September 10, 2010

Prof. Norbert Elliot, Chair
Middle States Commission on Higher Education Steering Committee
NJIT

RE: Assessment of Student Learning - BSCE Program Review

Dear Norbert,

I have reviewed the eleven core values articulated for CSLA and find them to be in general concurrence with those we have established for our BSCE program. The Civil & Environmental Engineering (CEE) Department has incorporated these core values by way of its Mission Statement, ABET Program Objectives, and ABET Program Outcomes (a-n).

Specific examples are:

- Core value – “an awareness of learning as a lifelong educational activity” is stated in our Program Objective #2, Professional Growth, and in Program Outcome (i), recognition of need to engage in life-long learning.

- Core value – “a call to service in a variety of community settings” is stated in our department mission, “to promote service to the engineering profession and society,” and in Program Objective #3, Service.

- Core value – “an adoption of ethical conduct across circumstance” is stated in our Program Outcome (f), an understanding of ethical and professional responsibility.

To evaluate how effectively we are fulfilling our mission, objectives, and outcomes, the CEE Department has established and uses the following student learning assessment tools.
<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Frequency of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Exit Surveys</td>
<td>Every graduating class</td>
</tr>
<tr>
<td>(2) Employer Surveys</td>
<td>Every 3 years</td>
</tr>
<tr>
<td>(3) Alumni Surveys</td>
<td>Conducted annually, targeting graduates 2-years and 6-years out of school</td>
</tr>
<tr>
<td>(4) Student Feedback Sessions</td>
<td>Every semester</td>
</tr>
<tr>
<td>(5) Standardized Exam Results</td>
<td>Every exam cycle</td>
</tr>
<tr>
<td>(6) External Board Review</td>
<td>Annually</td>
</tr>
<tr>
<td>(7) Course Evaluations</td>
<td>Every semester</td>
</tr>
<tr>
<td>(8) Laboratory Evaluations</td>
<td>Every year</td>
</tr>
<tr>
<td>(9) Course Objectives/Outcomes Instructor Self-Evaluation Matrix</td>
<td>Every class, every semester</td>
</tr>
<tr>
<td>(10) Faculty Course Assessment Report</td>
<td>Selected classes, every semester</td>
</tr>
</tbody>
</table>

Once the results of the assessments have been compiled and evaluated, the Department strives to improve areas that need more focus and attention. As an example, our assessment had showed that we needed to incorporate more computer software packages being used by industry into our courses. This need was documented, software was purchased and incorporated in the courses, and future assessments reflected a marked improvement in this area. All major aspects of the BSCE program are subjected to a continuous improvement process of self-evaluation.

The BSCE program was recently evaluated by ABET in 2007 and re-accredited for another full 6-year term. Attached and for your review, please find a draft report highlighting the assessment of student learning aspects of the CEE ABET self-study report. It focuses on the assessment tools and provides examples of the continuous improvement process that was followed. It should be noted that we have added two additional assessment tools (9 and 10 above) since the last ABET visit in order to focus more attention on the assessment of student learning in meeting our program objectives and outcomes.

Please let me know if you would like me to elaborate or simplify any parts of the report. I look forward to hearing from you soon.

Sincerely,

Taha F. Marhaba, Ph.D., P.E.
Professor & Chairman

cc.  S. Saigal
     CEE Curriculum Review Committee
     (T. Marhaba, W. Konon, J. Schuring)
ASSESSMENT OF STUDENT LEARNING

PROGRAM REVIEW

FOR

B.S. CIVIL ENGINEERING

NEWARK COLLEGE OF ENGINEERING

NEW JERSEY INSTITUTE OF TECHNOLOGY

September 6, 2010
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I. Background Information

A. DEGREE INFORMATION

Degree Title: Bachelor of Science in Civil Engineering
Credit Hours: 132
Academic Curriculum: see Table 1 on the next page and section II.B-2 for more details

The BSCE program was recently evaluated by ABET in 2007 and re-accredited for another full 6-year term. This report highlights the assessment of student learning aspects of the ABET 2007 Self-Study BSCE Program Review Report. It focuses on the assessment tools and provides examples of the continuous improvement process that is followed in the Department of Civil and Environmental Engineering (CEE).

B. PROGRAM MODES

The Bachelor of Civil Engineering program at NJIT is offered both full-time and part-time, and both programs of study are identical. Classes are offered in both the day and the evening. Full-time students can complete the degree in four years by enrolling in day classes. Evening classes are offered with enough frequency so that the part-time students can complete a degree in eight years. In order to be considered full-time, a student must register for at least 12 credits each semester. The status of a student may vary from semester to semester depending on the number of registered credits. Students are encouraged to participate in cooperative education for additive credit in the first course and degree credit in the second.

As of Fall 2010, the enrollment for the program is 456, an increase of 48% from Fall 2005 as shown in Table 2 below.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>FALL 2005 - FALL 2010 STUDENT ENROLLMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>2005</td>
</tr>
<tr>
<td>No. of Students</td>
<td>309</td>
</tr>
</tbody>
</table>

C. CONTACT INFORMATION:

Prof. Taha Marhaba – Chair
NJIT – CEE Dept.
Newark, NJ 07102-1982
Tel. (973) 642-4599, Fax. (973) 596-5790
Marhaba@adm.njir.edu
TABLE 2
ACADEMIC CURRICULUM FOR B.S. IN CIVIL ENGINEERING

FIRST YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 125</td>
<td>General Chemistry I</td>
<td>3-0-3</td>
<td>Chem 126</td>
</tr>
<tr>
<td>FED 101</td>
<td>Fund.of Engineering Design</td>
<td>2-1-2</td>
<td>Chem 124</td>
</tr>
<tr>
<td>HUM 101</td>
<td>Writing, Speaking, Thinking</td>
<td>3-0-3</td>
<td>CS 101</td>
</tr>
<tr>
<td>Math 111</td>
<td>Calculus I</td>
<td>4-0-4</td>
<td>HUM 102</td>
</tr>
<tr>
<td>Phys 111</td>
<td>Physics I</td>
<td>3-0-3</td>
<td>Math 112</td>
</tr>
<tr>
<td>Phys 111A</td>
<td>Physics I Lab</td>
<td>0-2-1</td>
<td>Phys 121</td>
</tr>
<tr>
<td></td>
<td>Physical Education</td>
<td>1-0-1</td>
<td>Phys 121A</td>
</tr>
<tr>
<td>Freshman S</td>
<td>Freshman Seminar</td>
<td>1-0-0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

SECOND YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 200</td>
<td>Surveying</td>
<td>3-0-3</td>
<td>CE 210</td>
</tr>
<tr>
<td>CE 200A</td>
<td>Surveying Lab</td>
<td>0-3-1</td>
<td>CE 260</td>
</tr>
<tr>
<td>Math 211</td>
<td>Calculus III</td>
<td>3-0-3</td>
<td>HSS*</td>
</tr>
<tr>
<td>Math 225</td>
<td>Survey of Prob. &amp; Stats.</td>
<td>1-0-1</td>
<td>Math 222</td>
</tr>
<tr>
<td>Mech 235</td>
<td>Statics</td>
<td>3-0-3</td>
<td>Mech 237</td>
</tr>
<tr>
<td>EnE 262</td>
<td>Intro. to Environ. Engineering</td>
<td>3-1-3</td>
<td></td>
</tr>
<tr>
<td>SS 201</td>
<td>Economics</td>
<td>2-0-3</td>
<td></td>
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</tbody>
</table>

THIRD YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 320</td>
<td>Fluid Mechanics</td>
<td>4-0-4</td>
<td>CE 333</td>
</tr>
<tr>
<td>CE 320A</td>
<td>Hydraulics Laboratory</td>
<td>0-3-1</td>
<td>CE 341</td>
</tr>
<tr>
<td>CE 321</td>
<td>Water Resources Engineering</td>
<td>3-0-3</td>
<td>CE 341A</td>
</tr>
<tr>
<td>CE 332</td>
<td>Structural Analysis</td>
<td>3-0-3</td>
<td>CE 350</td>
</tr>
<tr>
<td>Mech 236</td>
<td>Dynamics</td>
<td>2-0-2</td>
<td>HSS Elec</td>
</tr>
<tr>
<td>HUM/HIST**</td>
<td>Cultural History</td>
<td>3-0-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Elective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FOURTH YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 431</td>
<td>Construction Materials Lab</td>
<td>0-3-1</td>
<td>CE 495</td>
</tr>
<tr>
<td>CE 432</td>
<td>Steel Design</td>
<td>3-0-3</td>
<td>ME 435</td>
</tr>
<tr>
<td>CE 443</td>
<td>Foundation Design</td>
<td>3-0-3</td>
<td>Elective</td>
</tr>
<tr>
<td>CE 494</td>
<td>Civil Engineering Design I</td>
<td>3-0-3</td>
<td>HSS Elec</td>
</tr>
<tr>
<td>Elective</td>
<td>CE Elective</td>
<td>3-0-3</td>
<td>Elective</td>
</tr>
<tr>
<td>HSS Elec</td>
<td>Communications Elective</td>
<td>3-0-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 Level****</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fundamentals of Engineering (FE) Exam is required for graduation

* EPS 202 or Rutgers courses
**HUM 211, 212, or HIST 213. Student must select one
***Student must choose one of the following: CE 307, CE 351, CE 410, CE 414, CE 450
EnE 360, EnE 361
**** Eng 339, 340, 347, 352, 369, THTR 435

Total Credits 132
II. Accreditation Summaries

A. STUDENTS

1. Advisement and Monitoring

The CEE Department employs a mandatory advisement system. Each semester, every student is required to see one of the undergraduate advisors within the department prior to registration. In order to ensure compliance, a registration hold is placed on each student’s computer file. During the meeting the advisor reviews the student’s progress and discusses what courses should be taken in the upcoming semester. A curriculum checklist sheet is maintained in each student file to track student progress, and the advisor also completes a registration authorization form (samples of each are included as Exhibits 1 and Exhibit 2. The advisor also makes other notations in the file as appropriate. Following the meeting with the advisor, the registration hold is removed and the student then registers on-line following the NJIT standard procedure. The mandatory system has proven effective in preventing students from taking courses out of sequence.

An added advantage of the current advisement system is that it allows the advisors to get to know each student on a more personal basis. Advisors are encouraged not only to discuss course registration, but also to offer advice on civil engineering careers, summer internships, availability of scholarships, and graduate school. The advisor also tries to assess whether the student is experiencing personal or financial problems, and such problems are normally referred to the department Chair or the Dean of Students Office. Advisors maintain an “open door” policy, and students are encouraged to visit any time during the semester. Students can also contact advisors by e-mail or telephone for registration authorization, which is particularly convenient for part-time students.

Students can see advisors at any time during posted office hours, and during registration periods extended office hours are offered. Three faculty are currently serving as CE undergraduate advisors:

- Prof. Harold Deutschman - Freshmen
- Prof. Walter Konon - Full-time Undergraduates and Part-time Undergraduates
- Prof. Tom Olenik - Full-time Undergraduates and Part-time Undergraduates

Students apply for graduation prior to the semester in which they plan to graduate. This enables the department to perform a preliminary graduation certification for each student that includes a complete analysis of the courses taken to meet the degree requirements, a check of the cumulative grade point average for courses in the final two years of the program, and a check of the overall grade point average. These checks are performed in the semester just prior to the final semester in order to provide an opportunity for a student to address any deficiencies.

2. Student Retention
Retention of students in the civil engineering program is currently of concern. Retention is a complex issue since it is influenced by many factors including admission standards, advisement, instructional quality, personal issues, campus life, and outside employment opportunities. Since engineering programs are more inherently rigorous than most other courses of undergraduate study, the department has implemented several program specific measures to improve retention.

The first-time full-time freshmen (FTFTF) retention rates for 2004-2008 are shown in Table 3 below.

### TABLE 3
**FTFTF RETENTION RATES (2004-2008)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Entered</th>
<th>Retained</th>
<th>Ret. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>49</td>
<td>43</td>
<td>88%</td>
</tr>
<tr>
<td>2005</td>
<td>61</td>
<td>52</td>
<td>85%</td>
</tr>
<tr>
<td>2006</td>
<td>76</td>
<td>63</td>
<td>83%</td>
</tr>
<tr>
<td>2007</td>
<td>50</td>
<td>42</td>
<td>84%</td>
</tr>
<tr>
<td>2008</td>
<td>56</td>
<td>49</td>
<td>88%</td>
</tr>
</tbody>
</table>

Over the past several years, several actions have been taken to improve retention in the civil engineering program. These actions fall into one of the following three categories:

1. Development of accurate tracking data on student retention;
2. Identification of the reasons why students leave the program;
3. Implementation of measures to improve program retention.

The results and status of each of these actions will now be summarized.

**Tracking of Student Retention.** Retention rates in CEE have averaged 83% over the last four years; which is slightly above the NCE average. Retention efforts are focused at the freshman and sophomore level. To facilitate retention, a CEE faculty member has been selected to advise all freshmen. In F2004, The FED 101 course became department specific, which has helped to instill camaraderie in the freshman CEE cohort. The CEE Advisory board visits the CEE FED 101 sections to introduce the freshman to professional practice issues and to serve as role models for the students. In addition, considerable departmental scholarship support is directed at freshmen and sophomores. Reasons for students leaving the program are varied, but a main factor is that many are unable to cope with the academic rigors of the program. The next largest reason for loss involves students who are transferred to another degree program at NJIT. A majority of the internal transfers leave NCE altogether and entered either the School of Management or the College of Science and Liberal Arts. It is likely that this group also contains some students who could not cope with engineering, but it also includes students who were simply attracted to another program.
Measures Taken to Improve Program Retention. Based on the retention evaluation described above, a number of measures are being implemented to improve program retention. One measure is the gradual raising of admissions standards. Increasing standards will have an important impact on program retention over the long-term. In addition, the CEE department has implemented several program-specific measures that are aimed at improving retention. These are summarized as follows:

The Freshman Advisement Program: Based upon the finding that a substantial percentage of students leave the program before taking departmental courses, the CEE department lobbied to take over the responsibility for freshman advisement. Previously, the Office of the Dean of Freshman Studies advised all freshmen and first semester sophomores. The idea now is to bring freshmen into early contact with CEE advisors and faculty as opposed to faculty advisors from other departments as had been the case previously. It is also an opportunity for freshman students to physically come to the CEE department area to foster a sense of belonging. The academic progress of each freshman student is examined at the end of each semester, and each is contacted by letter to offer encouragement or assistance as each case warrants. Advisement of freshmen by the CEE Department commenced in Fall 2000.

Freshman and Transfer Student Mixer: As part of the “early contact with the department philosophy,” all FTFTF and first time transfer students are invited to a CEE barbeque mixer held in the department area during the first or second week of the academic year. Students who are undecided on an engineering major are also invited. Students are introduced to the department and its facilities by the chair, and they also have the opportunity to meet their advisors and student representatives of the ASCE, XE and AWWA student chapters. At the mixer the students are encouraged to visit the department throughout the academic year, attend student chapter meetings and express their concerns and needs.

Student Tracking and Advisement Procedures:
- All undergraduate student files are updated once a year. If a problem is identified, a letter or e-mail is sent to the student.
- At the beginning of each semester (after drop-add dates in September and January), a new list of enrolled students is received. Department files are reviewed for enrolled students in order to set up files for new students and to identify inactive students.
- Inactive student files are placed in an special file drawer for reference and follow-up.
- Lists of new transfer students are sent to the department. Transfers meet with an advisor to maximize transfer credit, to set up remaining program of study, and to resolve various questions about placement, registration, etc.
- Advisor office hours are set up and posted at the start of each semester with extra hours during registration periods in November and April.
• A letter is sent each semester to every enrolled student announcing the registration advisement hours and highlighting any changes in the curriculum requirements.

• During the summer, department advisors attend three transfer orientation evenings, and someone is available every Wednesday, throughout the year from 8:30 a.m. to 6 p.m.

• Registration holds are placed on full-time and part-time undergraduates in Fall and Spring.

• Students can contact advisor by phone or e-mail to have holds removed.

In keeping with the continuing process of self-evaluation, the effects of these advisement measures are monitored and adjustments made as appropriate.

Undergraduate Scholarships and Internships: CEE faculty in conjunction with the CEE Advisory Board embarked upon a campaign to raise funds for educational enrichment of students in the CEE department. Campaign funds were targeted to three areas that help advance the strategic priorities of the department: (1) undergraduate scholarship enhancement; (2) laboratory enhancement; and (3) student activities. A major effort is being placed on raising undergraduate scholarship funds. The idea is to reduce the amount of time that undergraduate students spend on part-time work during the school year, since retention studies clearly indicate that student performance is inversely proportional to the number of hours worked. Funds are being raised both for endowed and annual scholarship awards. The preferred model is to join the scholarship with a summer internship opportunity at the donor’s company. For example, the New York City office of Parsons Brinkerhoff has established four $1,000 awards plus a summer internship for a student in each class level, freshman through senior. The campaign has gaining momentum since employer donors are viewing it as a means to recruit participating students as full-time employees after graduation.

CEE Freshman Engineering Design (FED 101): Since the Fall 2004 semester Freshman Engineering Design has been discipline specific. All CEE freshmen are directed to the CEE FED 101 sections. This change allows the introduction of CEE design projects and AutoCAD at the start of their college experience. This also helps with establishing a sense of camaraderie and working in teams on project design. Since Fall 2004 the CEE Advisory Board members have been meeting the CEE FED 101 sections to start them thinking about CEE career path options and professional practice matters.

In keeping with the continuing process of self-evaluation, the effects of these advisement measures are monitored and adjustments made as appropriate.
B. PROGRAM EDUCATIONAL OBJECTIVES

1. Mission Statement and Vision

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

The department mission is consistent with the NCE and NJIT missions, which emphasize education, research, service, and economic development of the state.

In order to realize the department mission and vision, a strategic plan was established in Fall 1999. The plan was developed in concert with the strategic plans for NCE and NJIT. The plan was reevaluated and revised in 2003, 2006 and 2009 with input from students, faculty, and the Advisory Board. The strategic plan of the CEE Department is included as Exhibit 3. The 2009 CEE strategic plan review by the CEE department faculty included a review of our current undergraduate program offerings and their respective student enrollment figures.

As the CEE Department moves into the 21st century, we will continue to build upon our role as an important educator of civil engineers and environmental engineers in the State of New Jersey. Our main vision for the future is continuous quality improvement of faculty and students as NJIT advances in stature both regionally and nationally. Education of bachelor-level civil engineers remains a principal focus of the CEE department, and to this end, we have established three program objectives. The program objectives incorporate the program outcomes described in Section C-1. Department program objectives and outcomes were reviewed and revised in the 2006/2007 academic year with input from students, faculty, and the Advisory Board. The relationship between the program objectives and program outcomes is shown in Table 4. The BSCE program objectives will now be described.

2. Program Objectives

The program objectives were developed by the CEE department faculty in conjunction with the Advisory Board. The objectives are reviewed and revised periodically with input from faculty, students, and the Advisory Board.

Our program objectives are reflected in the achievements of our recent alumni.

Objective 1: Engineering Practice: Recent alumni successfully engaged in the practice of civil engineering within industry and government, working in a wide array of technical specialties including
construction, environmental, geotechnical, structural, transportation, and water resources.

**Comment:** Our graduates receive a broad based civil engineering education, with area concentrations, and professional design experience utilizing state of the art technologies and practices. This allows for maximum latitude in professional employment.

**Outcomes addressed:** a, b, c, d, e, f, g, h, i, j, k, l, m, n

**Objective 2: Professional Growth:** Recent alumni advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

**Comment:** This program objective addresses the NJIT, NCE and department mission of developing professionals who are prepared for lifelong careers and leadership roles.

**Outcomes addressed:** a, c, d, e, f, g, i, j, k, l, m, n

**Objective 3: Service:** Recent alumni perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

**Comment:** Our students are encouraged to engage in service endeavors through participation in ASCE, Chi Epsilon, AWWA, Engineers Without Boarders, and community project activities. This fosters the development of a culture of service to society and the profession in our alumni. This new service program objective was formulated and added as a program objective in Spring 2007.

**Outcomes addressed:** d, e, f, g, i, j, l

To achieve the above program objectives, the BSCE curriculum is structured to provide a broad undergraduate education. In response to needed improvements brought to light by the assessment process, the CEE curriculum has continued to change over the last several years. In Fall 2003 a senior level testing laboratory course Construction Material Lab CE 431 was added to the fourth year courses. In September 2004 the Freshman Engineering Design FED 101 became discipline (CEE) specific for our students. In January 2006, Introduction to Environmental Engineering EnE 262 had a one hour laboratory added to the existing 3 hours of lecture. In May 2006, Electrical Engineering Principles ECE 405 was removed from the curriculum as a required course and was replaced with a CEE elective. Students can still choose to take ECE 405 as a technical elective. Also in May 2006, the HSS – open elective 300 level was designated in our curriculum to be a HSS 300 level course with a significant communication component (e.g.: Eng 352 – Technical Writing). In November 2006 one of the two HSS cultural history courses was replaced by a second English course, English Composition: Writing,
The current BSCE curriculum is presented in Table 1. The first two years focus on mathematics and basic science courses that provide a solid foundation for the engineering science and design courses taken in the junior and senior years. Students are required to take one or more courses in each of the major areas of civil engineering. Two optional technical electives provide an opportunity for students to concentrate in one of these areas. The curriculum has been designed to expose students to an open-ended design project during their first semester at NJIT and to integrate design activities throughout the curriculum, culminating in a two-semester capstone design course sequence in the senior year. Each semester includes one or more humanities or social science courses, which are coordinated to integrate writing across the four years of the curriculum.

3. Program Constituencies

The educational objectives and the resulting curriculum of the program were established and are maintained based upon input from several different constituencies. Each of the constituencies is described below. In the next section, examples are provided describing how each constituency has contributed to improving the effectiveness of the program.

**Industry/Alumni.** NJIT and the CEE department have traditionally maintained a strong tie with industry. The original Newark College of Engineering, for example, was started in response to the needs of industry in the early 20th century. It is noted that the University is geographically situated in the New York/New Jersey Metropolitan area, which is an ideal location to foster this industrial relationship. The department solicits direct input for the program from industry/alumni through the periodic use of surveys. The Employer Survey queries about general and specific skills that employers desire for graduate civil engineers, and it also inquires about satisfaction with NJIT/CEE graduates. The Alumni Survey provides program specific feedback about the general undergraduate experience, employability, and progress towards licensing. Another important connection with industry/alumni is through our faculty, who actively participates in local professional organizations where they maintain continuing dialogue with practicing professionals about the needs of industry. In fact, a significant number of our faculty serve in leadership positions and on various committees within the professional organizations. Our department also uses a number of adjunct faculty who work in the engineering profession and who help to assure that the program is relevant and up-to-date.

**Current Students.** Current students provide direct input into the program by several different modes. One mode is through the Student Senate organized feedback sessions, which are held once each semester. Discussion at the sessions ranges from compliments and complaints about individual instructors to suggestions about course content. It is noteworthy that a substantial number of
students are employed with engineering firms and agencies either part time or during the summer. Thus, they can often provide perspectives that are based in part on work experience. Another opportunity for students to impact the program is through exit surveys of graduating students. The department has conducted exit surveys every semester since May 1999. The exit surveys will be further discussed under assessment tools below. Yet another means for students to impact program effectiveness is by one-on-one interaction between students and faculty. The CEE faculty enjoy good rapport with the students by virtue of the favorable student to faculty ratio in the upper-level civil engineering courses. In the Spring 2007 semester a Student Advisory Committee (SAC) was established to serve as a liaison between CEE undergraduate students and the department. The SAC will meet regularly to provide input and feedback on current or proposed issues and policies that affect CEE students.

**CEE Advisory Board.** The CEE department has an active Advisory Board that meets quarterly to review department activities and to provide a professional perspective for program development. The 14-member board represents a cross-section of civil engineering professionals including design consultants, construction managers, contractors, and attorneys. The Board, in conjunction with the Department Faculty, plays an important role in establishing and maintaining the program objectives. During 2005 and 2006 the Board had extended discussions at several Board meetings about the civil engineering body of knowledge (BOK) for the 21st century outcomes, developed by the ASCE/ABET BOK Committee, and the department’s program objectives. The principal focus of the discussions was balancing the needs of the engineering profession in light of the NJIT mission. At the same time the BOK outcomes and revised objectives were discussed in the monthly CEE faculty meetings. Following several cycles of draft and revision, the current outcomes were approved at the September 2006 Board meeting and the current objectives were approved at the April 2007 Board Meeting. Now the objectives are formally reviewed on an annual basis at the first Board meeting of each academic year.

**Faculty and Staff.** The department holds monthly faculty meetings that include discussions about the BSCE curriculum. Faculty and staff also serve on a variety of department, NCE and NJIT committees where academic as well as administrative topics are discussed. Frequently, these meetings generate new ideas that are considered by the department to enhance the civil engineering program. Another important source of program input is individual faculty, who generate suggestions based upon course-specific feedback. These suggestions are often first discussed and developed at the functional group level, e.g. CEE Structural Group, or in some cases they are communicated directly to the Chair. Eventually the item is either placed on the agenda of the monthly department meeting or referred to the Curriculum Committee.

**CEE Curriculum Committee.** Another important constituency providing input into the program is the CEE Curriculum Committee. The Curriculum Committee,
which has been a standing departmental committee for more than a decade, meets at least once each semester to review the undergraduate course of study. The committee solicits and receives ideas for possible curriculum change from a variety of sources including survey results, the Advisory Board, student feedback sessions, discussions at department meetings, and individual faculty. The Committee reports periodically to the CEE Faculty and the Advisory Board. The Committee is also responsible for initiating all formal proposals for curriculum modifications and carrying them forward to the NJIT Undergraduate Curriculum Review Committee (UCRC).

C. PROGRAM OUTCOMES AND ASSESSMENT

The previous section has described the educational objectives for the B.S. Civil Engineering degree program. This section describes the expected program outcomes as well as the assessment tools that are used to measure whether the objectives are fulfilled. Included is documented evidence that the assessment tools are helping us to come closer to achieving the desired outcomes and objectives.

All aspects of the BSCE program are subjected to a continuous process of self-evaluation, as depicted in Figure 1 below:

**FIGURE 1**
**SELF-EVALUATION PROCESS FOR THE B.S.C.E. PROGRAM**

1. **Program Outcomes**

ABET Engineering Criteria (EC 2000) requires a minimum set of generic outcomes (a-k) for all engineering programs. The department and its Advisory Board have reviewed the generic outcomes and found that they are applicable to the BSCE program, but need to be supplemented to reflect the uniqueness of this program. Therefore, in addition to the generic outcomes (a-k), students will have:

(i) an understanding of management and leadership principles and techniques

(m) take the FE examination as the first step toward professional licensure

(n) ability to find professional level employment and/or pursue an advanced degree
The 14 program outcomes are the minimum expected results if the department’s BSCE program objectives are achieved. The relationship between the program objectives and the 14 program outcomes is shown in Table 4. The assessment tools that are used to measure whether or not the objectives and outcomes of the BSCE program are being met will be presented and discussed in the next section.

**TABLE 4**

**RELATIONSHIP BETWEEN PROGRAM OBJECTIVES AND OUTCOMES**

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>Objective 1 Engineering Practice</th>
<th>Objective 2 Professional Growth</th>
<th>Objective 3 Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) ability to apply knowledge of math, science, and engineering</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(b) ability to design and conduct experiments, as well as interpret data</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) ability to design a system, component or process</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(d) ability to function on multi-disciplinary teams</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(e) ability to identify, formulate, and solve engineering problems</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>(f) understanding of ethical and professional responsibility</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>(g) ability to communicate effectively</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(h) broad education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) recognition of need to engage in life-long learning</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(j) knowledge of contemporary issues</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(k) ability to use techniques, skills, and tools in engineering practice</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(l) an understanding of management and leadership principles and techniques</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>(m) take the FE examination as the first step toward professional licensure</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n) ability to find professional level employment and/or pursue an advanced degree</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A brief demonstration of how the program satisfies each outcome (a-n) is now presented:

(a) Students develop an ability to apply their math, science, and engineering knowledge in the upper level civil and environmental engineering courses. For example, the design of a steel beam (CE 432) requires a blend of calculus, physics, and solid mechanics. Similarly, the design of a storm drainage system (CE 321 & CE 494) requires a student to apply the principles of probability, physics, and fluid mechanics. All of the civil and environmental engineering courses in the program reinforce the intimate connection of math, science, and engineering principles that define the field of civil engineering.

(b) The program requires students to take six laboratory courses within the CEE Department: Strength of Materials Lab within Mech 237, Surveying Lab (CE 200A), Environmental Engineering Lab within EnE 262, Hydraulics Lab (CE 320A), Soil Mechanics Lab (CE 341A), and Construction Materials Testing (CE 431). In addition, students complete two semesters of Physics Lab (Phys 111A and 121A) and one semester of Chemistry Lab (Chem 124) during their freshman year. Although the experimental medium of these eight lab experiences differs considerably, all require that the student apply the fundamental techniques of: (1) experimental set-up; (2) operation; (3) measurement; (4) adjustment; (5) data gathering; and (6) data interpretation. Additionally Hydraulics Lab (CE 320A) and Construction Materials Testing (CE 431), offered in the junior and senior years of the program, require students to design their own experiment, conduct the testing, interpret the results and present their findings.

(c) The design experience begins in freshman year with Fundamentals of Engineering Design (FED 101) where students solve open-ended design problems such as design of a public transportation link connecting Newark’s Penn Station with Newark International Airport. Courses in the sophomore and junior years introduce students to more traditional design as they develop individual components that are then used to build a larger system or process. Such courses include Environmental Engineering (EnE 262), Civil Engineering Methods (CE 260), Water Resources Engineering (CE 321), Reinforced Concrete Design (CE 333), and Transportation Engineering (CE 350). In the senior year, students take four design courses including Steel Design (CE 432), Foundation Engineering (CE 443), and the two capstone courses, Civil Engineering Design I (CE 494) and Civil Engineering Design II (CE 495). These courses require students to develop solutions for open-ended, real world engineering problems using both the component-system and component-process design approaches, and in this respect, the senior year is a culminating design experience.

(d) Students begin working in teams during their freshman year in the course Fundamentals of Engineering Design (FED 101). This is followed up in the sophomore year by multidisciplinary team project assignments in Civil Engineering Methods (CE 260). In addition, all laboratory courses require
students to work in teams. The most significant teamwork experience occurs in
the capstone design courses, Civil Engineering Design I (CE 494) and Civil
Engineering Design II (CE 495). The capstones require each student group to
function as a design consultant, and the teams are multidisciplinary in the sense
that students are required to divide up the work by specialty, e.g., drainage, water
supply, transportation, environmental. All the teaming experiences allow students
to develop their teamwork and project management abilities, and they
demonstrate the advantages as well as the challenges of working in engineering
teams.

(e) All courses in the program are oriented towards problem solving, since this
forms the basis of engineering design. Students are taught how to frame the
problem, formulate possible solutions, and then select the optimal solution.
Problem solving is integral to all the discipline-oriented courses of the program
including environmental engineering, geotechnical engineering, structural
engineering, and transportation engineering. This emphasis on problem solving is
consistent with Newark College of Engineering’s regional reputation as a
practice-oriented school.

(f) The topic of professional responsibility is introduced in the Fundamentals of
Engineering Design (FED 101) class through a scheduled visit by members of the
CEE Advisory Board who address the freshman class. Professional and ethical
responsibilities are presented as a topic in the sophomore year in Construction
Materials and Procedures (CE 210). This course describes the steps for becoming
a licensed professional engineer and the NSPE or NCEES code of ethics are
distributed, discussed, and written homework is assigned. The Environmental
Engineering (EnE 262) course also incorporates the topic of engineering ethics.
An environmental ethics case study is discussed in class and the students are
required to write up a response as to the ethical issues raised and suggest a course
of action to be followed. The senior Design I (CE 495) capstone course has a
module on ethics incorporated in the course. In addition, spontaneous discussions
about professional and ethical responsibilities occur in the upper level
departmental courses by virtue of the fact that 65% of the CEE faculty are
registered professional engineers. It is noted that graduates of the BSCE program
received strong ratings in the category of ethical and professional responsibilities
during the recent Employer Survey.

(g) Written and oral communication skills are integrated across the four-year
curriculum beginning in the first semester with English Composition: Writing,
Speaking, Thinking I (HUM 101). In Spring 2006 the General University
Requirements (GUR) of NJIT were revised by a vote of the faculty. This revision
allowed for a second English/communications course in place of a cultural history
course. In Fall 2006 the CEE faculty voted to replace one of the cultural history
courses in the CEE curriculum with HUM 102 – English Composition: Writing,
Speaking and Thinking II to be located in the second semester of the freshman
curriculum. In the remaining six semesters students take at least one humanities
or social science course per semester, which typically require substantial writing and an occasional oral presentation. The senior level HSS-open elective was designated in Spring 2006, by a CEE department curriculum change approval, to require a significant communications component. Departmental courses that target communications skills include Construction Materials and Procedures (CE 210), which requires submission of three written field reports and Civil Engineering Methods (CE 260), which devotes several weeks to report preparation and oral presentations (including PowerPoint). The CE 320A (Fluid Lab) and CE 431 (Construction Material Lab) both have student designed experiments/testing, the results of which the students present as a report and as an oral presentation to the class. The capstone design courses in the senior year (CE 494 and CE 495) require students to submit professional-style design reports and make class presentations. In January 2001, the department purchased a digital video camera. It is used for recording student presentations to facilitate development of oral communications skills.

(h) Recognizing the importance of a broad education for professional engineering practice, the BSCE curriculum includes 27 credit hours of general courses ranging from Writing, Speaking, Thinking (HUM 101) all the way through a capstone humanities and social science elective course in the senior year. The department’s student advisement system monitors a student’s progress through this general education component. For example, the history course (chosen from HUM 211, HUM 212 and HIST 213) and its prerequisites must be completed before students are permitted to take the upper division HSS electives. Students may select their general courses from offerings at either NJIT or Rutgers University–Newark, which assures good diversity. Also, students are required to take two Physical Education courses that introduce the importance of lifetime physical activity.

(i) The motivation for life-long learning begins early in the program as students realize that department instructors cannot possibly cover all necessary information during scheduled class. Thus, students become adept at seeking out knowledge on their own to complete their assignments. The importance of life-long learning is further reinforced during discussions with faculty, both inside and outside of class, about various career tracks requiring continuing education or advanced degrees. Students are informed about the versatility of a bachelor’s engineering degree, which allows them to pursue advanced degrees (MS or PhD) in engineering, or alternately pursue degrees in other fields such as business (MBA), medicine (MD) or law (JD). Also, the department’s undergraduate advisors offer advice and encouragement about graduate school when they meet with students during registration and at other times. It is noteworthy that the 2006 Alumni Survey showed that the large majority of alumni (90%) are pursuing additional education, including 50% who indicate they are seeking or have completed an MS degree.
(j) It is important for civil engineers to be knowledgeable about contemporary issues, since they frequently find themselves at the center of controversial projects involving sustainable development, the environment and society. One way that students are introduced to such issues is through their design courses since departmental instructors assign “real world” engineering problems that require consideration of technical as well as non-technical issues. Students are also introduced to a variety of social and political issues in their humanities and social science courses. Fortunately, the student body at NJIT is highly diverse, and students can participate in a number of cultural and social events sponsored by various student organizations. In addition, students are exposed to contemporary issues through attendance at ASCE seminars, participation in student governance, visiting the periodical section of the library, and reading the school newspaper.

(k) The techniques, skills and tools of modern civil engineering practice are taught throughout the departmental courses beginning in the freshman year with an introduction to AutoCAD in Freshman Engineering Design (FED 101). This is followed in the sophomore year by more AutoCAD use in Civil Engineering Methods (CE 260) and by Global Positioning Satellite System (GPSS) technology in Surveying with Laboratory (CE 200 and CE 200A). Now that the computer is the principal tool of the modern engineer, virtually all department courses require assignments that involve one or more software packages. The CEE Computer Laboratory supports more than 30 major software packages, and it is by far the busiest room in Colton Hall. Other more general software packages are available on the university network including MathCad, MatLab, and Microsoft Office.

(l) Students are introduced to management techniques in the required Construction Materials and Procedures (CE 210) and Management (IE 492 or Mgmt 390) courses. Further amplification of these topics is available to students in technical electives such as Construction Codes and Specifications (CE 412), cost estimating and scheduling (CE 410) and Professional Practice in Civil Engineering (CE 461). Leadership and management principles are also emphasized in the senior capstone design courses (CE 494, CE 495) through learning modules and by direct application of leadership and management principles as students work in multidisciplinary teams to complete and present their design projects. Students are also encouraged to attend student leadership conferences such as the ASCE Zone Leadership Conference in Princeton, N.J. held in January 2007, which several of our ASCE student leaders attended.

(m) As part of the BSCE degree requirements, all students must take the Fundamentals of Engineering (FE) examination. The department faculty stress this requirement and the importance of licensure throughout the curriculum. For example, the Freshman Advisor discusses the licensing process with all entering freshmen and gives each student a copy of the NCEES Supplied-Reference Manual for use in his or her undergraduate courses. Students are also encouraged to join the ASCE student chapter during their freshman year and to seek
leadership positions in the chapter in order to prepare them for a lifetime of professional service.

(n) Taken as a whole, the BSCE program provides a broad based undergraduate experience covering each of the major areas in civil engineering. Students are well prepared for both professional practice employment and graduate school. The results of alumni surveys indicate that our graduates are in demand and that many are pursuing a graduate degree on a part time basis.

The assessment tools that are used to measure whether or not the objectives and outcomes of the BSCE program are being met will be presented and discussed in the next section.

2. Assessment Tools

Traditionally, individual student performance has been measured by course materials such as homework, examinations, presentations, projects and grades. These are important performance indicators since they provide both the student and his/her professor with measured feedback on the student’s ability within the context of a specific course. These measurement tools will continue to be used and course materials and examples of student work including videotapes of student presentations will be available to the evaluator. However, additional tools are used to assess the overall effectiveness of the BSCE program.

The CEE Department has developed ten (10) assessment instruments to measure how well we are accomplishing the outcomes presented above. The tools are listed in Table 4 along with their frequency of application. Table 5 shows the relationship between each tool and the program outcomes. The assessment tools have been developed by the faculty in consultation with the CEE Advisory Board. In addition to the CEE department developed assessment tools the NJIT Office of Institutional Research and Planning also developed and conducted student satisfaction surveys and graduating student surveys. These are also used in our assessment process.
TABLE 5
ASSESSMENT TOOLS AND THE FREQUENCY OF APPLICATION

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Frequency of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Exit Surveys</td>
<td>Every graduating class</td>
</tr>
<tr>
<td>(2) Employer Surveys</td>
<td>Every 3 years</td>
</tr>
<tr>
<td>(3) Alumni Surveys</td>
<td>Conducted annually, targeting graduates 2-years and 6-years out of school</td>
</tr>
<tr>
<td>(4) Student Feedback Sessions</td>
<td>Every semester</td>
</tr>
<tr>
<td>(5) Standardized Exam Results</td>
<td>Every exam cycle</td>
</tr>
<tr>
<td>(6) External Board Review</td>
<td>Annually</td>
</tr>
<tr>
<td>(7) Course Evaluations</td>
<td>Every semester</td>
</tr>
<tr>
<td>(8) Laboratory Evaluations</td>
<td>Every year</td>
</tr>
<tr>
<td>(9) Course Objectives/Outcomes Instructor Self-Evaluation Matrix</td>
<td>Every class, every semester</td>
</tr>
<tr>
<td>(10) Faculty Course Assessment Report</td>
<td>Selected classes, every semester</td>
</tr>
</tbody>
</table>
TABLE 6
RELATIONSHIP BETWEEN ASSESSMENT TOOLS AND PROGRAM OUTCOMES

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>Assessment Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exit Surveys</td>
</tr>
<tr>
<td>(a) ability to apply knowledge of math, science, and engineering</td>
<td>✅</td>
</tr>
<tr>
<td>(b) ability to design and conduct experiments, as well as interpret data</td>
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<tr>
<td>(c) ability to design a system, component or process</td>
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<td>(e) ability to identify, formulate, and solve engineering problems</td>
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</tr>
<tr>
<td>(l) an understanding of management and leadership principles and techniques</td>
<td>✅</td>
</tr>
<tr>
<td>(m) take the FE examination as the first step toward professional licensure</td>
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</tr>
<tr>
<td>(n) ability to find professional level employment and/or pursue an advanced degree</td>
<td>✅</td>
</tr>
</tbody>
</table>
Each of the tools is described below along with related data sources, findings, and examples of actions taken.

**Assessment Tool #1: Exit Surveys**

**Description:** Beginning in May 1999, the department began conducting exit surveys of each graduating class. A one-page survey is mailed to new graduates to arrive within a few days of graduation. The survey is purposely kept brief to maximize response rate, which thus far has averaged around 50%. The survey asks students to numerically rate the overall quality of the program, as well as the perceived usefulness of the CE courses, design assignments, and labs. The survey also asks students to briefly comment about whether their experience at NJIT was positive and whether they feel adequately prepared for an engineering career. Each semester, the survey results are compiled, and a summary is circulated among department faculty, who use it to adjust their courses. In Spring 2007 a revised exit survey form was developed to better assess program outcome achievement. A revised sample survey form is included in Exhibit 4 along with the form used from 1999 to 2006. The NJIT graduation student survey on line sample form is shown in Exhibit 5.

**Data Sources:** A summary of the statistical results from the exit surveys for May 2002, 2004, and 2006 are presented in Exhibit 6. The individual survey sheets are available in the department files. The results of the on line NJIT exit surveys are also presented in Exhibit 6.

**Findings:** The surveys indicate general student satisfaction with NJIT and the BSCE program. For the years 02-06 surveys conducted, between 83% and 100% of the students indicate “a positive experience at NJIT.” The CE courses and design assignments also received favorable ratings. Students cited many of the design courses, and singled out the capstone design courses Civil Engineering Design I (CE 494) and II (CE 495), as being particularly worthwhile experiences. The area that consistently received the most concern is the topic of CAD and computer software applications and the need for better PC facilities. There were a number of negative written comments about insufficient CAD content and training in the curriculum, which concurs with feedback received from other program assessment sources. While the department has expended considerable efforts in this area, it is believed that student expectations are increasing and as such the rating responses fluctuate from year to year. Clearly more needs to be done. A second area of some concern in the written communication component of the curriculum. Exit survey responses to this question show some need for improvement.

**Actions Taken:** The negative feedback and comments about the CAD experience and PC facilities prompted the department to embark upon a major program to
upgrade the CEE department computer laboratory and software applications in the courses. Documentation of the items in the chronology of actions taken is available in the department files.

In response to the CAD deficiency, the Freshman Engineering Design (FED 101) class was made discipline specific. All CEE freshmen take a CEE FED 101 section. This has enabled the introduction of AutoCAD for our students in the freshman year. The Civil Engineering (CE 260) sophomore level course was then redesigned to strengthen the AutoCAD portion of the course. The idea has been to introduce the "CAD SOFTWARE of civil engineering" at an earlier time so that students can use it more extensively in their subsequent CE courses. Discussions at departmental faculty meetings about our computer application assessment results and the establishment of a policy by the department of including at least one CAD/CADD experience in every course has focused attention on needed improvements. The effect of these efforts has been monitored over the last several years. Survey result scores have fluctuated, but comments and feedback from several assessment courses have been positive.

Efforts to improve the communication skills of our students have been made by strengthening the communications component of CEE courses and the curriculum. In May 2006 the department made a curriculum change to require that the HSS-300 level open elective taken by CEE students have a significant communications component (e.g.: Eng 352-Technical Writing). In Fall 2006 the department made a significant additional curriculum change replacing one of the two HSS-cultural history courses with a second required English course – English Composition: Writing, Speaking and Thinking II-HUM 102.

On the positive side, the general student satisfaction with the design courses confirms that the department’s philosophy towards design seems to be working. This philosophy includes: (1) using a variety of instructors with differing design backgrounds; (2) using some adjunct instructors who are practicing professionals in addition to the full-time CE faculty; and (3) using team teaching whenever two sections of the same course are offered in the same semester.

**Assessment Tool #2: Employer Surveys**

**Description:** In Spring 2000, an employer survey was developed in consultation with the CEE Advisory Board. The survey queries employers about general and specific skills that they require for graduate civil engineers. It also inquires whether or not the company has hired any NJIT civil engineering graduates, and whether they have been satisfied with them. A sample copy of the survey form is included as Exhibit 7. In Spring 2007 the employer survey form was modified to better assess achievements of our program objectives and outcomes as viewed by the employers. This modified form was used in the 2009 employed survey and is also included in Exhibit 8. A target list of employers was compiled using engineering directories, faculty input, and lists provided by NJIT Career Services.
Whenever possible the survey was directed towards a specific individual at the company/agency in order to maximize response rate.

Data Sources: In June 2006, the surveys were mailed to 85 employers. The response rate of the survey was very good, with 45% of the employers responding. A summary of the statistical results from the employer surveys is presented as Exhibit 8. The individual survey sheets and a summary of the written comments are available in the department files.

Findings: The respondents of the survey represented a balanced cross section of the civil engineering profession both in regard to industry type (e.g., consulting, construction) and discipline (civil site, structural). Employers indicated that the most desired entry level degree was the bachelor’s (90%). They appear to place significance on professional registration since an estimated 26% of their total employees are PE’s. Most employers (69%) report that the supply of qualified applicants for entry level positions is “marginal” or “not adequate,” which is consistent with the strong employment outlook for civil engineering graduates. However, there appears to be general satisfaction with the overall quality of available applicants with 72% ranked as “good to excellent.”

The employers were asked to rate the importance of 16 specific employee skills. The six skills receiving the highest importance ranking (in descending order) were written communication, oral communication, problem solving, teamwork, and professional and ethical responsibilities. The survey also inquired about the percentage of time spent on CAD in the workplace. Employers estimated that engineers spend an average of 27% of their time in direct CAD work, and they indicated the following software preferences: AutoCAD 62%, Microstation 36%, and other 2%.

Employers who have supervised NJIT/CEE graduates were asked to rate them using the same 16 skill categories. Our graduates were rated as “good to excellent” in 8 of the 16 categories. The categories receiving the highest ratings (in descending order) were teamwork, problem solving, math, professional and ethical responsibilities, discipline-specific, and design. It is noteworthy that three of these categories are among those ranked most important by the employers. Our graduates were rated as “fair to good” in written and oral communications. Marketing and the understanding of the impact of engineering solutions on global issues was rated as least important by the employers and our students received “fair to poor” ratings in these two areas. On the positive side many of the employer comments were favorable such as “we currently employ approximately 22 NJIT graduates who have been with us from 3 to 25 years. I rank these individuals very high (#4) in the above categories. The only skill needing improvement would be technical writing.”

Action Taken: The results of the employer survey suggest that employers are generally satisfied with graduates of the BSCE program. The ratings they
received in important engineering skill categories such as teamwork, design, problem solving ability, and professional and ethical responsibilities, are indeed gratifying. The survey lends support to the department’s mandatory FE Exam policy, since employers estimated that 26% of total employees are registered professional engineers. The mandatory FE policy emphasizes the importance of professional registration to our students, and it also encourages them to complete the first step while still in school. The current use of AutoCAD in department courses appears justified since this was the preferred software of the respondents. However, the substantial use of Microstation has prompted us to submit a budget request to purchase an update of this program in the CEE Computer Lab.

The survey also prompted several actions to address apparent weaknesses in the BSCE program. In April 2006, the department faculty voted to require that all students now take a course with a significant communication component as the HSS-open elective to further reinforce written communication skills. This action, coupled with increased emphasis on correction of written work, is aimed at addressing this chronic criticism of engineering students. The department purchased a digital video camera to record student presentations, since experience has shown that video playback is highly effective for developing speaking skills. In order to reinforce possible weaknesses in the areas of business development, leadership, global issues, and knowledge of industry practices and standards, the CEE Curriculum Committee is now studying possible revision of the second capstone design course CE 495. However, it is noted that employers assigned low importance to some of these skills in the general survey. In keeping with the continuing process of self-evaluation, the effect of these measures will be monitored and adjustments made as appropriate.

**Assessment Tool #3: Alumni Surveys**

**Description:** The NJIT Office of Institutional Research and the Career Services Division conduct periodic surveys of alumni. Although valuable data are obtained relative to student placement and general student satisfaction, the Institute level surveys are not program specific.

To provide program specific feedback from alumni, the department instituted an annual survey of CEE alumni beginning in the AY 2000-2001. Each year, the department surveys two classes of graduates: those who are 2-years out of school and those who are 6-years out of school. The more recent graduates are expected to provide data with regard to the relevance of their undergraduate program and employability. Those who have been out of school for six years will provide a more mature level of feedback relative to their undergraduate and professional experiences. The alumni survey form was revised in Fall 2005 to include questions about business and leadership principles, marketing, and global issues to assess if these areas are important to the employers and to get a base line of our graduates’ current level of understanding in these areas. A sample Alumni survey form is included in Exhibit 9. In Spring 2007 the alumni survey form was revised.
to better assess the achievement of program objectives and outcomes as viewed by our alumni. This revised form was used in the Fall 2007 alumni survey of the 2002 graduating class and will now assess graduates who are 5-years out of school. The revised form is included in Exhibit 9.

Data Sources: In October 2005, surveys were mailed to 97 alumni. The response rate of the survey was very good, with 50% of the 2004 class responding and 31% of the 2000 class responding. A summary of the statistical results from the survey is presented as Exhibit 10. Individual survey sheets and a summary of the written comments are available in the department files.

Findings: The alumni expressed overall satisfaction with the program as evidenced by the 85% positive response to the question: “Would you recommend the NJIT CE program to a high school student?” Employability was also excellent, with 100% of the respondents indicating full-time employment. The large majority of alumni (90%) indicate that they are pursuing additional education, including 55% who indicate they are seeking or have completed an MS degree. Progress toward professional licensing appeared to be satisfactory since: 71% of the 2004 class are EITs; 40% of the 2000 class are EITs; and 20% of the 2000 class are PEs.

The survey asked alumni to indicate which courses were most important in the degree program. The responses showed good balance among all the courses in the curriculum, thus confirming program relevance. With regard to specific skills both alumni groups were most satisfied with the preparation they received in math and science, problem solving, design, use of computer programs and models analyzing experimental data, and professional and ethical responsibility. However, the two groups disagreed about the skill areas in which they were least satisfied. The 2000 alumni gave the lowest rating (“neutral”) to business fundamentals and leadership principles, and global issues, while the 2004 alumni assigned their lowest rating (“neutral”) to work in design teams. The 2004 alumni class neutral response to their preparation to work in design teams is puzzling since the employees’ surveys have consistently rated NJIT CEE graduates favorable in both team work and design.

The comment section of the survey asked for suggestions to improve the program. These comments were generally consistent with the skill ratings described above. The most common suggestion from the 2000 group was more coverage of management and communications skills. The most consistent theme of the 2004 group was inclusion of more CAD in the curriculum. While these comments represent potential areas for program improvement, they also reflect the respective career stage of the two groups. The 2000 group is starting to move into project management, while the 2004 group likely uses lots of CAD in their daily activities.
Action Taken: The suggestion of including more CAD in the curriculum was also voiced by other constituencies. Four actions have been taken to address this concern. First, the course Civil Engineering Methods (CE 260) has been redesigned to include seven weeks of CAD instruction. Second, CAD mapping is now included in Surveying (CE 200). Third, the CEE Computer Laboratory is to be expanded to 36 stations, and new computing equipment is to be purchased. Finally, faculty are now requiring more regular use of CAD in the upper level design courses.

In order to give students more practice in communications skills, the curriculum now requires all students to take a second English course – English Composition; Writing, Speaking and Thinking II – HUM 102 and also requires that the HSS – 300 level open elective have a significant communications component. Improvement of oral communications skills is being addressed by requiring more oral presentations, and then videotaping them with a digital camcorder that was purchased by the department. In order to reinforce possible weaknesses in the areas of business and leadership principles and global issues, the CEE Curriculum Committee is now studying possible revision of the second capstone design course, Civil Engineering Design II (CE 495) to include additional coverage of these topics.

Assessment Tool #4: Student Feedback Sessions

Description: Once each semester, the Student Senate sponsors a feedback session to provide an opportunity for students to voice their opinions and concerns directly to the Department Chair. Feedback sessions are announced to students in advance, and the sessions are normally well attended. They are typically scheduled at mid-semester. In the Spring of each year the NJIT office of Institutional Research and Planning conducts a student satisfaction survey.

Data Sources: A written record of each meeting is kept by the Chair in the department files along with the results of the student satisfaction survey.

Findings: Many of the discussions at the feedback sessions are non-programmatic such as compliments or complaints about individual instructors. The Chair follows up on these items as appropriate. However, students also raise issues that are directly connected with the program curriculum and its effectiveness. For example, during the Spring 2006 feedback session they expressed the need to have the CEE department computer laboratory open for additional hours so that students are able to work on homework and project assignments. The need for more printer capacity and availability was also discussed. A secondary issue of student concern was continued dissatisfaction with the textbook being used for Structural Analysis CE 332. The students felt the text was confusing and lacked sufficient sample examples.
During the Fall 2006 feedback session, discussion centered around the revised departmental outcomes and objectives and the need to offer additional technical electives in the program. There was a general feeling that the number of technical electives offered by the department each year may not be adequate. The students also commented that the FE/NCEES supplied reference manual, that all CEE students have, be allowed to be used during all exams so that students become familiar with its content and use for the FE examination.

Action Taken: In direct response to the students’ suggestion regarding the availability of the CEE computer laboratory the department now hires students to keep the lab open for additional hours on Saturday and Sunday during both semesters. The issue of printer availability was resolved by requiring large multipage printouts to be made only during non-peak hours. The department also purchased a new printer in the Fall of 2006. The students’ concern regarding the Structural Analysis text was resolved by reviewing it with the head of the structural group and deciding to select another text which has more solved examples and is widely used nationally.

In response to the discussion about technical electives, the first step was to increase student awareness of current elective offerings, which includes several courses outside the department. It is noted that the number of electives offered in a given semester should be influenced to some degree by the total number of students enrolled in the BSCE program, which has been increasing for several years. The department has a plan which attempts to balance scheduled technical elective offerings with student interest. The plan has been made available to students for planning their course of study and is updated periodically. In Spring 2007 the plan was revised to include more electives due to the additional new technical elective slot in our curriculum and due to our significantly increased enrollments over the last few years. A copy of the CEE plan for technical electives is included as Exhibit 11. In direct response to the students Fall 2006 request, Hydraulic Engineering CE 322 was added to the Spring 2007 elective course offering. Allowing the use of the FE/NCEES reference manual during exams is a matter for each faculty member to decide. Several courses including Mech 234/235, EnE 262 and CE 320 allow its use. At the November 8, 2006 department meeting the faculty was urged to allow the use of the reference manual during exams.

Assessment Tool #5: Standardized Exam Results

Description: At the December 3, 1997 department meeting, the CEE Faculty passed a resolution that requires all graduates of the program to sit for the FE Examination. The main impetus of the resolution was to impress upon students the importance of professional licensing for practicing civil engineers. The mandatory exam is also intended to improve student success on the exam, since historical data suggest that the senior year is the best time to take it. An additional benefit of the exam is it provides a means to assess the effectiveness of
the program since it is a national standardized exam. The CEE Department is currently the only department in NCE (and only school in the State of New Jersey) to require the FE as a condition of graduation. This requirement went into effect with the May 2000 graduating class.

Data Sources: The performance results for the FE Examination are obtained from the National Council of Examiners for Engineering and Surveying (NCEES) the New Jersey State Board of Professional Engineers. The available performance data on the FE Examination are maintained in the department files. A summary of FE exam performance results is in Exhibit 12.

Results for the BEST Exam are available for Spring 2003 to Spring 2006 and are maintained in the department files.

Findings: The mandatory FE Exam has greatly increased student awareness of the PE licensing process in the CEE department. Strategies for exam preparation are now common topics of discussion between faculty and students, and also among students. This is a stark contrast with the situation in the past when there were probably some seniors in every graduating class who were only vaguely familiar with the FE Exam and its purpose. The department recognizes that the mandatory exam may, in the short term, reduce the passing rate of CEE students. This is because all students must now sit for the exam, including those who still choose not to prepare adequately (in the past, these students would have elected not to take the exam while still at NJIT). It is believed, however, that the mandatory exam is beneficial in the long term, since the net number of students who pass the exam on the first try should now increase.

In Spring 2006, an analysis was conducted of the performance of CE students on the FE Exam using available data for the last six years. The analysis focused on seniors who took the exam while still enrolled in the program. The data indicate an overall pass rate of 53% for CEE seniors compared with a national pass rate of from 67% to 83% for the same period. Since implementing the mandatory FE exam requirement pass rate performance for CEE students has fluctuated, but trended upwards in April 2005. Since October 2000 the subject percentage correct scores for both the general AM and civil PM halves of the FE exam have been available and have been analyzed by the department. The subject specific results of our students were compared to the national average percent correct to ascertain how our students are doing. It is a growing national trend to use the FE exam as an important evaluative tool for curriculum development (more than 30% of CE programs nationwide now require the FE exam). A general trend evident in our analysis is that our students are typically a few percentage points below the national average in many subject areas across the board. Results in many subject areas fluctuate without apparent trend. Unusually low scores in subject areas such as ethics in April 2001 and Legal and Professional Aspects in October 2004 are above the national average in April 2005. Low scores in Transportation Facilities in October 2004 are almost at the national percent average in April 2005. Scores
that are close to the national average in Engineering Economics in April 2003 and 2004 are well below the national average in April 2005. In spite of these fluctuations a below average trend has been noted in the subject areas of Computers, Environmental Engineering, Structural Analysis and Surveying.

**Action Taken:** In keeping with the original purpose of the mandatory examination policy, the CEE faculty have increased their dialogue about the FE Exam and its importance in their classes at all levels. CEE faculty who are registered professional engineers are encouraged to prominently display their licenses in their school office. Students also get to interact with practicing professionals at the ASCE Student Chapter meetings, since a majority of the invited speakers are licensed engineers.

The weak scores achieved by CEE students on the FE exam in several subject areas have been addressed and continue to be monitored. The low scores in Computers have led to an examination of the Computer Programming and Problem Solving CIS 101 course and discussions on how to improve this course. In Fall 2005 it was decided to make MATLAB the primary programming language to be taught to most engineering students including CEE rather an C++. In Spring 2000 Environmental Engineering EnE 262 was made a required course in the curriculum. In Fall 2006 this course was strengthened by adding a laboratory experience which provides additional depth of understanding. In response to weak FE scores and student dissatisfaction the Structural Analysis CE 332 text was changed in Spring 2007 to a new text which is better suited for our students and is nationally used. The Surveying course CE 200 and the geometric design portion of the Transportation Engineering course CE 350 were reviewed in Fall 2006 to allocate a proper distribution of surveying subject area coverage between these two courses.

Each CEE Faculty has been provided with a copy of the NCEES supplied-reference manual, as well as one of the published FE review texts. The distribution was made to increase the faculty awareness of exam topics so that they may adjust their courses accordingly. Also, faculty are being encouraged to allow students to use the manual during course examinations.

There are several aids made available to students who are preparing for the FE Exam. A self-paced study module that contains more than 700 review questions is available in the CEE Computer Laboratory. A non credit, free of charge, general FE topics review course has been introduced and is regularly offered to students and alumni. Another available aid is the course Professional Practice in Civil Engineering (CE 461). The department began offering this course in Spring 1998, and students are permitted to use it as a technical elective. The course covers some of the legal, ethical and business aspects of the engineering profession. The course also reviews selected engineering science topics, and a practice FE examination is administered during the course.
From an administrative perspective, the transcripts of students applying to take the FE Exam are screened carefully to assure that they have completed the appropriate courses. Students found to be deficient must complete the missing courses before they are certified to sit for the exam.

**Assessment Tool #6: External Advisory Board Review**

**Description:** The CEE department has an active Advisory Board that meets quarterly to review department activities and to provide a professional perspective for the BSCE program. The 14-member board represents a cross-section of civil engineering professionals including design consultants, construction managers, contractors, and attorneys. Each meeting of the Advisory Board includes agenda items about different aspects of the program, ranging from the general to the specific. Once a year the Board reviews objectives, outcomes, and assessment tools of the program to assure relevancy. The department Chair carries Board recommendations back to the department, either for direct implementation or for further discussion at CEE faculty meetings.

**Data Sources:** The review and oversight activities of the Advisory Board are documented in their meeting minutes, which are maintained in the department files.

**Findings:** Over the last two years, the CEE Advisory Board has played a key role in a number of program initiatives. The Board was instrumental in reviewing and revising the program objectives and outcomes for the BSCE program. Discussions on strategies for implementing the ASCE Body of Knowledge (BOK) outcomes into the curriculum and how this can be achieved have been a topic at several Board meetings. The Board has been instrumental in the CEE Campaign II to raise $100,000 for the department of which $65,000 is to support undergraduate scholarships both endowed and annual. The Board is also involved in the recruitment of high school students for CEE and NJIT.

**Action Taken:** A number of actions have been taken as a result of recommendations by the Advisory Board. The department has implemented the Board’s recommendation of adding BOK modules covering ethics, leadership and project management into the capstone design courses. The Board has now made their presentations on professional practice and career opportunities within the various disciplines of CEE to the Freshman Engineering Design classes FED 101 a regular Board activity. The Board’s participation in department recruitment has also been effective, as evidenced by the very significant increase in enrollments of FTFTF and transfer students over the last few years.
Assessment Tool #7: Course Evaluations

Description: The CEE Department strives to make course instruction by faculty, adjuncts, and teaching fellows both rigorous and effective. Instructors are also encouraged to seek new and innovative teaching techniques, especially as information technology continues to advance at a rapid pace. While teaching effectiveness is difficult to measure in any educational setting, one indicator available at NJIT is the Course Evaluation form that is completed by students during the latter half of each semester. A sample Course Evaluation form is attached as Exhibit 13.

Data Sources: In accordance with NJIT policy, the original Course Evaluation forms are the property of the individual faculty member. However, a single-page summary is generated for each course, and a copy of the summary is maintained both by the Chair and the Dean of Engineering. In CEE, the summary sheets are maintained in the department files.

Findings: The results of the CEE department Teaching Evaluations conducted from Fall 04 to Fall 06 are summarized in the Table 6 below. As indicated, students have generally rated CEE courses favorably as indicated by the low percentage of courses rated below 3.0.

Action Taken: The department encourages all instructors to use the results of course evaluations to self-examine their teaching effectiveness and to modify their methods in order to increase student success. As encouragement for CEE faculty to improve teaching quality and develop new teaching methods, seminars are offered periodically in the department and at the university level by the Master Teachers. Seminar speakers include NJIT Faculty as well as outside speakers, and the topics include teaching techniques and communications skills.

TABLE 7
SUMMARY OF CEE UNDERGRADUATE COURSE EVALUATIONS

<table>
<thead>
<tr>
<th>Semester</th>
<th>Number of Courses Evaluated</th>
<th>Number of Courses Below 3.0</th>
<th>Percentage of Courses Below 3.0</th>
<th>Overall Department Rating</th>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>Mean</td>
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<tr>
<td>Fall 04</td>
<td>38</td>
<td>12</td>
<td>40%</td>
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<tr>
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<td>43</td>
<td>8</td>
<td>19%</td>
<td>3.12</td>
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<td>Fall 05</td>
<td>41</td>
<td>11</td>
<td>27%</td>
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<tr>
<td>Spring 06</td>
<td>50</td>
<td>12</td>
<td>24%</td>
<td>3.14</td>
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<tr>
<td>Fall 06</td>
<td>43</td>
<td>9</td>
<td>21%</td>
<td>3.29</td>
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In an effort to maintain teaching quality in the CEE department, the Chair takes follow-up action for all courses receiving weighted evaluation scores of less than 3.0. The follow-up procedure is outlined below:

(1) For courses taught by graduate teaching fellows, the Chair consults with the CEE Graduate Advisor. Teaching fellows will be referred to supplemental courses for improving communication skills, and assignment of the fellow to non-instructional duties is also considered.

(2) For courses taught by adjunct instructors, the Chair reviews past records of the instructor. The Chair may also elect to meet with the adjunct instructor. Adjunct instructors who receive low teaching evaluations are not rehired.

(3) For courses taught by full-time instructional staff, the Chair meets with the individual instructor to discuss the evaluation results. The possible effect of basic course mechanics (late text delivery, TA quit part way through the semester, inappropriate textbook, etc.) is examined first as a reason for the score. If instructional quality appears to be a factor, the Chair takes one of the following actions. If the instructor is a junior faculty, the Chair will assign a senior member of the CEE faculty to serve as a mentor for the following semester. If the instructor is a senior faculty, the Chair will encourage the member to explore new teaching techniques. In all cases, reassignment of the faculty member to a different course in the future semesters is considered.

Assessment Tool #8: Laboratory Evaluations

Description: The CEE department surveys the undergraduate laboratory courses once each year. The one page survey queries students about laboratory preparation, instructional quality, equipment condition, and safety. A sample Laboratory Evaluation form is attached as Exhibit 14.

Data Sources: The results of the Laboratory Surveys are tabulated at the end of the semester. Effort is made to survey both day and evening laboratory sections. The tabulated summaries and the original survey forms are maintained in the department files. A copy of the summary sheet, as well as a transcript of the written comments, is returned to the respective lab instructors and lab directors after each semester.

Findings: The findings of the CEE Laboratory Surveys vary widely according to the particular laboratory involved. As an example, the one page summary sheets for the surveys conducted in Spring 2006 are attached as Exhibit 15. In the CEE Computer Laboratory, the survey indicated general satisfaction with the computer equipment and the staff support. This result apparently reflects recent expenditures to upgrade the laboratory’s computers, server, and peripherals, as well as the department’s insistence to maintain full-time staff support and extended hours in this laboratory. Similarly, the CEE Surveying Laboratory received favorable ratings that likely reflect the state-of-the-art equipment in this
laboratory. The Surveying Laboratory also supports the B.S. in Surveying Engineering Technology program).

In contrast, the Strength of Materials Laboratory and the Construction Materials Laboratory received lower ratings. Improvements in the laboratory equipment and laboratory manual for Mech 237 are still indicated. The Geotechnical Laboratory received an intermediate rating. Although there appears to be general satisfaction with laboratory preparation and staff support in the Geotechnical Laboratory, the adequacy of the software used received a low rating.

**Action Taken:** In response to the results of the laboratory surveys, a number of actions were taken or are planned for the near future. They include:

- In Fall 2006, $10,000 was requested and received from NCE for repair and maintenance of the CEE Computer/GPS Laboratory, Strength of Materials Laboratory, Environmental Teaching Laboratory and the Geotechnical Laboratory. This funding was over and above the original maintenance and repair budget for the year.

- In Spring 2005, major changes to the mode of instruction were begun for the Strength of Materials Laboratory. Full-time faculty who teach the lecture component of the course are now more involved with the laboratory portion of the course. The Structures/Mechanics Group has rewritten the course laboratory manual to make it compatible with the equipment being used.

- The CEE Computer Laboratory in the busiest lab in the department and in being expanded from 24 seats to 36 seats in a phased 3 year plan at a cost of $135,000. AY 2006/2007 saw the purchase of additional computers and support equipment. In year two the lab will be renovated and expanded in size to seat 36.

- A multi channel data acquisition system with transducer cards was purchased in 2006 for the Strength of Materials Laboratory to have the lab operate more efficiently.

**Assessment Tool #9: Course Objectives/Outcomes Instructor Self-Evaluation Matrix**

**Description:** The CEE department initiated the Course Objectives/Outcomes Instructor Self-Evaluation Matrix in Fall 2009. The matrix is completed by the instructor of every undergraduate course at the end of each semester. The instructor rates the program outcomes (a-n) that relate to the course objectives. The rating is 1-4, where 1 is poor and 4 is excellent. These ratings are based on the assessment methods used, such as performance on assignments, exams, etc. The instructor will also make recommendations on a remedy for improvement for every outcome that is equal to or less than 2 (fair). A completed sample Course Objectives/Outcomes Instructor Self-Evaluation Matrix form is attached as Exhibit 16.
Data Sources: The results of the Course Objectives/Outcomes Instructor Self-Evaluation Matrices are reviewed each semester by the course coordinator and the Department Chair. They are then provided to the instructor teaching the course the following semester for implementing the remedy that results in potential improvement. The continuous improvement cycle continues semester after semester.

Findings: The findings of the evaluations vary from class to class. Most instructors find remedies that relate to modifications of current class assignments.

Assessment Tool #10: Faculty Course Assessment Report

Description: The CEE department will adopt a Faculty Course Assessment Report tool on a trial basis in Fall 2010. The report is completed by the instructor of selected undergraduate courses at the end of each semester. The department Curriculum Committee will select courses that have appropriate coverage of 1-3 outcomes. The selected courses together will have coverage of all outcomes (a-n). Outcome(s) will be assessed by for the same courses every semester. A completed sample Faculty Course Assessment Report is attached as Exhibit 17. Two to four performance criteria (PC) are developed for each selected outcome. The PCs are quantified using a four point scale; E = Exceeds Criteria, M = Meets Criteria, D = Developing, and P = Poor. An evaluation rubric is also developed for each selected outcome based on the four point scale quantification. The number of students meeting the appropriate scale is determined. An outcome is successfully achieved if all the PCs have an average EMDP-vector of 15% or less “Poor” rating. Proposed action for course improvement is noted for the next time the course is offered. Modifications made to course since the last offering is then noted in an attempt to achieve success. The continuous improvement cycle continues semester after semester.

Data Sources: The results of the Faculty Course Assessment Reports will be reviewed each semester by the course coordinator and the Department Chair. They are then provided to the instructor of the course the following semester in order for taking the appropriate remedy in improving results.

Findings: The findings of the evaluations will vary from class to class.
Exhibits

Exhibit 1 - BSCE Tracking Record
Exhibit 2 - Registration Authorization
Exhibit 3 - CEE Strategic Plan
Exhibit 4 - Exit Survey, Sample Form
Exhibit 5 - Exit Survey, Sample Online Form
Exhibit 6 - Exit Survey Results
Exhibit 7 - Employer Survey, Sample
Exhibit 8 - Employer Survey Results
Exhibit 9 - Alumni Survey, Sample Form
Exhibit 10 - Alumni Survey Results
Exhibit 11 - Technical Electives 4-Year Plan
Exhibit 12 - FE Exam Performance Results
Exhibit 13 - Course Evaluation Form
Exhibit 14 - Laboratory Survey Form
Exhibit 15 - Laboratory Survey Results
Exhibit 16 - Course Objectives/Outcomes Instructor Self-Evaluation Matrix
Exhibit 17 - Faculty Course Assessment Report
### Civil and Environmental Engineering Department
#### BSCE Tracking Record

**Name:**

**ID No.:**

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<th>Semester</th>
<th>Grade</th>
<th>Course Code</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 431</td>
<td>0-3-1</td>
<td></td>
<td>CE 495</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CE 432</td>
<td>3-0-3</td>
<td></td>
<td>ME 435</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CE 443</td>
<td>3-0-3</td>
<td></td>
<td>Elec Mgmt****</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CE 494</td>
<td>3-0-3</td>
<td></td>
<td>CE Des Elec***</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CE Elec</td>
<td>3-0-3</td>
<td></td>
<td>HSS -Capstone 400 Level</td>
<td>3-0-3</td>
</tr>
<tr>
<td>HSS Comm Elec****</td>
<td>3-0-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Fundamentals of Engineering (FE) Exam is required for graduation**

* EPS 202 or Rutgers course

** HUM 211, 212 or HIST 213 - Student must select one
Student must chose one of the following: CE 307, CE 351, CE 410, CE 414,

*** CE 450, EnE 360, EnE 361

**** ENG 339, 340, 347, 352, 369, THTR 435

***** HRM 301, MGMT 390, ENTR 410 or IE 492

---

**MARCH 2010/HY**
Exhibit 2
New Jersey Institute of Technology
Civil & Environmental Engineering Department

Registration Authorization Form

STUDENT'S NAME ____________________________ ID# ____________________________

This student has permission to register for the following courses for:

<table>
<thead>
<tr>
<th>Course I.D.</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<tr>
<td>9.</td>
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</tr>
</tbody>
</table>

Total Credits

Comments:_________________________________________________________________
_________________________________________________________________

Advisor's Signature: ____________________________ Date: ___________________

I certify that I agree with the courses listed above and that I will obtain my adviser's approval before any course is changed.

Student's Signature ____________________________ Date ___________________
NEW JERSEY INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
NEWARK COLLEGE OF ENGINEERING

STRATEGIC PLAN
2009-2014
(May 15, 2009)

NJIT
New Jersey's Science & Technology University
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<th>Page</th>
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<td>4</td>
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<td>4.5 Faculty Hiring</td>
<td>9</td>
</tr>
</tbody>
</table>
STRATEGIC PLAN

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

1.0 Mission and Vision

The CEE Department is dedicated to educating a diverse student body for employment in the civil and environmental engineering profession. The Department provides a broad-based educational experience in the various disciplines of civil engineering that is firmly founded upon science, mathematics, and the humanities. The Department encourages research and scholarship among our faculty and students to address the contemporary problems of technology and society. The Department emphasizes the skills of problem-solving, ethics, teamwork, communications, and management, while providing multidisciplinary design experiences to prepare graduates for the challenges of the profession. The Department encourages service to the engineering profession and society by all faculty and students.

The modern vision of the CEE Department is to be built upon its role as one of the largest educators of civil and environmental engineers in the State of New Jersey and focus on the environment and infrastructure through strengthening its educational and research programs. The Department will promote sustainability and embrace technology, by encompassing information technology, biotechnology, nanotechnology, and sensor technology. The Department will develop more cross-disciplinary activities through interdisciplinary thinking and synergistic collaboration of disciplines in order to solve complex problems, open new frontiers that lead to true innovations and breakthroughs, including implementation of green and smart structure technologies. The Department will strengthen its global collaborations in order to graduate engineers that are more innovative, who can excel in the latest technological advances, and take leadership roles.

2.0 Departmental Data

2.1 Faculty

- 2 Distinguished Professors, 19 Full Professors, 5 Associate Professors, 1 University Lecturer
- 15 Licensed Professional Engineers
- 6 Faculty Fellows
- National or International Awards: Fulbright Fellow, Senior Fulbright Visiting Professor, Guggenheim Fellow, White House Presidential Award for Mentoring in Engineering, Science and Mathematics, Dupont Young Professor Grant, NASA University Joint Venture Research Award, Thailand Outstanding Technologist Award
2.2 Undergraduate Education

- Enrolled 60 freshmen in Fall 08 with average class rank of top 70% and average SAT of 1125. Also enrolled 36 transfer students.
- Undergraduate student enrollment in Spring 09 is 373.
- Undergraduate sections taught: 45 in Fall 08 and 45 in Spring 09.
- 54 B.S. degrees conferred in 2008.

2.3 Graduate Research

- External Research Expenditures in FY2007 were $1,259,205 and $1,119,247 for the CEE Department and National Center for Transportation & Industrial Productivity (NCTIP), respectively.
- Current funding agencies are NSF, USDOT, NJDOT, U.S. Army and U.S. Dept. of Agriculture.
- Graduate student enrollment in Spring 09 is 141, including 119 M.S. and 22 Ph.D (CE and EnE).
- Graduate sections taught: 17 in Fall 08 and 18 in Spring 09.
- 1 Ph.D. degree conferred in AY 07-08.

2.4 Research Focus Areas

The current research focus areas are:

- **Environmental**: Profs. Axe, Ding, Dresnack, Golub, Hsieh, Marhaba, Meegoda, Olenik, and Schuring
- **Geospatial**: Profs. Bagheri, Chien and Greenfeld
- **Infrastructure/Materials/Construction Management**: Profs. Hsu, Karea, Khera, Konon, Meegoda, Nelson, Raghu, Saadeghvaziri, Saigal, Spillers, and Wecharatana
- **Transportation**: Profs. Chien, Daniel, Deutschman, Greenfeld, Liu, and Spasovic

3.0 Measuring Goals

The Department goals will be measured through the following key performance indicators (KPIs):
- Enrollment
- Graduation Rate
- Retention Rate
- Grade Point Average
- Research Funding
The five-year goals for the KPIs are as follows:

**Enrollment: 5-year Projection**  
(numbers in parentheses represent the current statistic-Fall 2008)

<table>
<thead>
<tr>
<th>Program</th>
<th>BS</th>
<th>MS</th>
<th>Ph.D.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>440 (397)</td>
<td>130 (105)</td>
<td>21 (14)</td>
<td>591 (516)</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>0 (3)</td>
<td>25 (15)</td>
<td>12 (8)</td>
<td>37 (26)</td>
</tr>
<tr>
<td>Critical Infrastructures</td>
<td>NA</td>
<td>25 (0)</td>
<td>NA</td>
<td>25 (0)</td>
</tr>
<tr>
<td>Transportation</td>
<td>NA</td>
<td>25 (16)</td>
<td>10 (7)</td>
<td>35 (23)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>440 (400)</strong></td>
<td><strong>205 (136)</strong></td>
<td><strong>43 (29)</strong></td>
<td><strong>688 (565)</strong></td>
</tr>
</tbody>
</table>

Enrolled PhD Students per Faculty Member: 1.7 (1.2)  
Enrolled MS Students per Faculty Member: 8.2 (5.4)

**Graduation Rate**

- Cohort 6 Years Graduation Rate (%) (received Bachelor degree within CEE): 55% (46%)
- Cohort 6 Years Graduation Rate (%) (received any NJIT Bachelor degree): (55%)
- PHD Graduates per Faculty Member: 0.4 (0.08)
- MS Graduates per Faculty Member: 8 (3.08)

**Retention Rate**

BS: 90%  
MS: 90%  
Ph.D.: 90%

**Grade Point Average**

BS: 3.0 (2.7)  
MS: 3.3 (3.1)  
Ph.D.: 3.5 (3.4)

**Research Funding**

- $2 million per year ($1.26 million per year)
- $75,000 per year per faculty ($48,000)

**Refereed Publications, Books, Book Chapters, and Patents**

Average 2 per faculty per year (1.5)

**FE Passing Rate for Seniors**

70% (52%)

**Honors Students**

100% increase

**Student Satisfaction**

Complaint rate <5% of total students
4.0 Strategies

4.1 Undergraduate Education

(i) We will continue the undergraduate program improvement process as outlined in the 2007 ABET Self-Study Report and identify improvement needs through the following assessment tools:

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>Frequency of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Exit Surveys</td>
<td>Every graduating class</td>
</tr>
<tr>
<td>(2) Employer Surveys</td>
<td>Every 3 years</td>
</tr>
<tr>
<td>(3) Alumni Surveys</td>
<td>Conducted annually, targeting graduates 2-years and 6-years out of school</td>
</tr>
<tr>
<td>(4) Student Feedback Sessions</td>
<td>Every semester</td>
</tr>
<tr>
<td>(5) Standardized Exam Results</td>
<td>Every exam cycle</td>
</tr>
<tr>
<td>(6) External Board Review</td>
<td>Annually</td>
</tr>
<tr>
<td>(7) Course Evaluations</td>
<td>Every semester</td>
</tr>
<tr>
<td>(8) Laboratory Evaluations</td>
<td>Every year</td>
</tr>
</tbody>
</table>

(ii) We will examine raising standards of our program by implementing the following policies and procedures:
   a. Uniformity of grading standards across all CEE courses
   b. Reviewing Fundamentals of Engineering (FE) exam results and incorporating FE exam material in CEE courses
   c. Continuously assessing course objectives and ABET outcomes for CEE courses
   d. Modernizing software and implementation in core CEE courses, especially courses with design components.
   e. Improving admissions standards for freshmen and transfers
   f. Minimum ‘C’ Grade in selected CEE courses that are prerequisites to core courses in the program
   g. Quality control over course content and delivery methods and designating course coordinators for main CEE courses
   h. Implementing common examinations for multi-section CEE courses.
   i. Standardizing course syllabi
   j. Developing assessment methods for course delivery

(iii) We will continue to focus on recruiting measures to increase the enrollment of quality students.

(iv) We will review the curriculum with the goals of:
a. Implementing designated science electives in light of ABET’s new “additional science area” requirement in lieu of one of the three technical electives in the curriculum.
b. Providing 3 specializations and one general option for the BSCE:
   i. Environmental
   ii. Transportation
   iii. Construction
   iv. General
c. Increasing industrial influence by providing credit (CE Technical Elective) for “appropriate” co-operative education work with industry that would complement our program objectives.
(v) We will seek to modernize our undergraduate teaching laboratories with the latest supplies, equipment and data acquisition systems. We will also seek to provide more student stations in order to accommodate more students in laboratory sections and enhance educational delivery. Laboratories includes:
   a. Strength of Materials Lab
   b. Geotechnical Engineering Lab
   c. Computer Lab
   d. Hydraulics Lab
   e. Environmental Lab
(vi) We will seek funding to support a program that enhances the transition of well prepared county college transfer students into our program.

4.2 Graduate Degree Programs

(i) We will combine the geotechnical and geoenvironmental MSCE specializations into one specialization, which also covers geospatial engineering.
(ii) We will maintain the environmental engineering specialization under the MSCE degree. This program will be the same as the M.S. EnE.
(iii) We will house the MS program in Transportation and its resources in our Dept. This includes providing joint appointments for its non-CEE faculty.
(iv) We will develop a new executive MS program in Construction Management, if determined economically beneficial.
(v) We will have the following four MS degree programs that require 10 courses (30 credits) and bridge courses (where required):
   a. MS in Civil Engineering (5 specializations)
      i. Construction Engineering and Management
      ii. Geoengineering
      iii. Structural Engineering
      iv. Transportation Engineering
      v. Environmental Engineering
   b. MS in Environmental Engineering
   c. MS in Critical Infrastructure Systems
   d. MS in Transportation
(vi) We will identify specializations on the students’ transcripts.
(vii) We will revisit all MS programs taking into account future needs of industry and commonalities among the degrees/specializations to more efficiently and competitively run the programs. Each discipline group will review (in consultation with industry) the current curricula and course offerings in their respective specializations.

General Structure of MS Degree Programs:

**Core:** 2 courses offered by CEE Dept
**Specialization Electives:** 4-6 courses (including Thesis or Project options) from a list of ≤ 10
**General Electives:** 0-2 courses from a list of ≤ 10 (CEE and non CEE)
**Management/Leadership Electives:** 1-2 courses from a list of about 5 (includes CEE and non-CEE)

Note: List of electives will be as common as possible to all degrees and specializations. Course scheduling will allow a student to complete any degree or specialization in a maximum of two semesters and summer sequence.

(viii) We will market the MS programs to potential students through various optimal means.
(ix) We will recruit quality PhD students through the CEE faculty’s connections with global universities and scholarship programs.
(x) We will seek to establish CEE Department scholarships for graduate students.

4.3 Research

(i) The CEE faculty will undertake research topics within the infrastructure, environment and civil engineering fields, with a focus on interdisciplinary and emerging areas. The faculty will undertake research and investigations in the processes and products of the built environment. Main themes are infrastructure management, non-destructive testing, environmental impact, construction, water and contamination research. Growth will continue in theoretical, experimental and numerical modeling research, investigating both fundamental science and applied technology at the interface of society and the environment.

(ii) Most grants for CEE faculty are obtained from the State. We will continue to seek State and Federal funding and develop mechanisms to better secure them.

(iii) We will seek to establish an infrastructure center of excellence in our Department that will tie all faculty research areas under one umbrella. The center will also include affiliated faculty from other NCE departments and universities/centers (i.e., Rutgers). The center effort will be directed by a member of our faculty in close collaboration with key faculty members.
(iv) We will incorporate the following strategies, via the members of the infrastructure center of excellence, to enhance our chances for obtaining sustainable research funding and complement our graduate programs together with increasing supported PhD student enrollment.
   a. Collaborations with Rutgers University
      i. Proposals on establishment of national and regional research centers
      ii. Joint appointments (i.e., affiliated faculty) in research centers
   b. Expanding other collaborations with other local universities, i.e., CUNY’s University Transportation Center.
   c. Establishing “proof of concept” projects in collaboration with industries and involving CEE faculty and students.
(v) We will seek to establish collaborations with international academic institutions through a variety of mechanisms, such as exchange of scholars and research project collaborations.
(vi) We will seek external funding to support a research experiences for undergraduates (e.g., NSF REU).

4.4 Space Centralization and Requirements

We will seek to move the transportation faculty and program to Colton Hall in order to enhance the synergy of CEE educational and research programs. We will also seek to expand our existing teaching laboratories and graduate student research areas as our programs grow.

4.5 Faculty Hiring

We will seek to hire two tenure-track assistant professors in infrastructures/materials and environmental engineering over the next year to aid in meeting our five-year strategic plan goals. The hires should have industrial experience and be licensed professional engineers.
Department of Civil and Environmental Engineering
Exit Survey for January 2007 Graduates

1. What are your immediate plans after graduation?
   □ Full-time employment, and I already have a job. □ Full time graduate school.
   □ Full-time employment, and I am still looking for a job. □ Other ________________ (please specify)

2. Is your employment or graduate study related to civil or environmental engineering?
   □ Completely related □ Somewhat related □ Not related

3. What specialty area, if any, do you think you might focus on in your career?
   □ Civil Site □ Construction □ Environmental □ Geotechnical □ Hydraulics/Water Resources
   □ Structural □ Transportation □ Other ________________ (please specify)

4. Do you have plans to pursue any additional education? (check as many as apply)
   □ Company sponsored seminars or training □ Continuing education
   □ Degree program ________________ (please specify) □ No additional education

5. What licenses or certifications do you plan to obtain?
   □ Engineer in Training □ Professional Engineer □ Other ________________ (please specify)

6. We would appreciate an assessment of the level of knowledge and ability you achieved at NJIT in the following areas. Please rate by checking the appropriate box.

<table>
<thead>
<tr>
<th>How well are you prepared to:</th>
<th>Very well</th>
<th>Well</th>
<th>Neutral</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge of math, science and engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Design and conduct experiments, as well as interpret data</td>
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</tr>
<tr>
<td>Design a project to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
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<tr>
<td>Function in multi-disciplinary teams</td>
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<td></td>
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<tr>
<td>Identify, formulate, and solve engineering problems</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Understand ethical and professional responsibility</td>
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<tr>
<td>Communicate effectively</td>
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<tr>
<td>Understand the impact of engineering solutions in a global, economic, environmental, and societal context</td>
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</tr>
<tr>
<td>Recognize the need for, and an ability to engage in life-long learning</td>
<td></td>
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<tr>
<td>Have a knowledge of contemporary issues</td>
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<tr>
<td>To use techniques, skills and modern engineering tools necessary for engineering practice</td>
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<td></td>
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<tr>
<td>Understand management and leadership principles and techniques</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Take the FE examination as the first step toward professional licensure</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To find professional level employment or pursue an advanced degree.</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONTINUE ON REVERSE SIDE
7. Indicate which of the following CE/Mech/EnE courses that you feel were most important to you in your degree program. Please check no more than five courses.

☐ Strength of Materials    ☐ Water Resources Engineering    ☐ Reinforced Concrete Design
☐ Surveying               ☐ Environmental Engineering   ☐ Steel Design
☐ Construction Materials and Procedures ☐ Soil Mechanics          ☐ C.E. Design I (CE 494)
☐ Civil Engineering Methods ☐ Transportation Engineering ☐ C.E. Design II (CE 495)
☐ Fluid Mechanics          ☐ Structural Analysis         □ ____________ (Tech Elec)
                          □ ____________ (Tech Elec)

8. Did you have a positive experience at NJIT?  Yes  No  (please check one)

Comments:

9. How effective was the academic advisement that you received in the completion of your degree requirements?
   ☐ Very effective    ☐ Effective    ☐ Not very effective

10. Do you have any suggestions for improving our program?

THANK YOU FOR YOUR TIME!
Department of Civil and Environmental Engineering
Exit Survey for May 2006 Graduates

1. What are your immediate plans after graduation?
   □ Full-time employment, and I already have a job.
   □ Full-time employment, and I am still looking for a job.
   □ Full-time graduate school
   □ Other ____________________________ (please specify)

2. Is your employment or graduate study related to civil or environmental engineering?
   □ Completely related  □ Somewhat related  □ Not related

3. What specialty area, if any, do you think you might focus on in your career?
   □ Civil Site □ Construction □ Environmental □ Geotechnical □ Hydraulics/Water Resources
   □ Structural □ Transportation □ Other ____________________________ (please specify)

4. Do you have plans to pursue any additional education? (check as many as apply)
   □ Company sponsored seminars or training
   □ Continuing education
   □ Degree program ____________________________ (please specify)
   □ No additional education

5. What licenses or certifications do you plan to obtain?
   □ Engineer in Training □ Professional Engineer □ Other ____________________________ (please specify)

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT. Please rate the preparation level that you feel in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well are you prepared to:</th>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use mathematics and science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solve problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze experimental data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use computer programs and models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate in writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate orally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work in design teams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply project management and engineering economics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the impact of engineering solutions on global issues and society</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Indicate which of the following CE/Mech/EnE courses that you feel were most important to you in your degree program. Please check no more than five courses.

   □ Strength of Materials □ Water Resources Engineering □ Reinforced Concrete Design
   □ Surveying □ Hydraulics Engineering □ Steel Design
   □ Construction Materials and Procedures □ Soil Mechanics □ C.E. Design I (CE 494)
   □ Civil Engineering Methods □ Foundation Engineering □ C.E. Design II (CE 495)
   □ Fluid Mechanics □ Transportation Engineering □ ____________(Tech Elec)
   □ ____________(Tech Elec)

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
8. Did you have a positive experience at NJIT? Yes No (please circle one)

Comments:

9. How effective was the academic advisement that you received in the completion of your degree requirements?
   □ Very effective    □ Effective    □ Not very effective

10. Do you believe that you are adequately prepared for an engineering career?
    Yes No (please circle one)

Comments:

11. Do you have any suggestions for improving our program?

THANK YOU FOR YOUR TIME!
# Exhibit 5

## Student Satisfaction Survey

### Spring 2006

<table>
<thead>
<tr>
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<th>Satisfaction: please indicate your satisfaction for each item</th>
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<td>Availability of washing &amp; laundry services</td>
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<td>Support for computer hardware and software</td>
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<td>Overall satisfaction with the registration process</td>
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<td>Overall satisfaction with NJIT</td>
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</table>

24. If you could start over again, would you go to NJIT?
   4) Definitely yes
   3) Probably yes
   2) Probably no
   1) Definitely no

25. Comments about NJIT are welcomed:

   [Blank space]
1. What are your immediate plans after graduation?  
- ☐ Full-time employment, and I already have a job. 91%  
- ☐ Full-time employment, and I am still looking for a job. 0%  
- ☐ Full-time graduate school 9%  
- ☐ Other 27%  

2. Is your employment or graduate study related to civil environmental engineering?  
- ☐ Completely related 91%  
- ☐ Somewhat related 0%  
- ☐ Not related 9%  

3. What specialty area are you focusing on in your career?  
- ☐ Civil Site 3  
- ☐ Construction 3  
- ☐ Environmental 0  
- ☐ Geotechnical 1  
- ☐ Structural 3  
- ☐ Transportation 2  
- ☐ Other 0  
- ☐ Hydraulics/Water Resources 2  

4. Do you have plans to pursue any additional education? (check as many as apply)  
- ☐ Company sponsored seminars or training 5  
- ☐ Continuing education 5  
- ☐ Degree program 8  
- ☐ No additional education 0  

5. What licenses or certifications do you plan to obtain?  
- ☐ Engineer in Training 9  
- ☐ Professional Engineer 2  
- ☐ Other 3  

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT. Rate your preparation level in the categories below (check appropriate box):  

<table>
<thead>
<tr>
<th>How well were you prepared to:</th>
<th>Very Disatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
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<tbody>
<tr>
<td>Use Mathematics and science</td>
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<tr>
<td>Solve problems</td>
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<tr>
<td>Perform design</td>
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<td>Analyze experimental data</td>
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<tr>
<td>Use computer programs and models</td>
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<tr>
<td>Communicate in writing</td>
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<td>Communicate orally</td>
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<tr>
<td>Work in design teams</td>
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<tr>
<td>Apply project management and engineering economics</td>
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<tr>
<td>Understand the impact of engineering solutions on global issues and society</td>
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</table>

7. Indicate which of the following CE/MECH/ENE courses that you feel were most important in your degree program. Please check no more than five courses.  
- ☐ Strength of Materials 6  
- ☐ Surveying 4  
- ☐ Construction Materials and Procedures 2  
- ☐ Civil Engineering Method 2  
- ☐ Fluid Mechanics 6  
- ☐ Water Resources Engineering 3  
- ☐ Hydraulics Engineering 3  
- ☐ Soil Mechanics 5  
- ☐ Foundation Engineering 7  
- ☐ Transportation Engineering 0  
- ☐ Structural Analysis 2  
- ☐ Reinforced Concrete Design 3  
- ☐ Steel Design 5  
- ☐ C.E. Design I (CE494) 5  
- ☐ C.E. Design II (CE495) 3  
- ☐ Tech Elec 1  
- ☐ Tech Elec 0
8. Did you have a positive experience at NJIT?  

| Yes | 91% | No | 0% |

Comments:

9. How effective was the academic advisement that you received in the completion of your degree requirements?  

- Very effective  
  - 55%
- Effective  
  - 36%
- Not very effective  
  - 9%

10. Do you believe that you are adequately prepared for an engineering career?  

| Yes | 73% | No | 18% |

Comments:

11. Do you have any suggestions for improving our program?
Exit Survey for May 2006 Graduates
General Satisfaction with the Education at NJIT
(11 responses)

Use Mathematics and science: 4.27
Solve problems: 4.45
Perform design: 3.73
Analyze experimental data: 4.09
Use computer programs and models: 3.09
Communicate in writing: 4.18
Communicate orally: 4.27
Work in design teams: 4.36
Apply project management and engineering economics: 4.09
Understand the impact of engineering solutions on global issues and society: 3.91

(mean: 1=low, 5=high)
Exit Survey for May 2006 Graduates

Did you have a positive experience at NJIT?

Yes.

Yes. There were some great professors at NJIT who really helped me, not only in education, but also in other areas that I had to work on.

Yes.

Yes. The CEE Dept. demonstrated their support of motivated students as well as organizations such as ASCE through financial and verbal means.

Yes. I'm sorry to say my expectations entering the school were not that high. The school proved me wrong, socially, and in its educational value. I am very pleased with my time spent in athletics and feel that Civil Engineering was a good fit. When speaking students of other majors it seems that CE students are more involved and cared about by the department.

Yes. The Civil Dept. professors at NJIT were great. Definitely filled with experience and knowledge. I would highly recommend someone for a civil degree.

Yes.

Yes, I enjoyed it.

Yes.

Yes. I certainly felt that the civil department worked extremely hard to provide its students the best support available. Also, the quality of the instructors was impressive too!

Yes.
How effective was the academic advancement that you received in the completion of your degree requirements?

Very effective.
Effective.
Effective.
Very effective.
Effective.
Very effective.
Effective.
Very effective.
Very effective.
Do you believe that you are adequately prepared for an engineering career?

No.
Yes.
Yes, but I think that computer software such as STAADPRO and AutoCAD weren’t touched on adequately. These programs are available, however, most classes leave little room for computer aided projects, hence making it almost impossible to gain good knowledge of these software without prior experience.

No, within the first year I will discover how much ground I can make up for those courses I believe I did not fully grasp.

Yes.
Yes. I feel that academics wise I’m more than happy with the amount of theory learned. Also, many professors, while teaching the theory, involved real hands on experience which was even more beneficial.

Yes.
Yes.

Yes. Although I know I am... I believe that a lot of the design aspects of civil requires a real hands on knowledge of hard desktop for AutoCAD which wasn’t provided well for undergraduates without more experience. Everything I learned in that regard came from work.

Yes.

**Do you have any suggestions for improving our program?**

Maybe consider an elective teaching students how to use computer programs such as AutoCAD, Hydrocad, and etc. That would make the semester a little less stressful. Since we wouldn't have to teach ourselves how to use the program.

Have available a TA who is capable in Land Desktop. Change the textbook for CE 332 Structural Analysis (it is difficult when the teacher writes the book). Have a course that introduces books like RSIS, ASSHTOO, Dot guidelines, because most people go in blind for design courses!

Try to make courses more practical. Have more classes like CE 431. Try to create a class where you have to use shop drawings (specs & scale).

Honestly the program is great with many wonderful professors. I think two things should change: 1. (the obvious) Structures and the other problem in the design classes is not the lack of knowledge in AutoCAD, its more of a LDD one. My group must have spent countless hours just trying to figure at how to do something in LDD. Bob knows his AutoCAD, but I think during the end of the term, you should get a TA or someone in the Lab about 2-6 hours a week. This way whatever questions one may have in LDD they go to this TA who is extremely proficient in AutoCAD.

There are so many software programs on the market, and without intern experience I feel there is not enough adequate training at school to use these essential programs. I understand it has a different skill level, but I think everyone needs Land Developer proficiency.

For significant/key courses, it is imperative to professors who can articulate the course material in fluent English. This was often, at times, not the case.

I’d like to see, if possible, choices of structural project in Design 1 and 2. I felt that every aspect of engineering was well covered by the program except for the CE 494, CE 495 which should be offered specifically according to each individual's interest (i.e., structural, ?) rather than the non-option Land Development project the program currently offers.

I really hope there would be a course dedicated to LDD not CE 260.
Department of Civil and Environmental Engineering
Exit Survey for May 2004 Graduates

1. What are your immediate plans after graduation?
   - Full-time employment, and I already have a job. 8/15 (53.3%)
   - Full-time employment, and I am still looking for a job. 3/15 (20%)
   - Full-time graduate school 2/15 (13.3%)
   - Other __________________________ (please specify) 3/15 (20%)

2. Is your employment or graduate study related to civil or environmental engineering?
   - Completely related 15/15 (100%)
   - Somewhat related 1/15 (12.5%)
   - Not related 0/15 (0%)

3. What specialty area, if any, do you think you might focus on in your career?
   - Civil Site 2
   - Construction 6
   - Environmental 0
   - Geotechnical 1
   - Hydraulics/Water Resources 2
   - Structural 5
   - Transportation 1
   - Other __________________________ (please specify) 1

4. Do you have plans to pursue any additional education? (check as many as apply)
   - Company sponsored seminars or training 8
   - Continuing education 6
   - Degree program __________________________ (please specify) 11
   - No additional education 0

5. What licenses or certifications do you plan to obtain?
   - Engineer in Training 11
   - Professional Engineer 14
   - Other __________________________ (please specify) 0

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT. Please rate the preparation level that you feel in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well are you prepared to:</th>
<th>Very Dissatisfied</th>
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<th>Satisfied</th>
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<tbody>
<tr>
<td>Use mathematics and science</td>
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</table>

7. Indicate which of the following CE/Mech/EnE courses that you feel were most important to you in your degree program. Please check no more than five courses.

   - Strength of Materials 4
   - Surveying 4
   - Construction Materials and Procedures 8
   - Civil Engineering Methods 2
   - Fluid Mechanics 4
   - Water Resources Engineering 3
   - Hydraulics Engineering 5
   - Soil Mechanics 6
   - Foundation Engineering 6
   - Transportation Engineering 0
   - Structural Analysis 8
   - Reinforced Concrete Design 6
   - Steel Design 5
   - C.E. Design I (CE 494) 8
   - C.E. Design II (CE 495) 6
   - (Tech Elec) 2
   - (Tech Elec) 0

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
8. Did you have a positive experience at NJIT? Yes  No (please circle one)
   Yes 15/15 (100%)  No 0/15 (0%)

Comments:

9. How effective was the academic advisement that you received in the completion of your degree requirements?
   □ Very effective  10/15 (66.7%)  □ Effective  5/15 (33.3%)  □ Not very effective  0/15 (0%)

10. Do you believe that you are adequately prepared for an engineering career?
    Yes  No (please circle one)  Yes 14/15 (93.3%)  No 1/15 (6.7%)

Comments:

11. Do you have any suggestions for improving our program?

THANK YOU FOR YOUR TIME!
### Exhibit 6

#### Department of Civil and Environmental Engineering Exit Survey for May 2004 Graduates (15 responses)

<table>
<thead>
<tr>
<th>Skill</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the impact of engineering solutions on global issues and society</td>
<td>4.07</td>
</tr>
<tr>
<td>Work in design teams</td>
<td>4.33</td>
</tr>
<tr>
<td>Communicate orally</td>
<td>4.20</td>
</tr>
<tr>
<td>Communicate in writing</td>
<td>4.13</td>
</tr>
<tr>
<td>Use computer programs and models</td>
<td>4.07</td>
</tr>
<tr>
<td>Analyze experimental data</td>
<td>4.20</td>
</tr>
<tr>
<td>Perform design</td>
<td>4.47</td>
</tr>
<tr>
<td>Solve problems</td>
<td>4.47</td>
</tr>
<tr>
<td>Use mathematics and science</td>
<td>4.33</td>
</tr>
</tbody>
</table>

(mean: 1=low, 5=high)
Exit Survey for May 2004 Graduates

Did you have a positive experience at NJIT?

Yes. I enjoyed all of my Civil Core Courses. They overwhelmed me at times, but the overall experience is very rewarding.

Yes. I learned a lot and most of the teachers and staff were very helpful.

Yes. Certainly.

Yes. CE being a small department and with the best teachers on campus, my experience at NJIT was wonderful. I don’t want to loose contact with NJIT, so would do masters and further dream of becoming a professor.

Yes.

Yes & No. Some professors were good, but most were poor. The attitudes that people have (staff and students) is quite disheartening. I think that the CE program is well run, but not all of the professors are “there,” and share the same interest as others.

Yes. NJIT has been a great experience. I encountered more positive things than negative.

Yes, I had a great time at NJIT. I learned so much from very knowledgeable professors and still had time to be involved with ASCE and many other activities. Work was challenging, but I wasn’t swamped so I could work and join ASCE giving me lots of practical and important additional experience.

Yes.

Yes.

Yes. The only major thing I felt that the school lacked as a whole, was a sense of pride. I would have liked to have seen more enthusiasm from the student body in support of their school.

Yes. The staff is great. They are really concerned about their students and they are knowledgeable in their fields.

Yes.

Yes. The civil program at NJIT was well thought out and was organized very well.
Yes. I believe that my involvement in extracurricular activities such as soccer, AFROTC, HOST/SHPE, EOP and various campus functions enhanced my college experience and helped me become comfortable with myself.

How effective was the academic advisement that you received in the completion of your degree requirements?

Very effective.
Very effective.
Effective.
Very effective.
Very effective.
Very effective.
Very effective.
Effective.

Do you believe that you are adequately prepared for an engineering career?

Yes. In particular the Design Courses. What I learned here is what got me my job today.

No. I would like to get my Masters to feel fully prepared.

Yes.
Yes.
Yes.

Yes. I think that I got a very good review of what I learned at County College. I think the combination of County and NJIT worked well to give me a solid foundation for the future.

Yes. Although a lot of things need to be learned while working in the private sector.

Yes. As best as I could be. There's still so much to learn— you could never learn all you need in 4 years. Maybe more trips would help. The FE exam needs to be more heavily advertised. I just happened to stumble upon it before it was due. I should have received this information at advisement sessions— well, I did, but when I was a freshman! I should have been reminded when it got closer.

Yes.

Yes.

Yes. I believe that I have a good understanding of the basics of CE. I feel confident and well rounded in the many areas of CE as well.

Yes. CE Design was the best course I took at NJIT. That truly prepared me for an engineering career.

Yes.

Yes. The civil program gave me a lot of hands on experience that will help me in my civil engineering career.

Yes. All I need is trust hand experience.

Do you have any suggestions for improving our program?

More AutoCAD experience.

More AutoCAD classes.

I would have liked more of an exposure to AutoCAD in the earlier classes. I felt a little lost in design I and II when we were expected to use the LDD software extensively. I feel that a better understanding of the software was needed before taking those courses. An exposure to other software such as STAAD, ArcView, etc. would have been valuable too.

To try to have more than one TA for each class so they can always be available for everyone who needs help.
Exhibit 6

Yes. I believe that my involvement in extracurricular activities such as soccer, AFROTC, HOST/SHPE, BOP and various campus functions enhanced my college experience and helped me become comfortable with myself.

How effective was the academic advisement that you received in the completion of your degree requirements?

Very effective.

Very effective.

Effective.

Very effective.

Very effective.

Very effective.

Very effective.

Effective.

Effective.

Very effective.

Very effective.

Very effective.

Very effective.

Effective.

Effective.

Do you believe that you are adequately prepared for an engineering career?

Yes. In particular the Design Courses. What I learned here is what got me my job today.

No. I would like to get my Masters to feel fully prepared.

Yes.

Yes.
Department of Civil and Environmental Engineering
Exit Survey for May 2002 Graduates

1. What are your immediate plans after graduation?
   - Full-time employment, and I already have a job. 5/5 (100%)
   - Full-time employment, and I am still looking for a job. 0/5 (0%)
   - Full-time graduate school 0/5 (0%)
   - Other ___________________________ (please specify) 0/5 (0%)

2. Is your employment or graduate study related to civil or environmental engineering?
   - Completely related 4/5 (80%)
   - Somewhat related 1/5 (20%)
   - Not related 0/5 (0%)

3. What specialty area, if any, do you think you might focus on in your career?
   - Civil Site 2
   - Construction 0
   - Environmental 0
   - Geotechnical 1
   - Hydraulics/Water Resources 2
   - Structural 0
   - Transportation 0
   - Other ___________________________ (please specify) 1

4. Do you have plans to pursue any additional education? (check as many as apply)
   - Company sponsored seminars or training 3
   - Continuing education 1
   - Degree program ___________________________ (please specify) 5
   - No additional education 0

5. What licenses or certifications do you plan to obtain?
   - Engineer in Training 3
   - Professional Engineer 5
   - Other ___________________________ (please specify) 0

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT. Please rate the preparation level that you feel in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well are you prepared to:</th>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use mathematics and science</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Solve problems</td>
<td></td>
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<tr>
<td>Perform design</td>
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<td></td>
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<tr>
<td>Analyze experimental data</td>
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<td></td>
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<tr>
<td>Use computer programs and models</td>
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<tr>
<td>Communicate in writing</td>
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</tr>
<tr>
<td>Communicate orally</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Work in design teams</td>
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<td></td>
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<tr>
<td>Apply project management and engineering economics</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand the impact of engineering solutions on global issues and society</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Indicate which of the following CE/Mech/EnE courses that you feel were most important to you in your degree program. Please check no more than five courses.

   - Strength of Materials 2
   - Surveying 0
   - Construction Materials and Procedures 0
   - Civil Engineering Methods 1
   - Fluid Mechanics 3
   - Water Resources Engineering 3
   - Hydraulics Engineering 1
   - Soil Mechanics 2
   - Foundation Engineering 1
   - Transportation Engineering 0
   - Reinforced Concrete Design 1
   - Steel Design 0
   - C.E. Design I (CE 494) 4
   - C.E. Design II (CE 495) 4
   - Structural Analysis 0
   - (Tech Elec) 2
   - (Tech Elec) 0

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
8. Did you have a positive experience at NJIT?  
   Yes 5/5 (100%)  No 0/5 (0%)  (please circle one)
   Comments:

9. Do you believe that you are adequately prepared for an engineering career?  
   Yes  No  (please circle one)  Yes 5/5 (100%)  No 0/5 (0%)  
   Comments:

10. Do you have any suggestions for improving our program?

THANK YOU FOR YOUR TIME!
Department of Civil and Environmental Engineering
Exit Survey for May 2002 Graduates (5 responses)

Use mathematics and science 4.20
Solve problems 4.60
Perform design 4.60
Analyze experimental data 4.00
Use computer programs and models 4.20
Communicate in writing 4.20
Communicate orally 4.20
Work in design teams 4.60
Apply projects management and engineering economics 4.00
Understand the impact of engineering solutions on global issues and society 4.00

(mean: 1=low, 5=high)
STUDENT COMMENTS - MAY 2002 EXIT SURVEY

Did you have a positive experience at NJIT?

I will be coming back for MS and Ph.D.

I learned a lot and have acquired skills that I had to be a successful engineer.

Do you believe that you are adequately prepared for an engineering career?

Could have used a little more designing and computer applications.

Do you have any suggestions for improving our program?

Prepare students for work to be done in Senior Design Classes. Better lab facility. Need more PC’s and better hours. PC’s were down for most of the semester.

Teach civil students more computer programs. Hydration, CADD, pay dirt, etc.

Teach autocad early on and make Hydraulics a required course.

I felt CE 260 - CE Methods was one of the most beneficial classes I have taken at NJIT. Given the good job market, I had the opportunity to interview with multiple companies (about 4). In all of them, each one wanted to know about my written and oral communications skills and two companies actually viewed some of my work. All emphasized that these skills were important. The CE Dept. Did a great job in working these skills into other technical CE classes as well as offering CE 260. I feel it is most critical to develop and foster these skills in as many classes as possible to create a well-rounded future engineer.
Exhibit 6
Department of Civil and Environmental Engineering
Exit Survey for May 2003 Graduates
Response Rate = 54% (12/22)

1. What are your immediate plans after graduation?
   - Full-time employment, and I already have a job. 7/12 (58%)
   - Full-time employment, and I am still looking for a job. 4/12 (33%)
   - Full-time graduate school 2/12 (17%)
   - Other __________________________ (please specify) 2/12 (17%)

2. Is your employment or graduate study related to civil or environmental engineering?
   - Completely related 8
   - Somewhat related 3
   - Not related 0

3. What specialty area, if any, do you think you might focus on in your career?
   - Civil Site 2
   - Construction 5
   - Environmental 1
   - Geotechnical 1
   - Hydraulics/Water Resources 1
   - Structural 4
   - Transportation 3
   - Surveying 1
   - Other Surveying (please specify)

4. Do you have plans to pursue any additional education? (check as many as apply)
   - Company sponsored seminars or training 7
   - Continuing education 8
   - Degree program M.S.C.E.(4), M.S EnE (1), MBA(1). (please specify) 6
   - No additional education 0

5. What licenses or certifications do you plan to obtain?
   - Engineer in Training 7
   - Professional Engineer 11
   - Other __________________________ (please specify) 0

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT. Please rate the preparation level that you feel in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well are you prepared to:</th>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use mathematics and science</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solve problems</td>
<td></td>
<td>8</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Perform design</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze experimental data</td>
<td></td>
<td>8</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Use computer programs and models</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Communicate in writing</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate orally</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Work in design teams</td>
<td></td>
<td>7</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply project management and engineering economics</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Understand the impact of engineering solutions on global issues and society</td>
<td>2</td>
<td>8</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Indicate which of the following CE/Mech/EnE courses that you feel were most important to you in your degree program. Please check no more than five courses.

- Strength of Materials
- Surveying
- Construction Materials and Procedures
- Civil Engineering Methods
- Fluid Mechanics
- Water Resources Engineering
- Hydraulics Engineering
- Soil Mechanics
- Foundation Engineering
- Transportation Engineering
- Structural Analysis
- Reinforced Concrete Design
- Steel Design
- C.E. Design I (CE 494)
- C.E. Design II (CE 495)
- __________________________ (Tech Elec)
- __________________________ (Tech Elec)

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
EXIT SURVEY COMMENTS FOR MAY 2003 GRADUATES.

Did you have a positive experience at NJIT?

The Civil Engineering Department has been very helpful in my years at NJIT. The faculty and staff both give personal attention when it is necessary. Overall, the department has made my years enjoyable at NJIT.

Yes, I do think, however, that the Biannual Career Fairs are purely cosmetic. I have since waited for correspondence from prospective employers. I am starting to think that these companies are discriminating against non-American sounding names.

Yes. I enjoyed speaking my second language in front of classmates during presentations.

Neutral.

Yes. I did have a positive experience at NJIT because I believe we were given the best using some of the best lecturers in the Nation. It was a stiff journey, but it was worth every minute.

5 Yes with no comment.

1 No with no comment.

How effective was the academic advisement that you received in the completion of your degree requirements?

Very effective 4

Effective 7

Not very effective 1

Do you believe that you are adequately prepared for an engineering career?

Yes. Although I feel that I am ready for a career in engineering, I do think that there may need to be some changes in the academic curriculum. Even if more credits need to be added to the curriculum, there should definitely be more computer-related courses.

Yes. In terms of the specific field, I say yes. However, there are some classes that seem to not offer interest.

Yes. I would like to have a deeper idea how to build civil constructions like towers, highways, dams, etc.
Department of Civil and Environmental Engineering
Exit Survey for May 2003 Graduates (12 responses)

- Use mathematics and science: 4.16
- Solve problems: 4.41
- Perform design: 4.16
- Analyze experimental data: 4.27
- Use computer programs and models: 3.08
- Communicate in writing: 4.25
- Communicate orally: 3.75
- Work in design teams: 4.36
- Apply project management and engineering economics: 3.92
- Understand the impact of engineering solutions on global issues and society: 4.00

(mean: 1=low, 5=high)
Yes. We had a chance to lay our hands on some of the practical aspects of the program such as the CE 494 and CE 495 not to mention others. These courses adequately prepared us for the outside world.

8 Yes with no comment.

Do you have any suggestions for improving our program?

Mech 235 – Professor needs to teach moment of inertia. (After 235 different professor) in Mech 237. Refused to teach moment of inertia. I ended up learning it while in CE 432 (Steel Design). Moment of inertia is a very important topic that is not covered in statics. Mech 237 (Strength of Materials) requires students to know MOI before they take the course.

For the CE 494 course, I believe we did not receive sufficient experience to use the Land Development program because CE 260 just does not do it. CE 494 is a very important course in the CE program and I believe there should be a course (maybe freshman year) to prepare us for this using the program in detail.

More instruction in design courses, rather than just letting students flounder, then correcting.

AutoCAD training is a must in the new working environment.

There should be more emphasis on writing courses. NJIT lacks a good English Department. I realize that English is many students’ second language, but it makes group report writing extremely difficult.

No suggestions.

It would be much better if the students learn how to build a building from the beginning to the end.

Need to do a better job recruiting prospective students. Offer better schedules.

The computer courses will help for the coming design courses.

AutoCAD training course. Mandatory projects in Design Courses 333, 432. Better monitoring during exams.
June 15, 2006

Ms. Janet Rivera
Recruiting Coordinator
Kiewit Construction
50 Chestnut Ridge Road
Montvale, NJ 07645

Re: Employer Survey

Dear Ms. Rivera:

I would appreciate several minutes of your time to complete the attached Employer Survey form. According to our records, your firm employees our graduates, and we thank you for that. Now we ask your assistance in assessing the course of study here in the Department of Civil and Environmental Engineering (CEE).

The goal of the CEE Department is to provide graduates with a comprehensive engineering education that will serve them immediately upon graduation, and at the same time prepare them for a lifetime of learning in the engineering profession. Your comments and insight will help to shape the future curriculum in CEE.

For your convenience, we have enclosed a self-addressed, stamped envelope.

Thank you for your time and cooperation.

Sincerely,

Walter Konon
Professor and Acting Chair
EMPLOYER SURVEY 2006
Civil and Environmental Engineering (CEE) Department
New Jersey Institute of Technology

1. Which of the following industry categories best describes your organization? (Check as many as apply)

   **General:**
   - [ ] Consulting
   - [ ] Construction
   - [ ] Developer
   - [ ] Government
   - [ ] Utility
   - [ ] Manufacturing
   - [ ] Services
   - [ ] Corporate Facilities
   - [ ] Other (describe) ____________________________

   **Specific:**
   - [ ] Architectural
   - [ ] Civil Site
   - [ ] Building Construction
   - [ ] Heavy Construction
   - [ ] Construction Manager
   - [ ] Environmental
   - [ ] Geotechnical
   - [ ] Structural
   - [ ] Transportation
   - [ ] Water Resources/Water Supply
   - [ ] Power
   - [ ] Telecommunications
   - [ ] Other (describe) ____________________________

2. Approximately how many employees are in your organization?

   - [ ] Under 10 employees
   - [ ] 10 to 50 employees
   - [ ] 51 to 100 employees
   - [ ] 101 to 300 employees
   - [ ] more than 300 employees

3. Please indicate the education level of your employees that are engaged in civil/environmental engineering:

<table>
<thead>
<tr>
<th>Estimated No.</th>
<th>Highest Educational Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Associate degree</td>
</tr>
<tr>
<td></td>
<td>Bachelors degree</td>
</tr>
<tr>
<td></td>
<td>Masters degree</td>
</tr>
<tr>
<td></td>
<td>Doctoral degree</td>
</tr>
</tbody>
</table>

**11:**
4. What educational level is most typical for your entry level civil/environmental engineers (check only one):

_____ Associate degree
_____ Bachelors degree
_____ Masters degree
_____ Doctoral degree

5. Approximately what percentage of your employees are registered professional engineers? ____________%

6. Does your company provide financial assistance for employees pursuing a degree program?
   On a part-time basis?
      _____ Yes
      _____ No
   On a full-time basis?
      _____ Yes
      _____ No

7. In your opinion, how much influence should business and industry have on college curriculum content?

_____ None
_____ Little
_____ Some
_____ Much
_____ A great deal
_____ No opinion/not sure

8. Is your company finding enough qualified applicants to fill your entry level positions?

_____ Very adequate
_____ Adequate
_____ Marginal
_____ Not adequate

9. How would you describe the general quality of the applicants for your entry level positions?

_____ Excellent
_____ Very Good
_____ Good
_____ Fair
_____ Poor
_____ Not sure
10. Please rate the importance to your organization of various employee skills and competence for civil/environmental engineers using a 5-point scale.

<table>
<thead>
<tr>
<th>Skills</th>
<th>Extremely Important (5)</th>
<th>Very Important (4)</th>
<th>Important (3)</th>
<th>Somewhat Important (2)</th>
<th>Not at all Important (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Math</td>
<td></td>
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<tr>
<td>(2) Sciences</td>
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<td>(3) Discipline - specific</td>
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<td>(4) CAD/CADD</td>
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<td>(5) Problem Solving</td>
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<tr>
<td>(6) Design</td>
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<tr>
<td>(7) Written communication</td>
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<tr>
<td>(8) Oral communication</td>
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<td>(9) Team-work</td>
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<tr>
<td>(10) Knowledge of industry practices and standards</td>
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<tr>
<td>(11) Interdisciplinary knowledge</td>
<td></td>
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<tr>
<td>(12) Professional and ethical responsibilities</td>
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<tr>
<td>(13) Need for engaging in life-long learning</td>
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<tr>
<td>(14) Understand business fundamentals and leadership principles</td>
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<tr>
<td>(15) Marketing</td>
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<tr>
<td>(16) Understand the impact of engineering solutions on global contemporary issues and society</td>
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</tbody>
</table>

11. Describe the 3 or 4 most important skills that you seek in a graduate civil/environmental engineering job applicant?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

12. If your engineers use CAD/CADD, please indicate which software you use?

___ AutoCad
___ MicroStation
___ Other (Specify) ____________________

13. In a typical 40-hour work week, what percentage of time will a typical engineer devote to direct CAD/CADD work? ______ %
14. If you have supervised NJIT/CEE graduates or students, please rate the performance of these graduates or students on the following skills and characteristics using a 5-point scale.

<table>
<thead>
<tr>
<th></th>
<th>Excellent (5)</th>
<th>Very Good (4)</th>
<th>Good (3)</th>
<th>Fair (2)</th>
<th>Poor (1)</th>
<th>Not applicable/ Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>(14) Understand business fundamentals and leadership principles</td>
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</table>

15. Are there any comments you would like to make about the NJIT/CEE curriculum, or the NJIT/CEE students or graduates that you have supervised?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

16. Contact information (Optional):

Your Name: ___________________  Your Company: ___________________

Phone No: ___________________  e-mail address: ___________________
1. Which of the following industry categories best describes your organization? (Check as many as apply)

   General:
   - [ ] Consulting
   - [ ] Construction
   - [ ] Developer
   - [ ] Government
   - [ ] Utility
   - [ ] Manufacturing
   - [ ] Services
   - [ ] Corporate Facilities
   - [ ] Other (describe) ____________________________

   Specific:
   - [ ] Architectural
   - [ ] Civil Site
   - [ ] Building Construction
   - [ ] Heavy Construction
   - [ ] Construction Manager
   - [ ] Environmental
   - [ ] Geotechnical
   - [ ] Structural
   - [ ] Transportation
   - [ ] Water Resources/Water Supply
   - [ ] Power
   - [ ] Telecommunications
   - [ ] Other (describe) ____________________________

2. Approximately how many employees are in your organization?

   - [ ] Under 10 employees
   - [ ] 10 to 50 employees
   - [ ] 51 to 100 employees
   - [ ] 101 to 300 employees
   - [ ] more than 300 employees

3. Please indicate the education level of your employees that are engaged in civil/environmental engineering:

<table>
<thead>
<tr>
<th>Estimated No.</th>
<th>Highest Educational Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Associate degree</td>
</tr>
<tr>
<td></td>
<td>Bachelors degree</td>
</tr>
<tr>
<td></td>
<td>Masters degree</td>
</tr>
<tr>
<td></td>
<td>Doctoral degree</td>
</tr>
</tbody>
</table>
4. What educational level is most typical for your entry level civil engineers (check only one):

   _____ Associate degree
   _____ Bachelors degree
   _____ Masters degree
   _____ Doctoral degree

5. Approximately what percentage of your employees are registered professional engineers? ________%

6. Does your company provide financial assistance for employees pursuing a degree program?
   On a part-time basis? On a full-time basis?
   _____ Yes _____ Yes
   _____ No _____ No

7. In your opinion, how much influence should business and industry have on college curriculum content?

   _____ None
   _____ Little
   _____ Some
   _____ Much
   _____ A great deal
   _____ No opinion/not sure

8. Is your company finding enough qualified applicants to fill your entry level positions?

   _____ Very adequate
   _____ Adequate
   _____ Marginal
   _____ Not adequate

9. How would you describe the general quality of the applicants for your entry level positions?

   _____ Excellent
   _____ Very Good
   _____ Good
   _____ Fair
   _____ Poor
   _____ Not sure
10. Please rate the importance to your organization of various employee skills and competencies for civil engineers using a 5-point scale.

<table>
<thead>
<tr>
<th>Skill Description</th>
<th>Extremely important (5)</th>
<th>Very important (4)</th>
<th>Important (3)</th>
<th>Somewhat important (2)</th>
<th>Not at all important (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge of math, science and engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and conduct experiments, as well as interpret data</td>
<td></td>
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</tr>
<tr>
<td>Design a project to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
<td></td>
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<tr>
<td>Function in multi-disciplinary teams</td>
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<tr>
<td>Identify, formulate, and solve engineering problems</td>
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<tr>
<td>Understand ethical and professional responsibility</td>
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<tr>
<td>Communicate effectively</td>
<td></td>
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<tr>
<td>Understand the impact of engineering solutions in a global, economic, environmental, and societal context</td>
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<tr>
<td>Recognize the needs for, and an ability to engage in life-long learning</td>
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<tr>
<td>Have a knowledge of contemporary issues</td>
<td></td>
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<tr>
<td>To use techniques, skills and modern engineering tools necessary for engineering practice</td>
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<tr>
<td>Understand management and leadership principles and techniques</td>
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<tr>
<td>Take the FE examination as the first step toward professional licensure</td>
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<tr>
<td>To find professional level employment or pursue an advanced degree</td>
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</tbody>
</table>

11. Describe the 3 or 4 most important skills that you seek in a graduate civil engineering job applicant?
12. If your engineers use CAD/CADD, please indicate which software you use?

___ AutoCad
___ MicroStation
___ Other (Specify) ______________

13. In a typical 40-hour work week, what percentage of time will a typical engineer devote to direct CAD/CADD work? _______%

14. If you have supervised NJIT/CEE graduates or students, please rate the performance of these graduates or students on the following skills and characteristics using a 5-point scale.

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<thead>
<tr>
<th></th>
<th>Excellent (5)</th>
<th>Very Good (4)</th>
<th>Good (3)</th>
<th>Fair (2)</th>
<th>Poor (1)</th>
<th>Not applicable/Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge of math, science and engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>To find professional level employment or pursue an advanced degree</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
15. Are there any comments you would like to make about the NJIT/CEE curriculum, or the NJIT/CEE students or graduates that you have supervised?


16. Contact information (Optional):

Your Name: ________________________
Your Company: ________________________
Phone No: ________________________
e-mail address: ________________________

Thanks for your time!
Exhibit 8

4. What educational level is most typical for your entry level civil/environmental engineers (check only one):

- [1] Associated degree
- [24] Bachelors degree
- [2] Masters degree
- [0] Doctoral degree

5. Approximately what percentage of your employees are registered professional engineers?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.4%</td>
<td>26.4%</td>
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<tr>
<td>91-100</td>
<td>0</td>
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</tbody>
</table>

6. Does your company provide financial assistance for employees pursuing a degree program?

<table>
<thead>
<tr>
<th>On a part-time basis?</th>
<th>On a full-time basis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 / 30 Yes</td>
<td>17 / 30 Yes</td>
</tr>
<tr>
<td>10 / 30 No</td>
<td>13 / 30 No</td>
</tr>
</tbody>
</table>

7. In your opinion, how much influence should business and industry have on college curriculum content?

- [0] None
- [2] Little
- [9] Some
- [8] A great deal
- [0] No opinion /not sure

8. Is your company finding enough qualified applicants to fill your entry level positions?

- [1] Very adequate
- [8] Adequate
- [14] Marginal
- [6] Not Adequate

9. How would you describe the general quality of the applicants for your entry level positions?

- [0] Excellent
- [8] Very Good
- [13] Good
- [8] Fair
- [0] Poor
- [0] Not sure
1. Which of the following industry categories best describes your organization? (Check as many as apply)

**General:**
- 20 Consulting
- 9 Construction
- 1 Developer
- 2 Government
- 0 Utility
- 0 Manufacturing
- 2 Services
- 3 Other (describe)

**Specific:**
- 8 Architectural
- 19 Civil Site
- 5 Building Construction
- 8 Heavy Construction
- 13 Construction Manager
- 17 Environmental
- 14 Geotechnical
- 20 Structural
- 18 Transportation
- 10 Water Resources/Water Supply
- 4 Power
- 4 Telecommunications
- 6 Other (describe)

2. Approximately how many employees are in your organization?

- 0 Under 10 employees
- 4 10 to 15 employees
- 4 51 to 100 employees
- 12 101 to 300 employees
- 12 More than 300 employees

3. Please indicate the education level of your employees that are engaged in civil/environmental engineering:

<table>
<thead>
<tr>
<th>Estimated No.</th>
<th>Highest Educational level</th>
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</thead>
<tbody>
<tr>
<td>112 (2.7%)</td>
<td>Associated degree</td>
</tr>
<tr>
<td>2744 (65.5%)</td>
<td>Bachelors degree</td>
</tr>
<tr>
<td>1219 (29.1%)</td>
<td>Masters degree</td>
</tr>
<tr>
<td>114 (2.7%)</td>
<td>Doctoral degree</td>
</tr>
</tbody>
</table>

120
10. Please rate the importance to you organization of various employee skills and competence for civil/environmental engineers using a 5-point scale.

<table>
<thead>
<tr>
<th></th>
<th>Extremely important (5)</th>
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<th>Not at all important (1)</th>
<th>Average</th>
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<td>2.59</td>
</tr>
</tbody>
</table>

11. Describe the 3 or 4 most important skills that you seek in a graduate civil/environmental engineering job application?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

12. If your engineers use CAD/CADD, please indicate which software you use?

   28 AutoCAD
   16 Micro Station
   1 Other (Specify)

13. In a typical 40-hour work week, what percentage of time will a typical engineer devote to direct CAD/CADD work? 26.8 %
14. If you have supervised NJIT/CEE graduates or students, please rate the performance of these graduates or students on the following skills and characteristics using a 5-point scale.

<table>
<thead>
<tr>
<th></th>
<th>Excellent (5)</th>
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<td>(5) Problem Solving</td>
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<td>(9) Team-work</td>
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<td>1.94</td>
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<td>(16) Understand the impact of engineering solutions on global contemporary issues and society</td>
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15. Are there any comments you would like to make about the NJIT/CEE curriculum, or the NJIT/CEE students or graduates that you have supervised?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

16. Contact Information (Optional):

Your name: ___________________________  Your Company: ___________________________

Phone No.: ___________________________  email address: ___________________________

Thanks for your time!
Employer Survey (2006) -- Importance of Skills and Competence for Civil/Environmental Engineers (31 responses)

- Math: 3.84
- Sciences: 3.61
- Discipline-specific: 3.72
- CAD/CADD: 3.35
- Problem Solving: 4.45
- Design: 4.55
- Written communication: 4.52
- Oral communication: 4.42
- Team-work: 3.65
- Knowledge of industry practices and standards: 3.10
- Interdisciplinary knowledge: 4.16
- Professional and ethical responsibilities: 3.39
- Need for engaging in life-long learning: 3.39
- Understand business fundamentals and leadership principles: 2.83
- Marketing: 2.59
- Understand the impact of engineering solutions on global contemporary issues and society: 2.59

(mean: 1 = low, 5 = high)
Employer Survey - 2006

Describe the 3 or 4 most important skills that you seek in a graduate civil/environmental engineering job applicant?

Courses taken; understanding of those courses; communication; understanding application of courses to practice.

Design background; strong math background; CADD and Number One by far: Pass the E.I.T. Exam!

Dedicated employee willing to learn communications skills.

Technical excellence, communication skills, desire to succeed.

Problem solving; professional ethical responsibilities; work ethic.

Communication skills; team work; depth of understanding; social skills.

Solid communication skills.

Self motivation; writing/oral communication skills.

Communication skills; organization; sound fundamentals of engineering.

Practical experience (co-op internship); written and oral communications; problem solving; organization.

Must be self starters; take a task and figure it out; must be able to communicate orally and written. Ability to work as a team.

Engineering and design knowledge; strong work ethic; written and oral communication; dependability and loyalty.

Good communication; organization; computer; knowledge of engineering software (including CADD).

English communication; understands basic engineering principals of major; common sense/problem solving.

Sharp and eager to solve problems; practical – use your resources; time sensitive – time is money! Must be able to express your solution on paper and verbally.

Communication; experience (employment while in school); personality; technical knowledge; goals.
Self motivated; hard working, technical skills; ability to work with others.

Ability to produce promptly; energy and keen intellect.

Must have completed an internship; interesting in P.E. licensure; strong relationship building skills.

Good grades; related experience; extracurricular activities; good communication skills.

Design abilities – use of AutoCad/LDD; teamwork – ability to work well with others; Analytical and good math skills; work ethic and communication.

Ability to communicate verbally and in writing; solid understanding of engineering fundamentals; good problem solving and design skills; motivation to learn.

Good problem solving skills (demonstrated by good grades in major courses); computer literate (computer analysis used in design courses; also CAD); demonstrates initiative and leadership (participates in extra-curricular activities); good written and oral skills.

Competitive; hard working; willing to learn.

Written communication; oral communication; math problem solving; CAD.

Computers – Excel, Word, AutoCAD and CPM’s; technical writing; oral communication; written presentations.

CADD; communication (verbal/written); EIT; internships/summer jobs in engineering.

Good grades; extra-curricular involvement; leadership traits.

Communication skills – ability to understand and articulate can’t be understated in our field; CAD/CADD and computer literacy are fundamentals and graduate engineers should be able to “hit the ground running;” teamwork and ability to “fit-in” and contribute are also important skills that rank high on the list.

Knowledge of industry practices; problem solving; teamwork.

Are there any comments you would like to make about the NJIT/CEE curriculum, or the NJIT/CEE students or graduates that you have supervised?

We currently employ approximately 22 NJIT graduates who have been with us from 3 to 25 years. I rank these individuals very high (#4) in the above categories. The only skill needing improvement would be technical writing.
All of my NJIT hires have been good. NJIT should push getting the EIT more. Writing skills of entry levels are fair at best. More CADD exposure needed. MicroStation used by NJDOT and most other DOT's yet AutoCAD is what students are exposed to. Is this because architecture students use AutoCAD and NJIT can't afford the Bentley Licenses?

You need to teach moment of inertia in statics to your ME students!

NJIT provides it's graduates with a good understanding of engineering fundamentals and good problem solving skills. This allows them to grow professionally in whatever specialty they choose.

Just that more attention, in all colleges and universities, needs to be put on CADD.

Although I don't directly supervise entry level engineers, I have received many excellent comments about the NJIT graduates that we have hired.

I have only supervised one in recent years. He has a BSCE and an M.S. both NJIT. He is a fabulous and unique individual. He will go far.

Professional and ethical responsibilities; need for engaging life-long learning; understand business fundamentals and leadership principles; marketing, understanding the impact of engineering solutions on global contemporary issues and society are not needed as a new graduate skill. Get rid of professors who cannot teach or speak English.

Seem to produce well rounded graduates.

I believe NJIT does a good job of marketing their students to industry. I have attended the career fair for 9 years. For Construction Management we usually provide most of the practical education.

NJIT grads are generally well prepared for the profession. Areas for improvement include oral and written communication.

You must increase E.I.T. pass rate. Frankly, it is an embarrassment.

NJIT graduates in BSCET Program have performed poorly. They do not seem to have understood fundamentals of various subjects they have studied. This program should not graduate students just because they have attended courses. I meant to pass on this comment for several years. Here it is!
Department of Civil and Environmental Engineering
Alumni Survey

Engineering Practice
1. Are you currently: □ Employed full-time
   □ Going to school full-time
   □ Other

2. Employed in:
   □ industry □ government □ private practice □ military □ other __________________________ (Please specify)

3. Is your employment or graduate study related to civil or environmental engineering?
   □ Completely related □ Somewhat related □ Not related

4. What specialty area are you focusing on in your career?
   □ Civil Site □ Construction □ Environmental □ Geotechnical □ Hydraulics/Water Resources
   □ Structural □ Transportation □ Other __________________________ (Please specify)

5. What is your current job title:
   □ project engineer □ district manager □ vice president
   □ design engineer □ estimator □ director
   □ staff engineer □ sales engineer □ professor
   □ field engineer □ resident engineer □ consultant
   □ project manager □ civil engineer □ inspector
   □ other __________________________ (Please specify)

6. Approximately how many employees are in your organization?
   □ under 10 □ 10 to 50 □ 51 to 100 □ 101 to 300 □ more than 300

7. If you are working full time your current salary (compensation package) is in the range of:
   □ $30,000 - $40,000 □ 40,000 - 50,000 □ 50,000 - 60,000
   □ 60,000 - 70,000 □ 70,000 - 80,000 □ 80,000 - 90,000
   □ 90,000 - 100,000 □ 100,000 - 110,000 □ 110,000 - 130,000
   □ other __________________________ (please specify)

Professional Growth
8. Since graduating 5 years ago, have you advanced your career through professional growth and development by:
   □ Company sponsored seminars
   □ Continuing education
   □ Graduate courses
   □ Degree program __________________________ (please specify)
   □ No additional education

9. What licenses or certifications do you currently possess?
   □ Engineer in Training
   □ Professional Engineer
   □ Other __________________________ (please specify)

Service
10. What professional societies do you belong to and participate in?
    □ ASCE □ ACI □ NSPE
    □ AWWA □ AISC □ ASEE
    □ other __________________________ (please specify)

11. What community/civic/humanitarian volunteer service activities do you perform?
    □ Habitat for Humanity □ Town __________________________ (please specify)
    □ Engineers Without Borders □ County __________________________
    □ ACE □ State __________________________

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
Feedback and Comments

12. Indicate which of the following CE/Mech/EnE courses were most important to you in your degree program. Please check no more than five courses:

☐ Strength of Materials  ☐ Water Resources Engineering  ☐ Reinforced Concrete Design
☐ Surveying  ☐ Environmental Engineering  ☐ Steel Design
☐ Construction Materials and Procedures  ☐ Soil Mechanics  ☐ C.E. Design I (CE 494)
☐ Civil Engineering Methods  ☐ Foundation Engineering  ☐ C.E. Design II (CE 495)
☐ Fluid Mechanics  ☐ Transportation Engineering  ☐ (Tech Elec)
☐ Structural Analysis  ☐ (Tech Elec)

13. Would you recommend the NJIT Civil Engineering program to a high school student?

Yes  No  (please circle one)

Comments:


14. Do you have any suggestions for improving our program?


15. Do you have any additional comments?


THANK YOU FOR YOUR TIME!
Department of Civil and Environmental Engineering
Alumni Survey

1. Are you currently:  □ Employed full-time
    □ Going to school full-time
    □ Other

2. Is your employment or graduate study related to civil or environmental engineering?
    □ Completely related  □ Somewhat related  □ Not related

3. What specialty area are you focusing on in your career?
    □ Civil Site  □ Construction  □ Environmental  □ Geotechnical  □ Hydraulics/Water Resources
    □ Structural  □ Transportation  □ Other (please specify)

4. Since graduating with your B.S.C.E. degree, have you pursued any additional education?
    □ Company sponsored seminars
    □ Continuing education
    □ Degree program (please specify)
    □ No additional education

5. What licenses or certifications do you currently possess?
    □ Engineer in Training
    □ Professional Engineer
    □ Other (please specify)

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT.
   Please rate your preparation level in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well were you prepared to:</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
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<tbody>
<tr>
<td>Use mathematics and science</td>
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<td>Solve problems</td>
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<tr>
<td>Perform design</td>
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<tr>
<td>Analyze experimental data</td>
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<tr>
<td>Use computer programs and models</td>
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<td>Communicate in writing</td>
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<td>Communicate orally</td>
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<td>Work in design teams</td>
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<td>Apply elements of project management, construction, and engineering economics</td>
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<td>Understand professional and ethical responsibility</td>
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</tbody>
</table>

7. Indicate which of the following CE/Mech/EnE courses that you feel were most important in your degree program.
   Please check no more than five courses.

- □ Strength of Materials
- □ Surveying
- □ Construction Materials and Procedures
- □ Civil Engineering Methods
- □ Fluid Mechanics
- □ Water Resources Engineering
- □ Hydraulics Lab
- □ Soil Mechanics
- □ Foundation Engineering
- □ Transportation Engineering
- □ Structural Analysis
- □ Reinforced Concrete Design
- □ Steel Design
- □ C.E. Design I (CE 494)
- □ C.E. Design II (CE 495)
- □ (Tech Elec)
- □ (Tech Elec)

SPACE FOR YOUR WRITTEN COMMENTS ON THE REVERSE SIDE
8. Would you recommend the NJIT Civil Engineering program to a high school student?

Yes  No  (please circle one)

Comments:

9. Do you have any suggestions for improving our program?

10. Do you have any additional comments?

THANK YOU FOR YOUR TIME!
Exhibit 10

Department of Civil and Environmental Engineering
Alumni Survey - Class of 2004

1. Are you currently:
   □ Employed full-time  □ Going to school full-time
   □ Other

2. Is your employment or graduate study related to civil environmental engineering?
   □ Completely related 95%  □ somewhat related 5%  □ Not related 0%

3. What specialty area are you focusing on in your career?
   □ Civil Site 5  □ Construction 8  □ Environmenta 0  □ Geotechnical 2
   □ Structural 3  □ Transportation 2  □ Other 2  □ Hydraulics/Water Resources 0

4. Since graduating with your B.S.C.E. degree, have you pursued any additional education?
   □ Company sponsored seminars 6
   □ Continuing education 3
   □ Degree program 12
   □ No additional education 4

5. What licenses or certifications do you currently possess?
   □ Engineer in Training 15
   □ Professional Engineer 1
   □ Other 0

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT.
   Please rate your preparation level in the categories below (check appropriate box):

<table>
<thead>
<tr>
<th>How well were you prepared to:</th>
<th>Very Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
<th>Very Satisfied</th>
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</thead>
<tbody>
<tr>
<td>Use Mathematics and science</td>
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<tr>
<td>Solve problems</td>
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<td>Perform design</td>
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<tr>
<td>Analyze experimental data</td>
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<td>Communicate in writing</td>
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<td>Work in design teams</td>
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<td>Apply project management and engineering economics</td>
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<td>Understand the impact of engineering solutions on global issues and society</td>
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</tbody>
</table>

7. Indicate which of the following CE/MECH/ENE courses that you feel were most important in your degree program.
   Please check no more than five courses.

   1  □ Strength of Materials
   2  □ Surveying
   3  □ Construction Materials and Procedures
   4  □ Civil Engineering Methods
   5  □ Fluid Mechanics
   6  □ Water Resources Engineering
   7  □ Hydraulics Engineering
   8  □ Soil Mechanics
   9  □ Foundation Engineering
   10 □ Transportation Engineering
   11 □ Structural Analysis
   12 □ Reinforced Concrete Design
   13 □ Steel Design
   14 □ C.B. Design I (CE494)
   15 □ C.B. Design II (CE495)
   16 □ (Tech Elec)
   17 □ (Tech Elec)
8. Would you recommend the NJIT Civil Engineering program to a high school student?

<table>
<thead>
<tr>
<th>Yes</th>
<th>90%</th>
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<tbody>
<tr>
<td>No</td>
<td>10%</td>
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</table>

9. Do you have any suggestion for improving our program?

10. Do you have any additional comments?
Alumni Survey - Class of 2004
General Satisfaction with the Education at NJIT --- October 2005
(21 responses)

- Use Mathematics and science: 4.19
- Solve problems: 3.76
- Perform design: 3.86
- Analyze experimental data: 3.95
- Use computer programs and models: 4.14
- Communicate in writing: 3.76
- Communicate orally: 3.52
- Work in design teams: 3.19
- Apply element of project management, construction, and engineering economics: 3.67
- Understand the impact of engineering solutions on global issues and society: 3.81
- Understand business fundamentals and leadership principles: 4.14
- Understand professional and ethical responsibility: 4.00

(mean: 1=low, 5=high)
8. Would you recommend the NJIT Civil Engineering program to a high school student?

Comments:
1. It is very hands on. You get a lot of experience there that will prepare you for the civil industry.
2. It is a good start for your career.
3. Solid education in the fundamentals of sciences, math and design prepares you for a great career.
4. Some adjunct instructors should be audited and evaluated course. Course material should be reviewed and submitted each semester also.
5. Give strong science background.
6. NJIT needs to emphasize on AUTOCAD application and application of courses (CE design I is not enough).
7. It is a great preparing program for the real world.
8. The more people that are in the field, the less I am worth.
9. I was a teacher assistant for professor Deutschman's summer program. It encourages high schoolers to have interest in civil engineering. More professors should get involved with this program. It's a total success.
10. Very satisfied with the close knit civil engineering department. Specialized attention. Great group and activities.

9. Do you have any suggestion for improving our program?

1. I attend right classes for my MSCE. I kind of got the feeling in a very few classes that the lowest grade I was going to get was a B. I understand the different reasons why but few Professors need to try to have students understand the principle better. You were one of my favorite professors.
2. Design course should focus less on one team member being in charge of a single discipline. It will allow the student to become more hell pounded.
3. There should be more intention among the students.
4. Must give optional 5th year for business and management course specific to the industry sector. No actual Engineering courses in the 5th year should be allowed only course in economics, leadership, accounting, public policy, and lobbying.

5. Estimating course at graduate level by Jim Mortimer was terrible and very little feed back on assignment (not even at undergraduate level).

6. My only comment would be to emphasize our department more on transportation. I don’t mean traffic engineering but rather layout of horizontal and vertical geometry; more education on drainage; sequence of construction; erosion and sediment control ... elements that graduates will encounter when they join the work force.

7. Yes, more practiced experience, I have been in construction for 14 months and I realized how poor my "hand on" practical problems were. More AutoCAD training. More work on shop drawing.

8. Well, I got the structural job. I am currently doing, I realized how much is involved in structural design. While in school, designs were idealized to simplified calculations. Beside a structure software was not thought. The basic of design were well explained but particularly should have been emphasized.

9. Needs to be more practical. CE designs I and II.

10. Provide more real life situations and problem solving. Discuss building codes and design requirement.

11. Provide a cost estimate class to prepare for bidding application.

12. Have more business related classes.

13. Teach how to grade a site.

14. More technical knowledge of design programs like AUTOCAD, Flowmaster, SewerCAD, StormCAD, Hydro flow, Hydrographs, etc. I felt that this is where I lacked skills once I reached.

15. Push ASCB to students. Try to offer more electives focus on construction as much as design.

16. It should be nice if students should learn AutoCAD Land development, before they take any design course.
10. Do you have any additional comments?

1. Graduate course should be more challenging and demanding.

2. I really miss NJIT. I had an excellent time while studying there Professor Konon, Thank you, Kind regard!

3. Loved my experience and education. It is helping me but I could have learned more.

4. I suggested more professors to get involved with professor Deutschman’s summer program because it would make adult more interesting for young high school students. There should be classes directly demonstrating these design computer programs. This way our graduates can be a step ahead of the game.
Exhibit 10

Department of Civil and Environmental Engineering
Alumni Survey - Class of 2000

1. Are you currently:
   - □ Employed full-time
   - □ Going to school full-time
   - □ Other
   Number of surveyors: 10
   100%

2. Is your employment or graduate study related to civil environmental engineering?
   - □ Completely related
   - □ Somewhat related
   - □ Not related
   90% 10% 90%

3. What specialty area are you focusing on in your career?
   - □ Civil Site
   - □ Construction
   - □ Environmental
   - □ Geotechnical
   - □ Structural
   - □ Transportation
   - □ Other
   - □ Hydraulics/Water Resources
   9 4 0 0 1

4. Since graduating with your B.S.C.E. degree, have you pursued any additional education?
   - □ Company sponsored seminars
   - □ Continuing education
   - □ Degree program
   - □ No additional education
   6 2 5 1

5. What licenses or certifications do you currently possess?
   - □ Engineer in Training
   - □ Professional Engineer
   - □ Other
   4 2 3

6. We would appreciate an assessment of your general satisfaction with the education that you received at NJIT.
   Please rate your preparation level in the categories below (check appropriate box):

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7. Indicate which of the following CE/MECH/ENE courses that you feel were most important in your degree program.
   Please check no more than five courses.

   - □ Strength of Materials
   - □ Surveying
   - □ Construction Materials and Procedures
   - □ Civil Engineering Methods
   - □ Fluid Mechanics
   - □ Water Resources Engineering
   - □ Hydraulics Engineering
   - □ Soil Mechanics
   - □ Foundation Engineering
   - □ Transportation Engineering
   - □ Structural Analysis

   3 6 4 2 2 5 2 4 3 1

   - □ Reinforced Concrete Design
   - □ Steel Design
   - □ C.E. Design I (CE494)
   - □ C.E. Design II (CE495)
   - □ (Tech Elec)

   2 4 5 3 1 0
Alumni Survey - Class of 2000
General Satisfaction with the Education at NJIT — October 2005
(10 responses)

Use Mathematics and science: 4.40
Solve problems: 4.30
Perform design: 3.90
Analyze experimental data: 4.10
Use computer programs and models: 4.00
Communicate in writing: 3.70
Communicate orally: 3.80
Work in design teams: 3.70
Apply element of project management, construction, and engineering economics: 3.80
Understand the impact of engineering solutions on global issues and society: 3.40
Understand business fundamentals and leadership principles: 3.50
Understand professional and ethical responsibility: 4.00

(mean: 1=low, 5=high)
Department of Civil and Environmental Engineering
Alumni Survey - Class of 2000

Would you recommend the NJIT Civil Engineering program to a high school student?

No.
Yes.
No.
Yes.

Yes. NJIT is an exceptional college which gave me the right balance of courses to further my career in CE. The senior design courses provided a great sense of direction a project takes as it evolves. In my opinion, these two courses were the most beneficial of the program. (CE 494 and 495).

Yes.

Yes, very much would recommend it, because of its academic standards and real life examples of the career itself.

Yes.

Yes. Over the years I have sent a number of people NJIT's way.

Do you have any suggestions for improving our program?

Every civil undergrad should leave school knowing how to read a tape measure, do a TAKE OFF, and read drawings, plans and specs. Newly hired Junior (young) engineers look like dopes when they are unable to do those three things. Throw in a working knowledge of golf, good grooming habits, and a command of English. You have the tools for success.

I think that it should eliminate some courses which do not correspond anything towards what civil engineering really is. Perhaps have more classes like CE Design I and II.

Many students will pursue careers with State or City agencies. A major focus of these agencies is the management of existing infrastructure (i.e., asset management). Consider offering courses in Asset Management, and the finance of transportation projects. Intelligent Transportation Systems (ITS) is another area that is expanding rapidly. Management of existing highways is a major focus of State, City agencies. Consider courses in ITS.
More classes in oral and written communication. Encourage summer internships.

**Do you have any additional comments?**

NJIT used to be one of the several area colleges involved with the University Transportation Research Center (UTRC). I have read about some of the research done in the past in transportation. I was curious about the status of transportation research currently at NJIT. Feel free to contact me if I can be of further assistance. (Daniel T. Degrossa).

NJIT is a great school. The Civil department is a great department/program. NJIT civil grads command respect as solid—having learned the basics of the trade. Any merger with Rutgers would be a travesty. NJIT is recognized nationwide.
Exhibit 11

Undergrad Electives

NEW JERSEY INSTITUTE OF TECHNOLOGY
Department of Civil and Environmental Engineering

To: All BSCE Students
From: Prof. John Schuring
Date: February 3, 2004
Subject: CEE Technical Electives

We have developed a list of the CE/EnE technical electives that we plan to offer through Spring 2008. The list will be helpful in planning your course of study. Also included is a list of courses in other fields such as surveying and mathematics that can be used as technical electives.

**CE/EnE Technical Electives**

<table>
<thead>
<tr>
<th>Fall 2004</th>
<th>Spring 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 342 Geology</td>
<td>CE 414 Engineered Construction</td>
</tr>
<tr>
<td>CE 351 Intro to Transportation Systems</td>
<td>CE 461 Civil Engineering Special Topics</td>
</tr>
<tr>
<td>EnE 361 Solid &amp; Hazardous Waste Engineering</td>
<td>CE 506 Remote Sensing of Environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall 2005</th>
<th>Spring 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 342 Geology</td>
<td>CE 342 Controllable C Z 342</td>
</tr>
<tr>
<td>CE 450 Urban Planning</td>
<td>CE 450 Civil Engineering Special Topics</td>
</tr>
<tr>
<td>CE 410 Constr. Scheduling &amp; Estimating</td>
<td>EnE 360 Water &amp; Wastewater Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall 2006</th>
<th>Spring 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 342 Geology</td>
<td>CE 307 Geometric Design of Highways</td>
</tr>
<tr>
<td>CE 351 Intro to Transportation Systems</td>
<td>CE 461 Civil Engineering Special Topics</td>
</tr>
<tr>
<td>EnE 361 Solid &amp; Hazardous Waste Engineering</td>
<td>CE 322</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall 2007</th>
<th>Spring 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 342 Geology</td>
<td>CE 322 Hydraulics</td>
</tr>
<tr>
<td>CE 450 Urban Planning</td>
<td>CE 461 Civil Engineering Special Topics</td>
</tr>
<tr>
<td>CE 410 Constr. Scheduling &amp; Estimating</td>
<td>EnE 360 Water &amp; Wastewater Engineering</td>
</tr>
</tbody>
</table>

**Some Other Technical Electives**

| CE 490 Independent Study | Math 337 Linear Algebra |
| CET 411 Cost Estimating  | IR 447 Legal Aspects of Engineering |
| SET 420 Land Information Systems | 500 and 600 level graduate courses (3.0 GPA required) |

Tech Elec Memo 501


**Civil and Environmental Engineering Undergraduate Electives**

All electives are 3 hour lectures and 3 credits

**CE 307 Geometric Design for Highways**  
*Prerequisites: CE 200, CE200A, CE 260*  
Highway design based on a study of traffic distribution, volume, and speed with a consideration for the predictable future. Analysis of elements of at-grade intersections and interchanges and the geometrics of highway design and intersection layout with advanced curve work including compound and transition curves.

**CE 322 Hydraulic Engineering**  
*Prerequisites: CE 320, CE 321.*  
The objective is to provide the tools required to design water distribution systems, storm drains, and sanitary sewers. Examines related hydrologic and hydraulic techniques.

**CE 342 Geology**  
*Prerequisite: Consult the instructor.*  
Studies science of geology with emphasis on physical geological processes. Stresses the principle of uniformity of process in the context of rock and soil formation, transformation, deformation, and mass movement. Includes aspects of historical geology and geomorphology.

**CE 351 Introduction to Transportation Systems**  
*Prerequisite: CE 350*  
Problems in modern transportation systems will be introduced. Transportation planning, and highway and urban street traffic engineering issues will be covered. Traffic simulation and animation will be used.

**CE 406 Remote Sensing**  
*Prerequisite: Phys 234.*  
Principles of remote sensing are covered including general concepts, data acquisition procedures, data analysis and role of remote sensing in terrain investigations for civil engineering practices.

**CE 410 Construction Scheduling and Estimating**  
*Prerequisites: CE 210, CE 260*  
Quantity take off, cost estimate and CPM analysis of typical building or highway projects. A study is made of construction project organization, contract requirements and management control techniques with an introduction to computer applications.

**CE 412 Construction Codes and Specifications**  
*Prerequisite: CE 210.*  
Code and specification aspects of engineered construction. Topics include professional ethics, contracts, specifications, bidding procedures, building codes such as B.O.C.A. and NJ Uniform Construction Code, Energy Code Provisions, construction safety, and the impact of the EPA on construction.

**CE 414 Engineered Construction**  
*Prerequisites: CE 210, CE 332, CE 341.*  
Design, erection, and maintenance of temporary structures and procedures used to construct an engineered project. Business practices, codes, design philosophies, construction methods, hardware, inspection, safety, and cost as they pertain to engineered construction projects.
CE 450 Urban Planning  Prerequisite: CE 350
Introduction to urban planning, its principles, techniques, and use. Topics include development of cities, planning of new towns, redevelopment of central cities, and land use and transportation planning.

CE 461 Civil Engineering Special Topics  Prerequisite: senior standing.
Familiarization with the professional practice of engineering including codes of ethics, professional business practices, and the process of becoming a licensed professional engineer.

CE 490 Civil Engineering Projects  Prerequisite: senior standing in civil engineering and approval of the instructor.
An individually selected project, guided by a department faculty advisor. The project may include planning, library or laboratory research, engineering reports, statistical or analytical investigations, and designs. Any of these may follow class inspired direction, or the student may select his/her own topic.

EnE 360 Environmental Engineering  Prerequisites: EnE 262 and junior standing.
Training in the methods used for water pollution control. Topics include the chemical, physical, and biological processes that occur in receiving waters, modeling schemes to determine allowable loadings in various bodies of water, and waste treatment processes used for water pollution control.

EnE 361 Environmental Problems  Prerequisites: EnE 262 and junior standing.
Exposure to the area of air pollution control, solid waste disposal, and radioactive waste disposal. Topics include the chemistry of contaminated atmospheres, the influence on meteorological conditions of dispersion of pollutants, abatement processes used in the control of emissions, classification and nature of solid waste, and solid waste disposal techniques, sources and methods for the disposal of radioactive contaminants, and related health effects.
### Exhibit 12

**FE Exam Performance Results**  
Currently Enrolled CEE Students

<table>
<thead>
<tr>
<th>Exam Date</th>
<th>PM – SELECTED: CIVIL</th>
<th>PM – CIVIL AND GENERAL</th>
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<td></td>
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<td>11</td>
<td>15</td>
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<tr>
<td>Oct. 2004</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Apr. 2004</td>
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<tr>
<td>Oct. 2002</td>
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<td>7</td>
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<td>Apr. 2002</td>
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<td>19</td>
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<td>Oct. 2001</td>
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<td>9</td>
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<td>Apr. 2001</td>
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<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Totals</td>
<td>66</td>
<td>124</td>
</tr>
</tbody>
</table>
Exhibit 13

NJIT Student Evaluation Form
Fall 2006

To students: This form provides an opportunity to evaluate the course that you are taking, the classroom, the instructor and your own performance. The back of the form has space for comments. Please take this assessment seriously. NJIT values your input, which will help the university evaluate and improve the learning environment.

Course Title: _______________________________ Section: ___________ Instructor: ________________

Semester/Year: ① Fall 2006 ② Spring 2007 ③ Summer 2007 ④ Other

Your College: ① Arch ② CSLA ③ NCE ④ SDM ⑤ COS ⑥ Other

Course Type: ① Required ② Elective

Grade that I expect in this course: ① A ② B ③ C ④ D ⑤ F

My approximate current GPA: ① 4.0-3.5 ② 3.4-3.0 ③ 2.9-2.5 ④ 2.4-2.0 ⑤ <2.0

Student class level: ① Freshmen ② Sophomore ③ Junior ④ Senior ⑤ Masters ⑥ PhD student

Assess using the following scale:
4 = Excellent 3 = Good 2 = Satisfactory 1 = Fair 0 = Poor 9 = Not Applicable

Course:
1) The quality of the course textbook(s). ③ ③ ③ ① ① ① ① ① ①
2) The quality of other instructional materials (handouts, multimedia, etc.). ③ ③ ③ ① ① ① ① ① ①
3) The extent to which the course content is current and relevant. ③ ③ ③ ① ① ① ① ① ①
4) The overall educational value of the course. ③ ③ ③ ① ① ① ① ① ①

Instructor:
5) The instructor’s ability to communicate. ③ ③ ③ ① ① ① ① ① ①
6) The instructor’s ability to stimulate interest in course content. ③ ③ ③ ① ① ① ① ① ①
7) The instructor’s encouragement of active class participation. ③ ③ ③ ① ① ① ① ① ①
8) The instructor’s promptness and full use of class time. ③ ③ ③ ① ① ① ① ① ①
9) The instructor’s availability outside of class hours. ③ ③ ③ ① ① ① ① ① ①
10) The instructor’s promptness in returning work. ③ ③ ③ ① ① ① ① ① ①
11) The instructor’s fairness and consistency in grading criteria. ③ ③ ③ ① ① ① ① ① ①
12) The instructor’s knowledge of the course material. ③ ③ ③ ① ① ① ① ① ①
13) The overall teaching ability of the instructor. ③ ③ ③ ① ① ① ① ① ①

Facility:
14) Comfortableness of the room (lighting, temperature, etc.). ③ ③ ③ ① ① ① ① ① ①
15) Availability of the necessary equipment in the room (multimedia, overhead, etc.). ③ ③ ③ ① ① ① ① ① ①

Student Self Assessment:
16) My preparation for this course from previous courses. ③ ③ ③ ① ① ① ① ① ①
17) My attendance record. ③ ③ ③ ① ① ① ① ① ①
18) The quality of my work or course assignments. ③ ③ ③ ① ① ① ① ① ①

Local Specific Questions: ① (Note: There may be an attachment with program specific questions. If yes, please respond to them on this form.)
19) ① ① ① ① ① ① ① ① ①
20) ① ① ① ① ① ① ① ① ①
21) ① ① ① ① ① ① ① ① ①
22) ① ① ① ① ① ① ① ① ①
23) ① ① ① ① ① ① ① ① ①
NJIT Student Evaluation Form

Comments: Please print neatly. The privilege of anonymity carries the responsibility of being courteous.

1. What are the best features of this course?

2. What aspects of the course would you want to see improved?

3. Would you recommend the instructor to your friends? Why or why not?

4. Questions on this form may not have covered everything you would like to assess about the course and the instructor. If there is anything else you would like to add, please do so here.
Civil and Environmental Engineering
Environmental Engineering Laboratory Survey

Please grade on a scale of 1 – 4 with:

- 4 = excellent
- 3 = good
- 2 = fair
- 1 = poor
- NA = not applicable

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
<td>1) How well prepared was the laboratory for your use?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>2) How do you rate your Instructor's ability to explain the experiments?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>3) How do you rate your Lab Assistant's ability to operate the lab equipment?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>4) How do you rate the quality and relevance of the lab manual?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>5) How well do the lab experiments correspond to the other things that you are learning in class?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>6) How do you rate the condition of the lab equipment (adjustment &amp; repair)?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>7) How up-to-date is the equipment in this lab?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>8) If you used software for some of the experiments, was it adequate?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>9) How well was laboratory safety discussed by your instructor?</td>
<td>NA 1 2 3 4</td>
</tr>
<tr>
<td>10) Did you have an opportunity for a &quot;hands on&quot; experience in the lab?</td>
<td>NA 1 2 3 4</td>
</tr>
</tbody>
</table>

Please answer the following question (continue on reverse, if necessary):

What changes would you make to this lab, if any?
Hydraulics Laboratory Survey --- Fall 2006
(20 responses)

Preparation of laboratory: 3.35
Instructor's ability to explain the experiments: 3.45
Lab assistant's ability to operate the lab experiment: 2.85
Quality and relevance of the lab manual: 3.00
Lab experiments correspond to the class work: 3.50
Condition of lab equipment (adjustment and repair): 2.85
How up-to-date is the equipment: 2.80
Adequacy of software: 3.05
Lab safety discussed by your instructor: 3.70
Opportunity for a "hands on" experiment in the lab: 3.80

(mean: 1=low, 4=high)
Hydraulic Laboratory Survey Comments – Fall 2006

What changes would you make to this lab, if any?

None.

More seats.

Need to make sure equipments works before class. For software use – needs to be explained better.

Need more chairs.
Strength of Materials Laboratory Survey --- Fall 2006
(86 responses)

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
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<tbody>
<tr>
<td>Preparation of laboratory</td>
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<tr>
<td>Instructor's ability to explain the experiments</td>
<td>2.76</td>
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<td>Lab assitant's ability to operate the lab experiment</td>
<td>3.24</td>
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<tr>
<td>Quality and relevance of the lab manual</td>
<td>2.86</td>
</tr>
<tr>
<td>Lab experiments correspond to the class work</td>
<td>3.19</td>
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<tr>
<td>Condition of lab equipment (adjustment and repair)</td>
<td>2.88</td>
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<tr>
<td>How up-to-date is the equipment</td>
<td>2.67</td>
</tr>
<tr>
<td>Adequacy of software</td>
<td>2.63</td>
</tr>
<tr>
<td>Lab safety discussed by your instructor</td>
<td>2.79</td>
</tr>
<tr>
<td>Opportunity for a &quot;hands on&quot; experiment in the lab</td>
<td>2.76</td>
</tr>
</tbody>
</table>

(mean: 1=low, 4=high)
Exhibit 15

Strength of Materials Laboratory Survey – Fall 2006

What changes would you make to this lab, if any?

Better manual.

I would not make changes to the lab, because it helps with the relevance of the course and helpful for tests.

Have the material in the labs done when they are discussed in/after class, not two weeks later. He was really boring and could not stimulate interest in the labs.

Clearer instructor – instructions. More concise schedule.

More handsfull stuff. Too long. Just do the lab and be done with it.

Chalk boards in the labs are so old and dirty that information is hard to see and also almost impossible to actually write on the boards with the quality of the board and chalk.

New lab manual; not up-to-date and has many errors. Labs are graded too strictly.

Answer the question, why? There were many instances where I was confused, because I did not understand how the math related to the experiment.

None.

The instructor’s communication ability should be increased.

A lot more hands-on experience.

Grades too harsh without explanation.

Update equipment.

There needs to be less work required for a lab. Two weeks is a long time to be able to complete labs, however, the workload completely overwhelms students who also have to concentrate on the extensive work due during lecture. There is minimal chances to participate and it basically seems like a waste of time. I did not learn too much from the lab and wish this school would not push 1 credit labs that are meaningless in any learning experience and helps to take the joy out of learning which seems to be the norm at NJIT. They need to go back to the way labs were conducted in the late 70’s, more participation and empowerment.

On every lab we’ve ended up working till past 3 a.m. Thursday (the lab was due Friday). It is a lot of work for a 2 week period given all the homework and exercises. A lot of work.

Make the topics correspond with the lecture.

I think the lab is fairly up to date, but it sure could use some new equipment, like an automated Olsen torque machine.
Exhibit 15

Involve the students more in the setup of the lab, as opposed to the experiment being completely ready when they arrive.

Update equipment and ask Prof. Milano (she knows the best).

Allow for more participation.

Hands-on experiment required.

Explain procedure better. Explain what is needed in analyses and discussion better except explaining twice. One new equipment and have it replace one old.

None.

Specify what is expected from the student in terms of the reports. The instructor does not specify that!!!

Never up to date equipment and 1 credit for lab.

More hands-on. Have the lab assistant do less. Students do more. Synchronize it with lab better.

I would like for the professors to speak clearer.

More equipment, hands on work.

Separate from lecture or at least stagger lab due dates and test dates. Lab preparation detracts from study time.

None.

Power Point presentations were much clearer than manual.

None.

Remaining lab time should be used for study groups.

Even with outdated and/or cheap equipment, preventative maintenance goes a long way – for the 2nd and 3rd experiments, results were affected by problems with the test machine or measuring equipment.
Lab reports were graded too touch and way too long.

None.

Change discussion questioning.
Surveying Laboratory Survey --- Fall 2006
(39 responses)

- Preparation of laboratory: 3.54
- Instructor's ability to explain the experiments: 3.56
- Lab assistant's ability to operate the lab experiment: 3.26
- Quality and relevance of the lab manual: 2.97
- Lab experiments correspond to the class work: 3.28
- Condition of lab equipment (adjustment and repair): 3.10
- How up-to-date is the equipment: 3.18
- Adequacy of software: 3.23
- Lab safety discussed by your instructor: 3.18
- Opportunity for a "hands on" experiment in the lab: 3.59

(mean: 1=low, 4=high)
Exhibit 15

Surveying Laboratory Survey Comments – Fall 2006

What changes would you make to this lab, if any?

None

I think the instructor lectures too much and doesn’t allow for enough time in the field.

None.

Lab fee? I already paid a lot for the class.

New legs.

None.

The scheduling of some labs is not proportioned to the hardness of the lab.

Fix the LZ total station.

New legs for transit.

New legs for the tripods.

None.

No changes, everything seems fine. I like it. I thin it is fair.

The weather not be so cold.

The equipment failed on us a few too many times. The availability of equipment forces groups to waste a lot of lab time forcing us to find what little time we could together outside the lab period to finish exercises. Introduction to lab equipment is almost non-existent and overall the lab is not set up in a way that allows for lab exercises to be completed in the time allotted.

Make sure equipment works ahead of time.

None.

Check all the equipment before giving it to the students. Verify that all the equipment is working properly.

More explanation of lab equipment. In person (hands on) before going out into field.
Construction Materials Laboratory Survey --- Fall 2006
(16 responses)

- Preparation of laboratory: 3.19
- Instructor's ability to explain the experiments: 3.00
- Lab assistant's ability to operate the lab experiment: 1.94
- Quality and relevance of the lab manual: 2.38
- Lab experiments correspond to the class work: 3.00
- Condition of lab equipment (adjustment and repair): 2.81
- How up-to-date is the equipment: 2.50
- Adequacy of software: 2.56
- Lab safety discussed by your instructor: 3.25
- Opportunity for a "hands on" experiment in the lab: 3.38

(mean: 1=low, 4=high)
Construction Material Lab Survey Comments – Fall 2006

What changes would you make to this lab, if any?

Need to share data.

Better lab manual.

Newer equipment.
Geotechnical Laboratory Survey --- Fall 2006
(21 responses)

- Preparation of laboratory: 3.29
- Instructor's ability to explain the experiments: 3.38
- Lab assistant's ability to operate the lab experiment: 2.90
- Quality and relevance of the lab manual: 3.14
- Lab experiments correspond to the class work: 3.52
- Condition of lab equipment (adjustment and repair): 3.14
- How up-to-date is the equipment: 3.10
- Adequacy of software: 1.71
- Lab safety discussed by your instructor: 2.86
- Opportunity for a "hands on" experiment in the lab: 3.57

(mean: 1=low, 4=high)
Exhibit 15

Geotechnical Laboratory Survey Comments – Fall 2006

What changes would you make to this lab, if any?

No lab reports . . . The sheet and the calculations we do during lab is enough.

None.

None.
Computer Laboratory Survey --- Spring 2000
Course No.* (20 responses)

<table>
<thead>
<tr>
<th>aspect</th>
<th>mean</th>
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<tbody>
<tr>
<td>Course instructor explain the use of the software package?</td>
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<tr>
<td>The assistance that you received from the computer lab stuff?</td>
<td>3.79</td>
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<tr>
<td>Quality and relevance of the instructional manuals?</td>
<td>3.22</td>
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<tr>
<td>Lab assignments correspond to the other things that you are learning in class?</td>
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<tr>
<td>Adequacy of the software?</td>
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<tr>
<td>Condition of the computer lab equipment (adjustment and repair)?</td>
<td>3.60</td>
</tr>
<tr>
<td>Up-to-date is the equipment in this lab?</td>
<td>3.60</td>
</tr>
</tbody>
</table>

(mean: 1=low, 4=high)

- Course included: CE200A, CE260, CE332, CE333, CE350, CE443, CE494, CE495, CE734, MECH237A

- Major and Degree:

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<th>M.S.</th>
<th>Ph.D</th>
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<th>%</th>
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<td>%</td>
<td>17/20 (85%)</td>
<td>2/20 (10%)</td>
<td>1/20 (5%)</td>
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</tbody>
</table>
2. What changes would you make to this lab, if any?

CE 200A-102:
No Comment.

CE 260:
Better seating/chairs.

MECH 237A / CE 260, etc.:
No comment.

Have printer paper available at night and early morning.

Strength of Material Lab:
No comment.

CE 332:
More computers and chairs.

Wished that there are more computers available especially during project deadlines.

Fix the broken chairs. Get all computers updated (not all CPU's are PII's). Give all CE students access to lab even when Bob is not around.

CE 333:
Mouse Pads

During those busy weeks more access to chairs.

More computers; more space.

No comment.

CE 350:
More PC's

CE 443:
No Comment.

CE 494:
Provide more terminals and more seating.
Course Objectives/Outcomes Instructor Self-Evaluation Matrix  
CE 260 – Civil Engineering Methods  
Department of Civil and Environmental Engineering  

Course/Section: CE 260-102  
Prepared by: Matthew Riegel  
Semester: Fall 2009  
Date: 12/7/09  

Please rate the student’s Learning Outcomes for each Program Outcome below.  
1= Poor  
2=Fair  
3=Good  
4=Excellent  

<table>
<thead>
<tr>
<th>Strategies and Actions</th>
<th>Student Learning Outcomes</th>
<th>Program Outcomes</th>
<th>Prog. Obj.</th>
<th>Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(a-n)</td>
<td>Rating (1-4)</td>
<td></td>
</tr>
</tbody>
</table>

**Course Objective 1: Provide the students with the communication skills to function as civil engineers including written, oral, and computer based techniques.**

| Indicate importance of communication skills in the life and functions of the civil engineer. | Students learn how communication skills are integral in their work and life. | g | 4 | 1, 2, 3 | Discussions, group presentations and paper. |
| Develop techniques for speaking (public speaking) and writing. | Learn to make presentations utilizing techniques discussed in class. | g | 4 | 1, 2, 3 | Oral and written Feedback. |
| Practice speeches and write papers. | Ability to make full length presentations and write papers. | g | 4 | 1, 2, 3 | Graded presentations and papers feedback. |

**Course Objective 2: Provide the students with the capability of using CAD as a tool for selected civil engineering problems.**

| Introduce CAD concepts. | Learn concepts as well as application to typical Civil Engineering problems. | a | 3 | 1 | Lab exercises. |
| Apply CAD to site project. | Learn the use of CAD road and lot layout. | a | 3 | 1 | Lab exercises. |

**Course Objective 3: Develop an understanding of the importance of effective communications in all phases of the life of the civil engineer.**

| Discuss various aspects of communication and its importance in the life of the civil engineer. | Learn how communication skills are integral to all aspects of work and life. | g | 4 | 1, 2, 3 | Discussions, individual comments and written papers. |
| Simulate presentation modes such as job interview, project presentation, planning of presentation. | Ability to present in a simulated, real world environment. | g | 3 | 1, 2, 3 | Grading on presentations, written feedback, grading on written assignments. |
CEE Mission, Program Objectives and Program Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) ability to apply knowledge of math, science, and engineering
(b) ability to design and conduct experiments, as well as interpret data
(c) 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
(d) an ability to function multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) ability to use techniques, skills and modern engineering tools necessary for engineering practice
(l) an understanding of management and leadership principles and techniques
(m) take the FE examination as the first step toward professional licensure
(n) an ability to find professional level employment or pursue an advanced degree
CE 431 Construction Materials Lab

Catalog Description (credit 1): This course provides an understanding of the basic properties of construction materials, and presents current field and laboratory standards and testing requirements for these materials. Students select a material or component assembly for testing, design a testing procedure, and present their results. Prerequisites: Mech 237, CE 210.

Modifications Made to Course Since Last Offering:
1. State changes made. Consider prior offering FCAR (Faculty Course Assessment Report).
2. For example text was changed based on student feedback or number of labs/exams was increased to better assess course outcomes or nature of homework/reports changed to better support attainment of outcomes, etc.

Program Outcome(s):
Upon completing this course, students will attain the following program outcome(s):

b. Ability to design and conduct experiments, as well as to analyze and interpret data

Program Outcome(s) Assessment:
Develop two to four performance criteria (PC) for each outcome being assessed:

b. 1. Knowledge of common testing standards used in the profession
b. 2. Design or select testing procedure to meet stated objective
b. 3. Perform, analyze and interpret the results of experiments

Quantify the performance criteria using a four point scale:
E = Exceeds Criteria, M = Meets Criteria, D = Developing, P = Poor
 Evaluation rubric for this scale (EMDP-vector) is provided at the end of this report. The number (or %) of students in each level in shown the table below.

An outcome is successfully achieved if all of the PCs have an average EMDP-vector with x% or less “Poor.”

<table>
<thead>
<tr>
<th>PO</th>
<th>PC</th>
<th>Assessment Tool/Type</th>
<th>No. of Students = 35</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>1</td>
<td>Lab 1 Report: ASTM &amp; ....</td>
<td>22 12 0 1</td>
<td>This is numerical results of student survey on outcome(s).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assignment 4: if needed</td>
<td>18 11 4 2</td>
<td>Not to be confused with course evaluation.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Provide tool/type for PC 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Provide tool/type for PC 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* add rows if more than one PO are being assessed under this course.

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1 Department ABET Committee/instructor to develop this. A list of PCs might be compiled by asking those who have taught the course and then be narrowed down to 2-4 PCs by the outcome Champion/ABET Committee.
2 Could be looked at as A, B, C, D grade scale.
3 This could be 15% or any % the Program ABET Committee or Instructor determines.
4 Performance Criterion
Exhibit 17
FCAR: Faculty Course Assessment Report
Newark College of Engineering

Student Feedback:
Provide student feedback here............

Reflection/Proposed Action for Course Improvement:
Provide your own reflections here. Try to address the following questions and any other deemed appropriate:

1. What deficiencies/shortcomings are present in the course as offered?
2. What measures are recommended to rectify these deficiencies?
3. What additional features should be added to the course?
4. What were the results of efforts 2 and 3 at the end of the course?
5. What deficiencies/shortcomings unresolved and additional ones identified?

Evaluation Rubric:

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>E = Exceeds Criteria</th>
<th>M = Meets Criteria</th>
<th>D = Developing Criteria</th>
<th>P = Poor Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Knowledge of common testing standards used in the profession</strong></td>
<td>Can identify 3 or more common testing standards used in the profession and can list more than two common testing standards.</td>
<td>Can identify 1-2 common testing standards used in the profession and can list more than one common testing standard.</td>
<td>Cannot identify any common testing standards used in the profession but can list at least one common testing standard.</td>
<td>Cannot identify any common testing standards used in the profession and is unable to list even one common testing standard.</td>
</tr>
<tr>
<td><strong>2. Design or select testing procedure to meet stated objective</strong></td>
<td>Designs or selects testing procedure that meets stated objective in the most effective and efficient manner</td>
<td>Designs or selects testing procedure that meets stated objective although resulting procedure may not be as effective or as efficient as possible.</td>
<td>Can begin to design or select testing procedure but the result does not adequately meet the stated objective</td>
<td>Have no capability to design or select testing procedure</td>
</tr>
<tr>
<td><strong>3. Perform, analyze and interpret the results of experiments</strong></td>
<td>Collect all the required experimental data and draw logical conclusion to thoroughly address the objective of the experiment based on the analysis of the collected data</td>
<td>Collect the key experimental data and draw conclusion to address the primary objective of the experiment based on the analysis of the collected data</td>
<td>Collect the key experimental data but have one or two flaws in the data analysis that miss the experimental objective</td>
<td>Have no capability for data collection and analysis</td>
</tr>
</tbody>
</table>

Department of Civil Engineering

9/8/2010