows for quick development of graphical user interfaces, provides innate file I/O and pdf viewing support, it is a good fit for developing these applications.

The user interface to the developed ABET catalog creator application is shown in Figure 2. Note that the interface closely resembles the layout of the assignment coversheet shown in Figure 1. The application not only allows the user to enter information from the coversheet, it also provides a means to scan the developed database and edit its contents as needed. It is important to note that the database is not saved in a text readable format, but instead is saved as a binary file to reduce memory storage space.
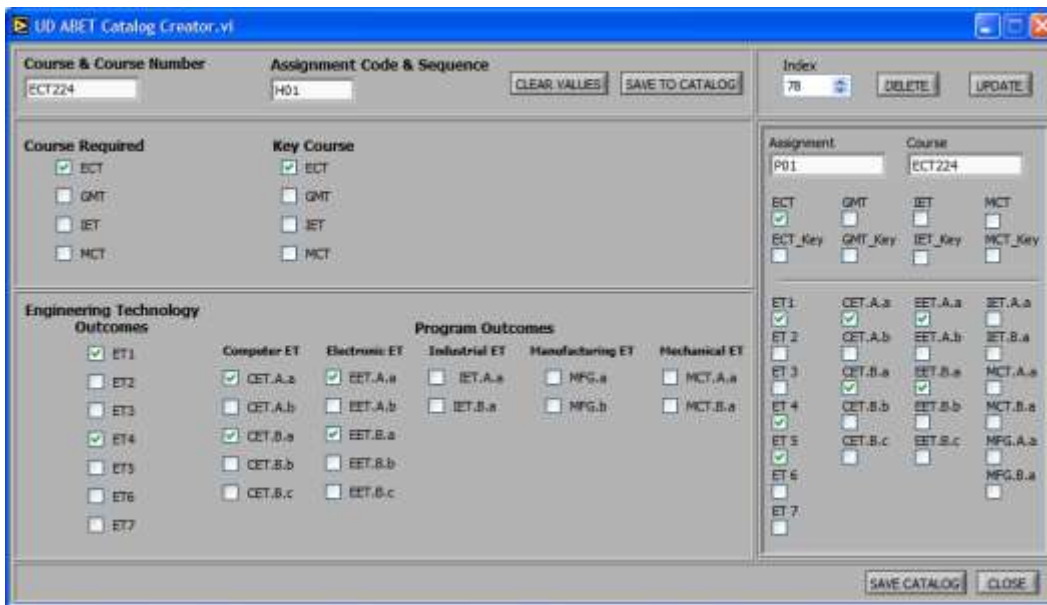


**Figure 2: ABET catalog creator application user interface**

The user interface to the ABET catalog viewer application developed is shown in Figure 3. The user interface allows the PEVs to easily search and view for supporting student material based upon course name and program and ABET outcomes.
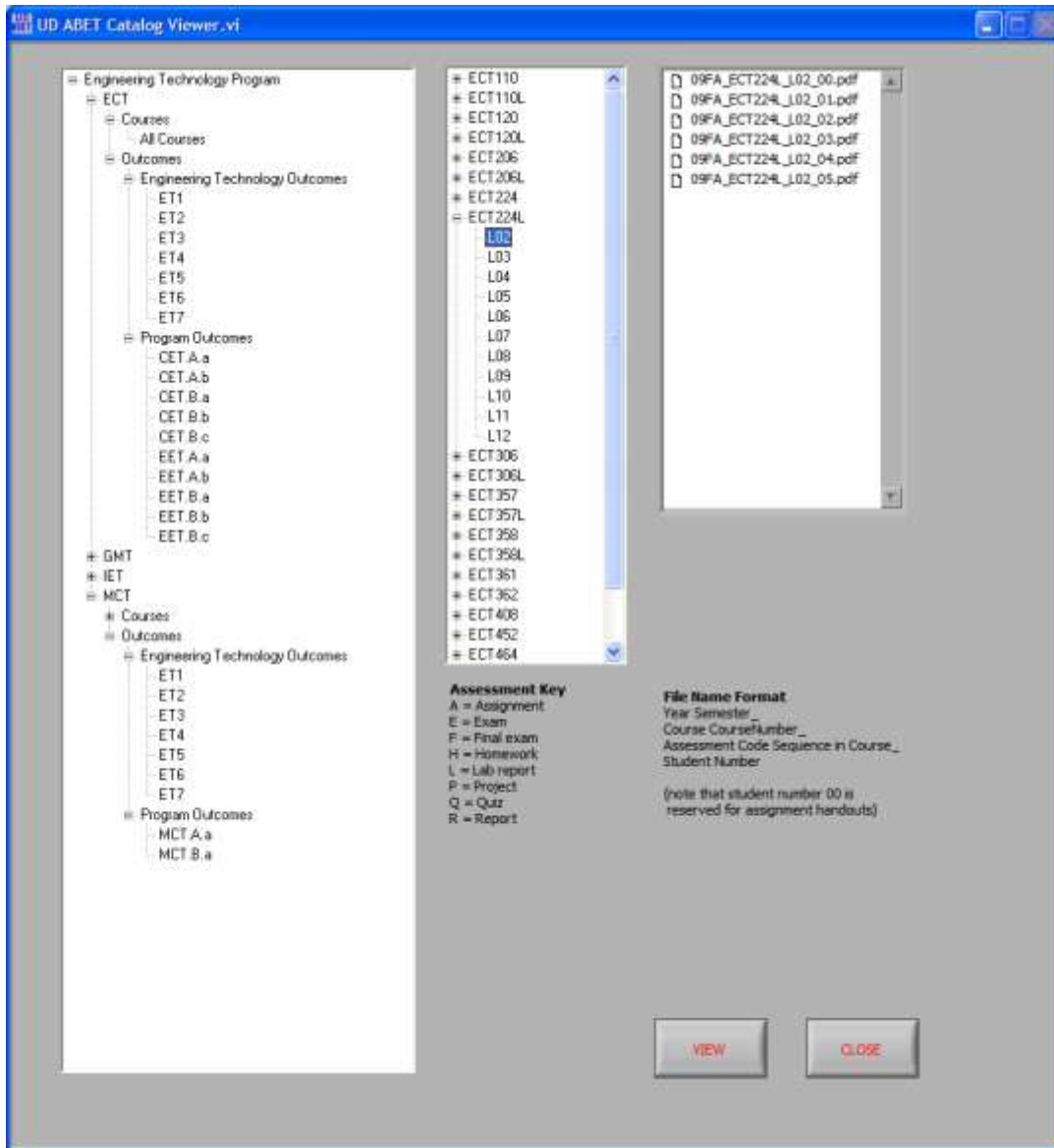
**Figure 3: ABET catalog viewer application user interface**

### ABET Catalog Usage

The developed ABET catalog creator application was used by staff within an Engineering Technology Department during the 2009 – 2010 academic year in preparation for an upcoming ABET on-site accreditation visit. The same staff members were responsible for scanning the student materials into pdf files using a document scanner. The staff members found the scanning process to be quicker than the previous copying process for the last ABET accreditation visit.

While the staff members entered data into course material catalog using the ABET catalog creator application, a couple deficiencies were noted and rectified throughout the process. First, it was noted that the user would be best served with an ability to easily search the catalog for previously entered assignments. This capability was added to the right-hand side of the user

interface by sorting the assignments by name and adding a quick scroll feature. An additional request by the staff using the ABET catalog creator application was to provide a safety mechanism that would not allow duplicate information to be entered for the same student assignment name. This feature was also added and implemented with a pop-up dialog window indicating to the user that duplicate information was not allowed and to verify the entered data. These modifications were easily implemented and reduced the chances of erroneous information making it into the course material catalog.

The ABET on-site accreditation visit took place during the Fall 2010 semester. The student material was provided for review by the PEVs on four dedicated laptop computers that contained the course material database, all scanned student materials, and the ABET catalog viewer application. These computers were located in the ABET review room along with the individual course outlines and textbooks. The on-site visit was conducted by four PEVs, one observer, and one team chair. To assess the usefulness of providing the student material in an electronic form and the ease of use of the ABET catalog viewer application, a short survey was administered to the PEVs, the observer, and the team chair. The results of this survey will also be used in the Department's continuous improvement process.

The first part of the PEV survey focused on assessing the ease of use of the ABET catalog viewer application and comparing its efficiency in finding the necessary material compared to traditional, non-electronic means. Table 1 contains the PEV survey results for these first questions where the level of agreement with each statement is rated using a five point scale; agree (5), somewhat agree (4), neutral (3), somewhat disagree (2), and disagree (1). From this information it can be seen that the ABET reviewers found the application to be easy to use, however, there was some disagreement on the usefulness of the tool when compared to non-electronic, standard hard copied material as indicated by the large standard deviation for the results of these statements. This difference in opinion may be more of a result of familiarity with the standard process of reviewing student material than the actual efficiency of locating student material using the ABET catalog viewer application.

| Statement | AVG Rating | Std. Dev. |
|---|---|---|
| The electronic database application was easy to use | 4.00 | 0.63 |
| The course material was easy to view using the electronic database | 4.33 | 0.82 |
| Material was easy to locate using the electronic database application | 3.83 | 0.75 |
| Review of course material was easier to perform using the electronic database application than by using hardcopies of the student material | 3.50 | 1.76 |
| Supporting material for program outcomes was easier to locate using the electronic data base application than by using non-electronic means | 3.00 | 1.41 |

**Table 1: PEV survey results for using the ABET catalog viewer application**

The second part of the survey allowed the reviewers an opportunity to comment on the perceived benefits and weaknesses of the electronic application and to provide suggestions for future improvements. Some of the documented benefits were the speed in performing the searches, the reduced usage of paper, and that this application could allow for the review of material before an on-site accreditation visit. The documented weaknesses include the speed of the computer running the application and that some course material was mapped to a large number of outcomes. As far as suggested improvements, the reviewers commented on making material available on CD/DVD prior to the on-site accreditation visit, inclusion of other supporting material in database, not just student work, and refining the course mapping process.

## Concluding Remarks

Overall the development of ABET catalog creator and viewer applications to manage a database of student material proved worthwhile. This process reduced the cost and time associated with gathering student material for an on-site ABET accreditation visit. In analyzing the PEV feedback from using the ABET catalog viewer application, it is clear that the system achieved its goal of providing them a mechanism to easily search for supporting material not just by course, but also by program and ABET outcomes. Furthermore, it was even suggested to expand this applications functionality to also store and catalog other review material such as meeting minutes and course surveys. This feedback also made clear that with this information in an electronic format, making it available to the reviewers prior to the on-site visit would be helpful. Overall, after using an electronic database of student material and an associated ABET catalog viewer application for an ABET on-site accreditation visit, it is evident that moving towards an electronic storage format that is searchable is definitely the way forward in maintaining accreditation material. This process makes locating and viewing the supporting material easy and efficient for all reviewers involved.

## Bibliography

1. ABET 2010-2011 Accreditation Policy and Procedure Manual; ABET Technology Accrediting Commission, ABET, Inc.