Assessment Plan BT/ECET Program

The BT in Electrical and Computer Technology program will be seeking an ABET reaccreditation of its program in the fall of 2010. At the time of the visit we are expected to provide the evaluation team with a self-study report that will with respect to our assessment and continuous improvement activities:

- List the Program Educational Objectives and state where these are published.
- Describe how the Program Educational Objectives are consistent with the Mission of the Institution
- List and describe the program constituencies
- Describe the processes used to define program educational objectives, and the processes used to periodically review these definitions. Describe the extent to which the program's various constituencies are involved in these processes.
- Describe the level of achievement of each program educational objective. Provide evidence to the visiting team that supports the levels of achievement of each program educational objective.
- Describe the ongoing process and measures used to assess the Program Educational Objectives. Include a timeline for this process and describe where this process is documented
- Describe the ongoing process used to evaluate the level of achievement of the Program Educational Objectives
- Describe the process used for establishing and revising Program Outcomes
- List the Program Outcomes and describe how they encompass Criterion 3 and any applicable Program Criteria. Indicate where the Program Outcomes are documented.
- Describe how the Program Outcomes lead to the achievement of the Program Educational Objectives. Include a matrix to illustrate these relationships.
- Describe the process used to achieve each of the program outcomes. Include a matrix or table relating each course in the curriculum to specific program outcomes, and describe any other learning activities that result in achieving program outcomes.
- Describe by example how the evaluation team will be able to relate the display materials, i.e., course syllabi, sample student work, etc., to each Program Outcome

- Describe the level of achievement of each program outcome. Provide evidence to the visiting team that supports the levels of achievement of each program outcome.

- Describe the ongoing process and measures used to assess the extent to which the Program Outcomes are being achieved. Include a timeline for this process and describe where this process is documented.

- Describe the ongoing process used to evaluate the extent to which each of the Program Outcomes is being met.

- Describe the ongoing process that uses the results of the evaluations of the Program Educational Objectives and the Program Outcomes to continuously improve the program. Indicate any program improvements that have resulted and indicate where these improvements are documented.

- At the time of the visit, provide documentation that demonstrates the assessment, evaluation, and continuous improvement processes are functioning

As a result of the upcoming accreditation visit the Dept of Technology will be assessing during the fall 09, spring 10 semesters, not only the learning outcomes (LOs) associated with all our course offerings but our program outcomes (POs) and program educational objectives (PEOs) as well.

The following is a detailed description of the assessment process.

General Assessment Process

Consistent with the mission of New York Institute of Technology to provide career oriented education, support applications oriented research, and offer service in the public interest, the primary goals of the department of Electrical and Computer Engineering Technology (ECET) are to produce versatile graduates capable of growth within industry, prepared to pursue advanced education, and to contribute to the economic development of the country.

To achieve these goals the ECET department has developed a set of **Program Educational Objectives (PEO)** which represents the expected accomplishments of graduates during the first few years after graduation. Graduates should:

1. be successful in their Technology or chosen career path.

2. engage in life-long learning and professional development through graduate studies and active participation in professional organizations.

3. be able to interact effectively with others in a collaborative team-oriented manner in the management and execution of a project

4. function as a responsible member of society with a willingness to act as a mentor to fellow employees and in the community with an understanding of the social, ethical and economic impact of his/her work at the local and global level.

To support these objectives the curriculum has been developed to satisfy **Program Outcomes (PO)** which describe what students are expected to know and be able to do by the time of graduation. Upon graduation students are expected to demonstrate:

1. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines

2. an ability to apply current knowledge in areas such as statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of computer systems and networks and electrical/electronic(s) systems and adapt to emerging applications of mathematics, science, engineering, and technology

3. an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes

4. an ability to apply creativity in the design of systems, components, or processes appropriate to program educational objectives

5. an ability to function effectively on teams

6. an ability to identify, analyze, design and solve technical problems in the areas of hardware and software computer systems and/or control systems, instrumentation systems, communications systems, computer systems, or power systems.

7. an ability to communicate effectively

8. a recognition of the need for, and an ability to engage in lifelong learning

9. an ability to understand professional, ethical and social responsibilities

10. a respect for diversity and a knowledge of contemporary professional, societal and global issues

11. a commitment to quality, timeliness, and continuous improvement

ASSESSMENT PROCESS

Continuous Improvements

At NYIT's School of Engineering, each program has a rigorous, multidimensional, assessment protocol in place to assure that graduates have achieved the program outcomes and, by implication, the program's educational objectives. It is a dynamic process that provides systematic, consistent, and relevant data to support continuous program improvement.

The assessment protocol, depicted in the figure below, begins with the program's educational objectives which flow from and align with NYIT's mission. The educational objectives lead to outcomes which are achieved through program courses and experiences. Data on student performance are collected throughout the program. Data are also collected from other internal and external sources. These data provide evaluative information on program effectiveness and are used to plan curriculum enhancements. The educational objectives and program outcomes are developed with input from the program's Industrial Advisory Board, graduating students, alumni, faculty, employers, practitioners, and graduate school representatives.

The assessment process has both course embedded and constituency based assessment tools. The course embedded assessment is the Faculty Course Assessment Report (FCAR) or Online Faculty Assessment Report (OFAR), which are the primary tools used to assess the program and learning outcome achievement.

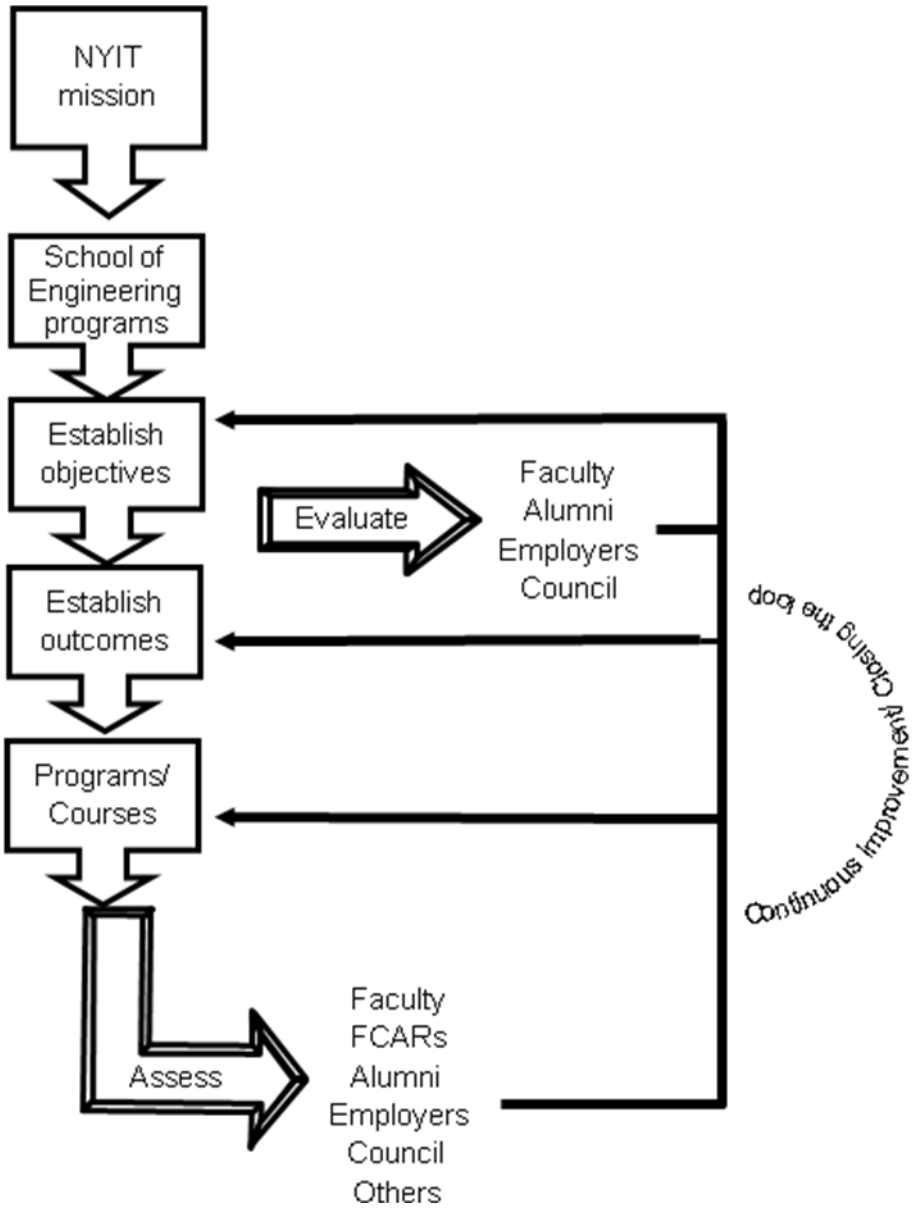
The constituency based assessments are secondary sources in the Program Outcome Assessment process, but represent primary components to the assessment of Program Educational Objectives. Constituency based assessment tools are:

Surveys of alumni, employers, and faculty
Industrial Advisory Board meetings
Institutional surveys

While many courses may satisfy a particular outcome, the assessment committee identifies a subset of these courses that it finds most appropriate to determine the minimum metric for each outcome.

The recommendations of the assessment committee meetings are generally of two types. One set of recommendations can be implemented solely through the faculty member making internal changes to the courses (i.e. textbook changes, pedagogical changes). The other set of recommendations would need to be forwarded to the curriculum committees of the School of Engineering and then to the Senate for adoption (i.e. new course, prerequisite/co requisite changes, catalog description).

Each of the assessment tools contributes to make the program effectiveness system robust. They provide information from a broad range of perspectives, student, alumni, employer, and faculty, and must be used in conjunction with one another if we are to undertake changes that are meaningful.


NYIT mission
School of Engineering programs
Establish objectives
Establish outcomes
Programs/ Courses
Evaluate
Faculty
Alumni
Employers
Council
Assess
Faculty
FCARs
Alumni
Employers
Council
Others
Continuous improvement/ Closing the loop

Surveys Used for Assessment

Three survey instruments are used for program assessment. One solicits information from current students, one from alumni, and one from employers.

At the end of each course, each term, students complete a standardized survey called the Student Rating of Courses/Teaching Form. This survey elicits students' input about the teaching process and outcomes and provides the opportunity for students to respond to open-ended questions about the course's strengths, areas to improve, and to provide additional comments. These forms are machine scored. Student responses to the constructed answer sections are given to the faculty member who taught the course. Faculty use these comments and the data provided in the course evaluation report to consider modifications to the course to meet student needs.

The Alumni Survey solicits information on how well the curriculum prepared graduates for entry level positions or for graduate school. It also gathers information about how well the program prepared them with professional skills including the use of development tools, effective communication, independent and team work skills, and flexibility to adapt to changes in technology. Alumni are also asked to provide an overall rating of the department and college. Alumni are encouraged to provide comments to improve the program as well.

The employer Survey solicits similar information about the preparedness of NYIT graduates for entry level positions in the field, their ability to use the tools of professional practice, to communicate effectively, function independently and as a member of a team, adapt to changes in technology. They are also asked to suggest ways the program might be improved to better prepare graduates for professional practice.

Copies of the Alumni and Employer surveys follow below:

NYIT/School of Engineering and Computing Sciences
Employer Survey

Name and Job Title of Person completing this form: _____
_____
Company Name: _____

With regard to NYIT graduates that you have worked with, we would appreciate if you would take the time to answer the following questions by ranking them using the following scale:

1- poor **2** - fair **3** - good **4** - excellent (circle the desired number)

1. Was the employee prepared for an entry level position at your company?
   1 2 3 4

2. Is the employee able to use the software tools of professional practice in the design process?
   1 2 3 4

3. Is the employee able to communicate effectively in both written and oral form?
   1 2 3 4

4. Is the employee able to function on an individual level?
   1 2 3 4

5. Is the employee able to function as a member of a team?
   1 2 3 4

6. Is the employee able to provide leadership in a team?
   1 2 3 4

7. Is the employee able to adapt to changing technologies and demonstrate an ability to work independently?
   1 2 3 4

Comments you feel would help us to better prepare our students. Please use this item to comment on your evaluations

_____

_____

_____

FACULTY GUIDELINES

For each course the faculty are required to submit two Online Faculty Assessment Reports (OFAR), or two Faculty Course Assessment Reports (FCAR), one for learning outcomes and one for program outcomes. The OFAR requires:

- each faculty member to identify course specific learning outcomes (LO's) for his/her course and to establish appropriate performance tasks (APT's) with appropriate documentation to assess to what extent the learning outcomes are being met. These APTs may be quizzes, exam questions, reports, projects, presentations, etc. Each student's APT is then scored with the method shown below, to create an EGMU Vector for that specific learning outcome and a corresponding assessment metric.

- each faculty member is required to satisfy a minimum set of program outcomes (POs) for his/her course as established by the department. This is accomplished by using a subset of the appropriate performance tasks (APT's) used to satisfy the LO's. Here the faculty member is required to show what part of each APT is being used to form a metric for the program outcome with appropriate documentation.

RUBRIC FOR ASSESSMENT

The EGMU Vector is obtained as follows:

3 Demonstrates a complete and accurate understanding of the important concepts **Excellent**

2 Applies appropriate strategy or concepts with no significant errors **Good**

1 Displays an incomplete understanding of the important concepts and has some notable misconceptions; makes a number of errors when performing important strategies or skills but can complete a rough approximation of them **Minimal**

0 Demonstrates severe misconceptions about the important concepts; makes many critical errors **Unsatisfactory.**

A typical EGMU vector for a class with 19 students in which the APT was the third problem of the first exam might be (8, 9, 1, 1) which would signify that 8 students demonstrated a complete and accurate understanding, while 9 students applied appropriate strategies etc. The average score in this case being 43/19 = 2.26 which is Good.

These course embedded assessments serve as the primary tools to determine program outcome achievement and afford a direct link between learning outcomes and program outcomes as one aspect of curriculum change.

The current faculty's comments and recommendations that might be used to close the loop on the assessment process are also included on each Online Faculty Assessment Report (OFAR) / Faculty Course Assessment Report (FCAR).

It is important to note that the department is requiring, as a minimum, an EGMU score of 1.5 for each (PO). This value was chosen because it represents a grade of C or Satisfactory (2.0).

i.e., if a grade of A or Excellent (4.0) is equivalent to an EGMU of 3 then C (2.0) is equivalent to an EGMU score of ¾ of 2 or 1.5.

FACULTY COURSE ASSESSMENT REPORT

For each course in the program the instructor is required to submit a Faculty Course Assessment Report (FCAR). The FCAR requires:

- each faculty member to identify course specific learning outcomes (LO's) for his/her course and to establish relevant performance tasks with appropriate documentation to assess to what extent the learning outcomes are being met. These tasks may be quizzes, exam questions, reports, projects, presentations, etc. Each course outcome is then scored with the rubric described below to create an EGMU (excellent, good, minimal, unsatisfactory) vector for that specific course outcome and a corresponding assessment metric.

- each faculty member must satisfy a minimum set of ABET POs and/or other outcomes, for his/her course as established by the department. This is accomplished by using a subset of the appropriate performance tasks used to satisfy the LO's. Here the faculty member is required to show what part of each task is being used to form a metric for the ABET and/or other outcomes with appropriate documentation. To accomplish this task, the department formulated a set of items for each outcome that can be used as a rubric to explain and help faculty evaluate what that outcome requires for an EGMU score of 3. EGMU scores of 2, 1, and 0 represent partial satisfaction of the rubric.

These course embedded assessments serve as the primary tools at our assessment meetings to determine program outcome achievement and to afford a direct link between course outcomes and program outcomes as one aspect of curriculum change. Inputs from the previous assessment process as well as the current faculty's comments and recommendations that might be used to close the loop on the assessment process are also included on each FCAR.

This data from both the constituency based assessment tools and FCARs are then evaluated at our Assessment meetings. At these meetings the full time and those regular part time faculty wishing to participate, identify and propose strategies to improve program outcome and program educational objective performance through course work. The department determined that the minimum level of quality that it felt was necessary in order to produce graduates that will ultimately achieve our program educational

objectives is an EGMU score of 1.5 for each program outcome. This score of 1.5 was chosen by the department because in the EGMU scoring it falls midway between the Minimal and Good indicators and therefore represents what a student would need in order to satisfy the requirements for graduation. (If each of the EGMU scores is adjusted to correspond to the grade points associated with A, B, C, D, a 1.5 is a C.)

While many courses may satisfy a particular outcome, the assessment committee selects a subset of these courses, with learning outcomes strongly linked to program outcomes, that it finds most appropriate to determine the minimum metric for each outcome.

The recommendations of the assessment committee meetings are generally of two types. One set of recommendations can be implemented solely through the faculty member making internal changes to the courses (i.e. textbook changes, pedagogical changes). The other set of recommendations would need to be forwarded to the curriculum committees of the School of Engineering and Technology and then to the Senate for adoption (i.e. new course, prerequisite/corequisite changes, catalog description)

We have found that each of our assessment tools must be used in conjunction with one another if we are to undertake changes that are meaningful.

FCAR COMPONENTS

Faculty Course Assessment Report (FCAR)
Course Title Semester 200x
Example

Catalog Description:
Describes the current catalog offering of the course and over time, together with previous FCARs, this will provide documentation of the major changes made to the course.

Grade Distribution:
Documents course results as an aggregate of grades assigned to students this semester. This allows the instructor analyze grade distribution.
A A- B+ B B- C+ C C- D+ D F I W WF

Modifications Made to Course:
Provides contemporaneous documentation of the actual "continuous improvement" activities. Where possible cite the source for each modification, e.g.:

Previous FCAR
Assessment Committee
Minutes from a Curriculum Committee Meeting

Learning Outcome Assessment:

In this section learning outcomes (not to be confused with program outcomes i.e. the ABET outcomes a - k) are listed. The faculty may consider using the chapter titles in the textbook being used, or course outline as a guide for developing an appropriate set of learning outcomes. Subsequently, we must establish appropriate performance tasks (APTs) to evaluate student levels of performance in our courses with respect to each of these outcomes. These APTs may be quizzes, exam questions, reports, projects, presentations and so forth. These course embedded assessments will be the primary tool used to determine learning outcome achievement and to affect faculty input as one aspect of curriculum change.

Program Outcome Assessment:

This section of the FCAR links the courses in our program to the assessment process of ABET a – k. The learning outcomes as defined in the previous section will be used to assess ABET outcomes a – k. A table which illustrates the relationship between courses and ABET outcomes a – k determines the ABET outcomes that the course is required to assess.

To assess the ABET outcomes we consider which of our appropriate performance tasks are related to the required and/or considered a – k. Then, we clearly indicate which part of the task (it may be the entire task) is being used to measure the ABET outcome.

Student Feedback:
Results of the previous terms SIRs as well as feedback gained during class or in our office hours, comments from students in the class, are summarized here.

Instructor's Comments:

This section promotes instructor self-awareness and provides an opportunity for the instructor to document impressions regarding the effectiveness of instruction, extenuating circumstances and to put forth ideas that might be used in "closing the loop" on the assessment process.

INTERPRETATION OF ABET AND OTHER OUTCOMES

As an example of how a faculty member is expected to interpret the EGMU scores for an ABET outcome, the following serves as a rubric for some typical ABET and other program outcomes which appear across all engineering and related programs.

Examples

An ability to apply knowledge of mathematics, science as needed in their discipline

- Combines mathematical as well as scientific principles to formulate models of systems relevant to the discipline
- Applies concepts of integral-differential calculus, linear algebra, probability, statistics and

discrete mathematics to solve discipline-related problems
- Understands the interpretation of mathematical and scientific operations
- Understands that there is a limitation between a mathematical model and physical reality
- Is able to execute calculations correctly by hand and by using appropriate software

An ability to design and conduct experiments, as well as to analyze and interpret data

- Observes laboratory safety procedures
- Is able to gather data to confirm a stated objective (i.e. theoretical result)
- Carefully documents data collected
- Is able to implement experimental procedures, operate instrumentation and analyze and interpret data using appropriate theory when required
- Is able to design appropriate experimental procedures when necessary
- Is aware of measurement error and can account for it

An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

- Is able to use technical, computer, and mathematical principles to develop alternative designs taking into consideration economic, health, safety, social, and environmental issues, codes of practice, and applicable laws.

An ability to function effectively on teams
- Is prepared for group meetings with clearly formulated ideas and contributes a fair share to the project workload
- Shares credit for success and accountability for team results
- Shares information and provides assistance to/with others
- Is able to assume a designated role in the group
- Values alternative perspectives and encourages participation among all team members
- Remains non-judgmental when disagreeing with others/seeks conflict resolution

An ability to identify, formulate, and solve technical problems
- Can relate theoretical concepts to practical problem solving and demonstrates creative synthesis and defense for the solution (solution is correct and checked in other ways when it can be)
- Uses appropriate resources to locate information needed to solve problems
- Effectively integrates new information with previous knowledge problems

An understanding of professional and ethical responsibility

- Takes personal responsibility for his/her actions
- Is punctual, professional, and collegial
- Attends classes regularly
- Evaluates and judges a situation using facts and a professional code of ethics
- Uses personal value system to support actions, but understands the importance of using professional ethical standards for corporate decisions

An ability to communicate effectively

Written

- Articulates ideas clearly and concisely
- Organizes written materials in a logical sequence (paragraphs, subheading, etc.) to facilitate reader's comprehension
- Uses graphs, tables, and diagrams to support, interpret, and assess information in the proper format
- Written work is presented neatly and professionally, conforms to the prescribed format, and grammar and spelling are correct

Oral

- Presentation has enough detail appropriate to the technical content for the time constraint and the audience
- Presents well mechanically: makes eye contact, can be easily heard, speaks comfortably with minimal prompts, does not block screen, no distracting nervous habits
- Uses proper American English and visual aids effectively
- Has a professional appearance
- Listens carefully and responds to questions appropriately

The broad education necessary to understand the impact of technical solutions in a global, economic, environmental, and societal context

- Is familiar with the current trends in the technical disciplines and the historical aspects of their solutions and their impacts
- Is able to evaluate political solutions, or scenarios using a series of different measures - e.g., economic, quality of life; number of individuals affected; political ramifications, etc.
- Can demonstrate a personal perspective on the importance of technology and technology related disciplines in today's world

A recognition of the need for, and an ability to engage in life-long learning

- Demonstrates an understanding of the need for and the ability to learn independently, e.g., goes beyond what is required in completing an assignment; brings information from outside sources into assignments; etc.
- Participates and takes a leadership role in professional and technical societies available to the student body

A knowledge of contemporary issues

- Has knowledge of current events in society .
- Is able to discuss, summarize, and defend major political issues at national, state and local levels

An ability to use the techniques, skills, and modern tools of their disciplines

- Uses computer-based and other resources effectively in assignments/projects
- Maintains current, state-of-the-art abilities in PC use

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