Program Review

Bachelor of Science in Engineering

College of Information Technology and Engineering

October 2015

MARSHALL UNIVERSITY
Program Review
Marshall University

Date: October 15, 2015

Program: Bachelor of Science in Engineering (BSE)

Date of Last Review: Academic Year 2010 – 2011

Recommendation
Marshall University is obligated to recommend continuance or discontinuance of a program and to provide a brief rationale for the recommendation.

Recommendation

- Code (#):
  1. Continuation of the program at the current level of activity; or
  2. Continuation of the program at a reduced level of activity or with corrective action: Corrective action will apply to programs that have deficiencies that the program itself can address and correct. Progress report due by November 1 next academic year; or
  3. Continuation of the program with identification of the program for resource development: Resource development will apply to already viable programs that require additional resources from the Administration to help achieve their full potential. This designation is considered an investment in a viable program as opposed to addressing issues of a weak program. Progress report due by November 1 next academic year; or
  4. Development of a cooperative program with another institution, or sharing of courses, facilities, faculty, and the like; or
  5. Discontinuation of the program

Rationale for Recommendation: (Deans, please submit the rationale as a separate document. Beyond the College level, any office that disagrees with the previous recommendation must submit a separate rationale and append it to this document with appropriate signature.)

Recommendation: Signature of person preparing the report:

Recommendation: Signature of Program Chair:

Recommendation: Signature of Academic Dean:

Recommendation: Signature of Chair, Academic Planning Committee (Baccalaureate programs only):

Recommendation: Signature of Chair, Faculty Senate Chair, Graduate Council:

Recommendation: Signature of the Provost and Senior Vice President for Academic Affairs:

Recommendation: Signature of the President:

Recommendation: Signature of Chair, Board of Governors:

Date: 11/28/2016
Date: 11/30/2016
Date: 2/18/2016
Date: 2/25/2016
Date: 4/13/2016
Date: 11/13/16
College/School Dean’s Recommendation

Deans, please indicate your recommendation and submit the rationale.

Recommendation:

Continuation of the program at the current level of activity

Rationale:
(If you recommend a program for resource development identify all areas for specific development)

During the period of this program review, the BS in Engineering program has achieved many milestones. After initial implementation in 2006, the program has graduated its first full class of students and continues to be one of the most rapidly growing programs in the university. In addition, the program obtained accreditation from the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), which was retroactive to October 2008. The most recent comprehensive visit was in November 2015 (see www.abet.org for the program’s status).

The Weisberg Division of Engineering recently added a Bachelor of Science in Mechanical Engineering (BSME) as well as Master’s Degree in Mechanical Engineering (MSME). The Mechanical Engineering programs have attracted a huge interest and enrollment has increased significantly.

In May 2015, the Weisberg Division of Engineering moved into the Arthur Weisberg Family Applied Engineering Complex (WAEC). The engineering students are taking classes in new high-tech classrooms and laboratories. The Advanced Materials Testing Lab will be considered as one of the most capable engineering laboratories in the region and will allow full-scale designs of structural members, building and mining-related structures to be evaluated under real-world conditions. Students have immediate access to faculty, Division and College administrative offices. They will also have access to new computers and software in convenient collaborative areas outside faculty offices. The BSE faculty and advisory board members all strongly believe that full enrollment potential has not been reached yet due to the fact that the program was starting and we did not have the space and faculty resources until recently.

I would like to recommend continuation of the program at the current level of activity. The Engineering program is one of the fastest growing programs at Marshall University. As the program continues to grow and enrollment increases, there will be a need for additional faculty resources in the future to maintain acceptable faculty to student ratio as required by ABET. The need for additional resources will be addressed when required by the growth of the program.

Signature of the Dean

Date

01/07/2016
For purposes of program review, the academic year will begin in summer and end in spring.

**Program:** Bachelor of Science in Engineering (BSE)  
**College:** Information Technology and Engineering  
**Date of Last Review:** Academic Year 2010 – 2011

## I. CONSISTENCY WITH UNIVERSITY MISSION

The B.S.E. degree supports the university mission statement in that it provides a multi-campus affordable, high quality undergraduate education for the state and region using all appropriate modes of delivery and promotes economic development through research, collaboration, and technological innovations needed for our region.

**Institutional Mission Statement**  
Marshall University is a multi-campus public university providing innovative undergraduate and graduate education that contributes to the development of society and the individual. The University actively facilitates learning through the preservation, discovery, synthesis, and dissemination of knowledge.

Marshall University will:
- provide affordable, high quality undergraduate and graduate education appropriate for the state and the region;
- provide services and resources to promote student learning, retention, and academic success;
- foster faculty, staff, and student outreach through service activities;
- provide a safe and secure employee work environment;
- make instruction available throughout Marshall’s service area using all appropriate modes of delivery;
- enhance the quality of health care in the region;
- promote economic development through research, collaboration, and technological innovations;
- educate a citizenry capable of living and working effectively in a global environment;
- support and strengthen the faculty, staff, student, and administrative governance structures in order to promote shared governance of the institution;
• further the intellectual, artistic, and cultural life of the community and region; and
• adhere to the Marshall University Creed and to the Statement of Ethics.

CITE Mission Statement
CITE will be a recognized leader in practice-oriented teaching and applied research.
• CITE is committed to serve the lifelong educational needs of students, new graduates, working professionals, and employees.
• CITE builds on combined traditions of student-focused education, entrepreneurship, and funded research and service emphasis. CITE provides education when and where needed, incorporating technology-enhanced methods, by full-time, dedicated faculty complemented by expert adjunct faculty from industry and government.

BSE Mission Statement
The mission of the Bachelor of Science in Engineering Program has several key components:
• to provide high quality undergraduate education that leads to the development of well-trained graduates for employment in the engineering profession,
• to provide opportunities for faculty and students to participate in service-oriented activities through civic and professional organizations, and
• to provide research opportunities for faculty in areas consistent with the needs and interests of the region.

Program Educational Objectives

In order to accomplish this mission, the following educational objectives have been established for the BSE program:

1. B.S.E. graduates will be recognized for their success in designing engineering systems that promote the health, safety, and welfare of the public.

2. B.S.E. graduates will demonstrate their awareness of an engineer’s role in contemporary society and their understanding of the societal and environmental contexts of engineering projects.

3. B.S.E. graduates will practice in specific areas of engineering that are consistent with the needs of the region served by Marshall University.
Consistency of the Program Educational Objectives with the Mission of the Institution

The BSE program objectives were developed in accordance with the mission of Marshall University, and in particular, these specific applications of the Marshall University Mission Statement played a major role in BSE program development.

Marshall University will:
- provide affordable, high quality undergraduate and graduate education appropriate for the state and the region;
- foster faculty, staff, and student outreach through service activities;
- promote economic development through research, collaboration, and technological innovations.

II. Accreditation Information

1. Name of Accrediting Organization:
   ABET-EAC

2. Date of Most Recent Self-Study and Accreditation visit:
   The program was visited by ABET in Fall 2009. The next visit is scheduled to take place on November 2015.

3. Accreditation Status:
   Fully Accredited. All weaknesses were resolved in Fall 2014.

4. Accrediting Organization’s Report:
   The final ABET report, which was issued on September 16, 2014, stated that all weaknesses are resolved. The BSE will be visited by ABET during Fall 2015 (November 15-17) for affirmative accreditation visit. A Self-Study Report was submitted to ABET on June 30, 2015.

III. Adequacy of the Program

The Bachelor of Science in Engineering (B.S.E.) degree program, offered by Marshall University’s College of Information Technology and Engineering (CITE), is a general engineering program designed to meet the specific needs of engineers employed in industry, government and consulting firms in the region. The program is housed within CITE’s Weisberg Engineering Division, and offers a central core curriculum with a civil engineering area of emphasis.
1. **Faculty:**

In the addition to the Chair of the Weisberg Division of Engineering, the B.S.E. program utilizes 10 full-time engineering faculty members in the Division. Of these faculty members, five are tenured and six are tenure-track. Several are registered professional engineers. Six of full-time faculty hold degrees in civil engineering, four in mechanical engineering and one in physics. The program has an open position in mechatronics which resulted from a retirement of a faculty with electrical engineering background. The Division’s Chair and the search committee have submitted their recommendations for faculty appointment to the Dean.

All but one of the full-time faculty have terminal degrees (Ph.D) in fields relevant to their teaching emphases, and continue to be very actively involved in their professions through funded research, professional societies, and other service activities. Six of the above faculty members are involved in teaching courses (CE) directly related to the civil engineering area of emphasis, while the other faculty also teach courses in the general degree program (ENGR) and mechanical engineering (ME).

Essentially all of these faculty members are very active in their fields, both academically and professionally, serving on national and local boards, publishing papers and attending conferences regularly. Details may be seen in the faculty data sheets of Appendix I.

2. **Students:**

   a. **Entrance Standards:**

      **Marshall University**
      1. A high school diploma (official transcript with graduation date required).
      2. An Overall Grade Point Average of at least 2.00 on a 4.00 scale and a composite score of at least 19 on the ACT or a combined score (critical reading + math) of at least 900 on the SAT; OR An Overall Grade Point Average of at least 3.00 on a 4.00 scale and a composite score of at least 16 on the ACT or a combined score (critical reading + math) of at least 770 on the SAT.
      3. Recommended completion of Higher Education Policy Commission (HEPC) core requirements:
         - 4 units of English (including English 12 CR and courses in grammar, composition, and literature);
         - 4 units of mathematics (three units must be Algebra I and higher or Math I or higher; Transitional Math for seniors will also be accepted). Courses designed as “support courses”, such as Math I Lab or Math I Support, that provide extra instructional time but no
additional content shall not be acceptable as meeting the required mathematics course core requirements.
- 3 units of social studies (including U.S. studies/history)
- 3 units of science (all units must be college-preparatory laboratory science, preferably including units from biology, chemistry, and physics)
- 2 units of world language (two units of the same world language; sign language is also acceptable)
- 1 unit of arts

**Bachelor of Science in Engineering**

To gain admission to the Bachelor of Science in Engineering, applicants must meet the general Marshall University admission requirements listed above. In addition, the following requirements apply:
- B.S.E. - Math ACT of 24 and minimum composite ACT of 21 (Math SAT of 560; composite SAT 980)
- Engineering Transfer program – Math ACT of 24 and minimum composite ACT of 21 (Math SAT of 560; composite SAT of 980)
- Pre-Engineering - Math ACT of 19-23 and minimum composite ACT of 19 (Math SAT of 460-550; composite SAT of 900)
- Incoming transfer students must have completed the equivalent of college algebra and trigonometry.

Students who fail to meet these admission requirements may be admitted as pre-engineering students if they have a minimum ACT composite score of 19 (SAT 900) with a math ACT score of 19-22 (SAT 460-530). Students who are admitted to CITE with this status generally require an additional calendar year of academic work to complete the BSE degree requirements.

b. **Entrance and Exit Abilities of past five years of graduates:**

Appendix II shows that our last five years of students entered the program with high school GPAs that ranged from yearly means of 3.55 to 3.79. The yearly mean composite ACT scores ranged from 23.6 to 26.2. Yearly mean SAT Verbal scores ranged from 446.7 to 595, SAT Quantitative scores from 520 to 601.3, and SAT Analytic Writing scores from 475 to 535. Appendix III shows that these graduates compiled respectable GPAs during their undergraduate program, with yearly means ranging from 2.83 to 3.23.

3. **Assessment Information:**

The Weisberg Division of Engineering-BSE program implements a continuous improvement process that involves assessing the degree of attainment of the Student Outcomes (SOs). This process involves evaluating the assessment results, identifying improvement needs and opportunities, and recommending actions to be
taken. This continuous improvement process is regular, documented, appropriate, and systematic.

It is generally understood that Student Outcomes are the skills, knowledge, attitudes, values, and behaviors that students demonstrate at the time of graduation. The BSE Student Outcomes (SOs), which were approved by the BSE Advisory Board, are:

a) an ability to apply knowledge of mathematics, science, and engineering;
b) an ability to design and conduct experiments, as well as to analyze and interpret data;
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
d) an ability to function on multidisciplinary teams;
e) an ability to identify, formulate, and solve engineering problems;
f) an understanding of professional and ethical 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 the need for, and an ability to engage in life-long learning;
j) a knowledge of contemporary issues;
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

In summary; a robust, progressive, agile, multifaceted, and continuous assessment, evaluation, and improvement process was implemented since last ABET accreditation visit. Compared to our targets, all the student outcomes are being attained. Attached in Appendix IV are all assessment, evaluation and continuous improvement activities that were reported and included in the ABET’s Self-Study Report.

4. **Previous Reviews**: At its meeting on April 28, 2011, the Marshall University Board of Governors recommended that the Bachelor of Science in Engineering (BSE) continue at its current level of activity.

5. **Identify weaknesses and deficiencies** noted in the last program review and provide information regarding the status of improvements implemented or accomplished.

ABET evaluated the BSE program on eight criteria, with the final accreditation action depending on the program’s range of compliance, or non-compliance, with regard to each criterion. The following terms are used to indicate the extent to which a program complies with ABET expectations for each of the eight published criteria:
- **Deficiency**: A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.
- **Weakness**: A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure.
- **Concern**: A concern indicates that a program currently satisfies a criterion, policy, or procedure; however, the potential exists for the situation to change such that the criterion, policy, or procedure may not be satisfied.

The previous ABET program review that was completed in 2009-2010 cited the following concerns and weaknesses.

**Deficiencies** – The ABET team found no deficiencies; the MU BSE program is in compliance with all eight evaluation criteria.

**Concern #1**: The assessment tools for the Program Educational Objectives focused on the attainment of student outcomes at the time of graduation rather than achievements of graduates. (2009-2010 Criteria for Accrediting Engineering Programs, Criterion 2).

**Response to Concern #1**: During due process, the program provided survey instruments, performance metrics, and a schedule for assessing graduates’ achievement. Under the 2013-2014 Criteria for accrediting Engineering programs there is no requirement to assess and evaluate the extent to which program educational objectives are being attained.

**Weakness #1**: The program did not have an adequate assessment and evaluation process that periodically documents and demonstrates the degree to which the program outcomes are attained (2009-2010 Criteria for Accrediting Engineering Programs, Criterion 3 and 2013-2014 Criteria for Accrediting Engineering Programs, Criterion 4). According to the 2009-2010 ABET/EAC Final Statement, a weakness remained with respect to assessment of the following outcomes:

- Outcome (h) – the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- Outcome (i) – recognition of the need for, and an ability to engage in lifelong learning
- Outcome (j) – knowledge of contemporary issues

Specifically, ABET/EAC found that the following issues were associated with the assessment of these three learning outcomes:

- Assessment of outcomes (h, i, and j) appears to rely solely on senior exit surveys.
• The campus-wide assessment mechanisms such as Collegiate Learning Assessment (CLA) and National Survey of Student Engagement (NSSE) do not differentiate engineering students from the general university student population.
• The connection between the campus-wide assessment mechanisms and the BSE program outcomes is not readily apparent.
• It is unclear how the General Education Assessment Repository (GEAR) supports program outcomes.
• While student attendance and participation in the Winter Technical Conference supports program outcomes (i) and (j), in part, no direct tie to program outcomes seems to be evident.

Response to Weakness #1: The BSE program submitted two Interim Reports to ABET in 2011 and 2013 to address the program weaknesses and concerns, and Supplemental Information in June 2014 (as part of Due-process response to 2013 Interim Report). All weaknesses and concerns have been resolved.

6. Current Strengths/Weaknesses

The principal strengths of the B.S.E. degree program include its versatile, experienced, multi-disciplinary full-time faculty. The collective faculty have many years of relevant work experience and are oriented toward application and research. A second strength of the program is its small classes and low student to faculty ratio which provides students with ample opportunities to interact with faculty. A third strength is the agility as well as the flexibility of the curriculum which provides students with hands-on learning and allows them to participate in many experiential learning opportunities. A fourth strength is the immense support that the Program and students enjoy from the community and local industry. This immense support provided our students with sizable financial support in terms of scholarships, internships and Co-Op as well as the needed financial support to ensure the state-of-the-art facilities and labs.

The main sources of the BSE weaknesses mainly originate from the basic nature of the program, which is its generality i.e. BS in General Engineering with civil engineering area of emphasis. The program loses many potential students due to the fact that they are interested in a full civil engineering degree and not in an area of emphasis. Another weakness is the lack of technical courses in the areas of construction and engineering management. There is a growing demand from students and employers to offer more courses in this important field. The BSE program lacks faculty who can develop and teach courses in construction or engineering management.
IV. Viability of the Program:

The current Program is viable and will continue to grow at moderate rates. However, it will be in the best interest of the Program and students if it would be converted into a BS in Civil Engineering.

1. Articulation Agreements:

None.

2. Off-Campus Classes:

No off-campus classes are offered.

3. Online Courses:

No online courses are offered.

4. Service Courses:

No service courses are offered.

5. Program Course Enrollment:

The B.S.E. degree program requires a minimum of 128 credit hours of coursework. In addition to fulfilling the university's requirements for graduation, BSE students must maintain a minimum GPA of 2.0 in all professional courses. These professional courses include mathematics (MTH 229 or above), required science courses, core engineering (ENGR) courses, engineering emphasis courses (CE), and courses used as technical electives. Entering students with a math ACT of 24-26 are required to take MTH 132, Pre-Calculus. Such students will likely need an extra semester or summer term to satisfy BSE requirements.

To be eligible to take the capstone design course (ENGR 453), students must have senior standing in engineering which is defined as follows: Students in the civil engineering area of emphasis must have completed four of CE 312, CE 321, CE 322, CE 331, CE 342, and CE 413.

The design elective for the civil engineering area of emphasis must be taken from CE 414 Steel Design, CE 425 Foundation Design, CE 443 Highway Design, or CE 434 Advanced Water and Wastewater Treatment.

Specific course enrollments is provided to you in Appendix VI.
6. Program Enrollment:

For the past five years, The BSE program enrollment grew by about 50% (from 186 in 2010-11 to 245 in 2014-15). The enrollment number that is reported for 2013-14 and 2014-15 included mechanical engineering students. At the current time there are around 160 students enrolled in BSE-CE. The Program has graduated a total of 97 students during that period. It is projected that program will continue to grow as the same of even higher rate for the next five years because of the increased visibility of the program due to the new Weisberg Applied Engineering Complex.

Please see Appendix VII and Figure 1 for more details.

7. Enrollment Projections:

Engineering education is one of the most important aspects of this innovative cultivating process. Many states are now recognizing a shortage of engineers and are taking actions to address this urgent problem. These conclusions have been reached through a deliberate process of studying the current state of engineering education in the state and country, future trends and needs of society, the role of the U.S. in the knowledge-based society and global economy for high-impact jobs and markets, the need of the state for economic development and the role of MU as a public supported university in economic development.

The U.S. Bureau of Labor projected a 10-13 percent increase in the national demand for engineering between 2012 and 2022. The demand for engineers with expertise in the design and development of civil engineering applications is projected to increase 18% nationally over the same period.

Student interest in BSE-Civil at MU is remarkably high. In the current academic year (2015-16), about 65-70 of the incoming students showed strong interest in the BSE-Civil emphasis. It is projected the BSE-Civil will continue to grow at net annual rate of 8-12% for the next 5 years. The project enrollment will reach to around 240-275 students by 2020.

V. Necessity of the Program

1. Advisory Committee:

The interests of regional employers are represented by the BSE Advisory Board. The Advisory Board is a consultative panel which:

- Serves as a linkage between the BSE program and its external constituencies;
- Helps set goals and objectives and provides input into the planning process that establishes strategies to meet BSE program goals and objectives;
• Assists in assessing program effectiveness and suggests mechanisms for continuous program improvement;
• Facilitates acquisition and enhancement of the resources required to maintain an effective BSE program.

BSE Advisory Board members serve for staggered three-year terms, renewable at the discretion of the Executive Committee of the Advisory Board.

2. Graduates:

During the past five years the BSE program has graduated 97 students.

3. Job Placement:

Employment of engineers is expected to grow about as fast as the average for all occupations over the next decade, but growth will vary by specialty. Civil engineers are projected to have about 10-14 percent employment growth over the projected decade, slower than the average for all occupations.

Based on the most current Alumni Survey (Summer 2012), 82% of our BSE graduates are working in related engineering fields (Civil Engineering), 15% in non-engineering and only 3% are not employed.

The major employers are WV DOH (17%) and USACE (14%). Private firms employ about 48% of our graduates and 21% our graduates pursued other options such as graduate studies or to serve in the armed forces.

VI. RESOURCE DEVELOPMENT

At the current time the BSE program has an immediate need for an additional faculty position in the area of construction or engineering management. Certainly, future growth will create demands that strain the available facilities such as physical and computational labs. It will, also, result in higher demands on required and prescribed courses as well as the need to create and develop new courses. Therefore, additional faculty, personnel, labs, and operating expenses are needed. Based on current projections, it is anticipated that one faculty position in the area of structural engineering will be required in 2017-18 and another additional faculty position in the area of transportation or environmental engineering will be required in year 2018-19.
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Richard D. Begley  
Rank: Professor  

Start Date at Marshall as a Faculty Member: January 16, 1990  
Status: Tenured  

Highest Degree Earned: Ph D  
Date Degree Received: 1990  
Conferring Institution: West Virginia University, Morgantown WV  
Area of Degree Specialization: Mining Engineering, Geology and Rock Mechanics  
Professional Registration/Licensure: Engineering Intern, Underground Mine Foreman  
Field of Registration/Licensure: Successful completion of the nationalized Fundamentals of Engineering Exam. Most states accept this regardless of its attainment date since it was the nationalized exam. Certification resulting from examination and adequate number of years of experience working in an underground coal mine combined with education.  
Agency: WV State Board for Registration of Professional Engineers, WV Office of Miners' Health and Training  
Date Obtained, Expiration Date Obtained: December 1, 1998  
Date Obtained: June 1, 1980  

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
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<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
<th>Enrolled</th>
<th>% Response</th>
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**NOTE:** Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

**Contracts, Grants and Sponsored Research**


**Intellectual Property**

Szwilski, A. B., Begley, R. D., Patent, "Motion Induced Generator", # 7629700, Regular, United States.


Research Currently in Progress


2) Service

Department

Engineering Division Scholarship Committee, Committee Chair, (January 1, 2015 - Present).

Liason to RCBI for ME AOE, Serves as liason bewteen division of the manufacturing center for utilization of facilities, (September 30, 2013 - Present).

Real World Engineering Challenge, Faculty Advisor, (January 1, 2013 - Present).

Student Recruitment, Attending various high school recruitment events, (September 1, 2012 - Present).

Assistant Professor Search Committee (Two Openings), Committee Member, (August 30, 2012 - Present).

Theta Tau Fraternity, Faculty Advisor, (August 30, 2012 - Present).

Geologic Engineering AOE Development Committee, Committee Member, (January 1, 2012 - Present).

Assistant Professor in Mechatronics Search Committee, Committee Chair, (December 1, 2014 - May 30, 2015).

Planning Committee for a Geotechnical Workshop, Committee Member, (September 6, 2012).

University

Pickens Quuen Faculty Teaching Awards, Committee Member (August 30, 2012 - Present).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Faculty Development Activities Attended

Workshop, "Writing Across the Curriculum Training Workshop", MU CTL, Huntington, WV, US. (October 18, 2014).


4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I  
Faculty Data Sheet  
August 15, 2010 - August 14, 2015

Name: Ronald Bieniek  
Rank: Professor  

Start Date at Marshall as a Faculty Member:  

Status: Tenured  

Highest Degree Earned: Ph.D  
Date Degree Received:  

Conferring Institution: Harvard University  

Area of Degree Specialization: Physics  

Professional Registration/Licensure:  
Field of Registration/Licensure:  
Agency:  
Date Obtained, Expiration Date:  

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
<th>Enrolled</th>
<th>% Respon</th>
</tr>
</thead>
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NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

2) Service

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I
Faculty Data Sheet
August 15, 2010 - August 14, 2015

Name: William Ford III

Start Date at Marshall as a Faculty Member: _____________________________________________

Rank: _____________________________________________

Status: _____________________________________________

Highest Degree Earned: Ph.D Date Degree Received: ____________________________

Confering Institution: University of Kentucky

Area of Degree Specialization: Civil Engineering –Environmental

Professional Registration/Licensure: _____________________________________________

Field of Registration/Licensure: _____________________________________________

Agency: _____________________________________________

Date Obtained, Expiration Date: _____________________________________________

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
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<th>% Respon</th>
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</thead>
</table>

NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

2) Service

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Dr. Gang Chen Rank: Associate Professor

Start Date at Marshall as a Faculty Member: August 17, 2012

Status: Tenured

Highest Degree Earned: Ph D Date Degree Received: 1997

Conferring Institution: Nanyang Technological University, Singapore

Area of Degree Specialization: Mechanical Engineering- Structural Dynamics

Professional Registration/Licensure:

Field of Registration/Licensure:

Agency:

Date Obtained, Expiration Date:

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
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<th>Enrolled</th>
<th>% Response</th>
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<tbody>
<tr>
<td>Spring 2015</td>
<td>ENGR 214</td>
<td>Dynamics</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>ENGR 221</td>
<td>Engineering Economy</td>
<td>17</td>
<td>100</td>
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<tr>
<td>Spring 2015</td>
<td>ENGR 216</td>
<td>Mech of Deformable Bodies</td>
<td>23</td>
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<tr>
<td>Fall 2014</td>
<td>ENGR 216</td>
<td>Mech of Deformable Bodies</td>
<td>9</td>
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<td>Fall 2014</td>
<td>ENGR 216</td>
<td>Mech of Deformable Bodies</td>
<td>9</td>
<td>100</td>
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<td>Fall 2014</td>
<td>ENGR 216</td>
<td>Mechanics of Deformable Bodies</td>
<td>9</td>
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<td>Structural Analysis</td>
<td>32</td>
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<td>ENGR 214</td>
<td>Dynamics</td>
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<td>Spring 2014</td>
<td>ENGR 102</td>
<td>Introduction to CAD</td>
<td>25</td>
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NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

Contracts, Grants and Sponsored Research

Chen, G. (Co-Principal), Sponsored Research, "Tribology and dynamics for ultra-high precision micromachining, Grant ID: 51375195", Natural Science Foundation of China, Other, $800,000.00, Funded. (October 2013 - September 2017).

Chen, G. (Co-Principal), Sponsored Research, "Uncertain Vibration Diagnosis and Control, NSFC Grant ID: 51275085", Natural Science Foundation of China, Other, $800,000.00, Funded. (October 2012 - September 2015).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Measurement of lateral earth pressures behind fully integral bridge abutments by measuring nonlinear vibration response to vehicle loads (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 1, 2014 - December 31, 2014).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Detection of Bridge Damages Using Nonlinear Vibration-Based Health Monitoring (Not Funded)", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Measurement of lateral earth pressures behind fully integral bridge abutments by measuring nonlinear vibration response to vehicle loads (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).

Chen, G. (Principal), Sponsored Research, "Critical Issues in Friction Dynamics", Beihang University, China, Local, $20,000.00, Not Funded. (December 15, 2013 - December 25, 2013).

McIntosh, J. D. (Co-Principal), Chen, G. (Principal), Huffman, J. T. (Co-Principal), Sponsored Research, "Development of an Illigent Diagnosis Systyem to Evaluate Roof Bolt Integrity", Alpha Foundation, Private, $80,000.00, Not Funded. (March 15, 2013 - May 15, 2013).

Intellectual Contributions


**Presentations**


**Research Currently in Progress**


Chen, Gang, John, James, "Nano scale interface dynamics", On-Going, Scholarly.

Chen, Gang, Jeff, "Roofbolting Diagnosis", On-Going, Scholarly.

Chen, Gang, "Tribology and dynamics for ultra-high precision", On-Going, Scholarly.

Chen, Gang, Zengshi, Weimin, "Tubular Rod Dynamics of Sucker Pump System", On-Going, Scholarly.

Chen, Gang, Yongfu, "Uncertainty Vibration Control", On-Going, Scholarly.

Huffman, Jeffery T, Chen, Gang, "Utilizing Nonlinear Vibrations to Evaluate Lateral Earth Pressures Against Concrete Structures", On-Going, Scholarly.

Huffman, Jeffery T, Chen, Gang, "Utilizing Nonlinear Vibrations to Evaluate Mine Roof Bolt Bonding", On-Going, Scholarly.

**Directed Student Learning and Research**
Mickel, Z., Cooper, D., Research, Supervised Research, Engineering Department, Completed. (September 2014 - December 2014).


Ross, T., McMahon, J., Research, Supervised Research, Engineering Department, "Roof bolting diagnosis", Completed. (February 2014 - May 2014).

Xiao, F., Research, Doctoral Advisory Committee Member, Other (Outside Marshall University) Department, CE, In-Process. (January 2013 - December 2013).

Quan, Z., Research, Master's Thesis Committee Chair, Completed. (January 2013 - July 2013).

Nash, M., Research, Master's Thesis Committee Member, Completed. (January 2013 - July 2013).


Huang, D., Research, Doctoral Advisory Committee Member, In-Process. (April 2011 - January 2013).


2) Service

Department


ME program committee, Committee Member, (January 2014 - December 2014).

ME faculty search committee, Committee Member, (January 2014 - May 2014).

Search committee for two new ME faculty members, Committee Member, (January 10, 2013 - December 2013).

ABET committee, Committee Member, (August 20, 2013 - December 5, 2013).

Faculty Travel Fund Committee, Committee Member, (August 2013 - November 2013).

ME Course Committee, Committee Member, (August 2013 - November 2013).

College

Hearing Panel representative for CITE (January 2014 - December 2014).

Hearing Panel representative for CITE (along with Andrew Nichols and John Biros), Committee Member (September 2013 - December 2013).

University

Faculty Senate Committee-Student Conduct and Welfare committee, Committee Member (September 2014 -
December 2014).

Faculty Senate committee (research, temporarily for fall 2012 semester), Committee Member (September 2012 - December 2012).

Professional

SAE International Journal of Passenger Cars-Mechanical Systems, Editor, Associate Editor (September 2014 - Present).

SAE International, New engine, sensor and actuator technical committee, Member (April 2014 - Present).


Advances in Automobile Engineering, Editorial Review Board Member, USA (October 2012 - Present).


SAE International Powertrains, Fuels and Lubricants Meeting, Program Organizer, USA (April 2009 - Present).

SAE Powertrain NVH Session in SAE Congress, Program Organizer, Detroit, MI, USA (January 2009 - Present).


Applied Physics Research (Journal), Editor, Associate Editor, Canadian Center of Science and Education., Canadian Center of Science and Education (October 2010 - 2014).

SAE Lubricants and Powertrain Systems Committee & TC127 US TAG Earthmoving Machinery, Committee Member, Detroit, MI, USA (May 2009 - March 2014).


Community


FLL teams (K-12 outreaches) in Huntington, Task Force Member, Huntington (February 2013 - November 2013).

FLL teams (K-12 outreaches) in Huntington, Volunteer and mentor to students’ activities, Huntington, WV, US (September 22, 2012 - December 8, 2012).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Professional Memberships

Society of Automotive Engineers International, SAE International, Fellow (elected in Oct 2013), organizer/chair of Powertarin session of SAE congress, organizer/chair of SAE Int PFL global congress, SAE International is the leading professional society for Automotive Engineer. (March 2003 - Present).

American Society of Mechanical Engineers, ASME, Fellow (3% elected from members), ASME is the leading
Faculty Development Activities Attended

Workshop, "microstation".


CITE Faculty adviser training, CITE. (February 26, 2014).

Workshop, "SAE professional workshop series", SAE, 10 credit hours. (January 2013 - December 2013).


Tutorial, Safe driving training course, Huntington, WV, USA. (November 1, 2012).


Awards and Honors


International Lecturership of Beihang University, Beihang University (top 20 university in China), (June 2013).
### Appendix I

**Faculty Data Sheet**

*May 15, 2010 - May 15, 2015*

<table>
<thead>
<tr>
<th>Name:</th>
<th>Dr. Iyad A. Hijazi</th>
<th>Rank:</th>
<th>Assistant Professor</th>
</tr>
</thead>
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<tr>
<td>Start Date at Marshall as a Faculty Member:</td>
<td>August 17, 2013</td>
<td>Status:</td>
<td>Probationary</td>
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<tr>
<td>Highest Degree Earned:</td>
<td>Ph D</td>
<td>Date Degree Received:</td>
<td>2010</td>
</tr>
<tr>
<td>Conferring Institution:</td>
<td>New Mexico State University, Las Cruces, NM</td>
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<tr>
<td>Area of Degree Specialization:</td>
<td>Mechanical Engineering - Materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Registration/Licensure:</td>
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<td>Agency:</td>
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<tr>
<td>Date Obtained, Expiration Date:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. *(Expand the table as necessary)*

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
<th>Enrolled</th>
<th>% Respon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2015</td>
<td>ENGR 111</td>
<td>Engineering Computations</td>
<td>25</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>ENGR 102</td>
<td>Introduction to CAD</td>
<td>22</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>ENGR 102</td>
<td>Introduction to CAD</td>
<td>22</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>12</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>ENGR 215</td>
<td>Engineering Materials</td>
<td>14</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>34</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>28</td>
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<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>17</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>ENGR 111</td>
<td>Engineering Computations</td>
<td>27</td>
<td>100%</td>
</tr>
</tbody>
</table>
NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

Contracts, Grants and Sponsored Research


Intellectual Contributions


Presentations


Research Currently in Progress


2) Service

Department

Mechanical Engineering Curriculum, Committee Member, (August 17, 2014 - December 17, 2014).

ME Search Committee, Committee Member, (January 27, 2014 - July 31, 2014).
ABET Assessment, Committee Member, (August 17, 2013 - December 31, 2013).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Professional Memberships

American Physical Society, APS, The American Physical Society (www.aps.org) is a non-profit membership organization working to advance and diffuse the knowledge of physics through its outstanding research journals, scientific meetings, and education, outreach, advocacy and international activities. APS represents over 50,000 members, including physicists in academia, national laboratories and industry in the United States and throughout the world. Society offices are located in College Park, MD (Headquarters), Ridge, NY, and Washington, DC.

American Society of Mechanical Engineers, ASME, ASME is a not-for-profit membership organization that enables collaboration, knowledge sharing, career enrichment, and skills development across all engineering disciplines, toward a goal of helping the global engineering community develop solutions to benefit lives and livelihoods. Founded in 1880 by a small group of leading industrialists, ASME has grown through the decades to include more than 130,000 members in 158 countries. Thirty-thousand of these members are students.

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Professor Jeffrey T Huffman    Rank: Assistant Professor
Start Date at Marshall as a Faculty Member: January 1, 2011
Status: Probationary
Highest Degree Earned: MS    Date Degree Received: 1990
Conferring Institution: Virginia Polytechnic Institute and State University, Blacksburg, Virginia
Area of Degree Specialization: Civil Engineering- Geotechnical
Professional Registration/Licensure: Professional Engineering License - NC, Professional Engineering License - OH, Professional Engineering License - KY, Professional Engineering License - WV, Professional Engineering License – PA
Field of Registration /Licensure: Professional engineering license, Professional engineering license, Professional engineering license, Professional engineering license, Professional engineering license.
Agency: North Carolina Board of Examiners for Engineers and Surveyors, State Board of Registration for Professional Engineers and Surveyors, Kentucky State Board of Licensure for Professional Engineers and Land Surveyors, West Virginia State Board of Registration for Professional Engineers, Commonwealth of PA Department of State Bureau of Professional and Occupational Affairs
Date Obtained, Expiration Date
Obtained: June 20, 2008
Obtained: April 18, 2007
Obtained: February 27, 2007
Obtained: June 2, 2005
Obtained: August 1, 1994

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment.  (Expand the table as necessary)

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
<th>Enrolled</th>
<th>% Respon</th>
</tr>
</thead>
<tbody>
<tr>
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<td>ENGR 111</td>
<td>Engineering Computations</td>
<td>25 100%</td>
<td>100</td>
</tr>
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<td>Spring 2015</td>
<td>ENGR 453</td>
<td>Senior Design Projects</td>
<td>10 100%</td>
<td>100</td>
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<tr>
<td>Spring 2015</td>
<td>CE 322</td>
<td>Soil Mechanics</td>
<td>31 100%</td>
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<tr>
<td>Fall 2014</td>
<td>CE 321</td>
<td>Civil Engineer Materials</td>
<td>28 100%</td>
<td>100</td>
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<td>Fall 2014</td>
<td>CE 425</td>
<td>Foundation Engineering</td>
<td>20 100%</td>
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<td>Fall 2014</td>
<td>ENGR 452</td>
<td>Senior Engineering Seminar</td>
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<td>Period</td>
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<td>13</td>
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<td>ENGR 453</td>
<td>Senior Design Projects</td>
<td>12</td>
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<td>CE 322</td>
<td>Soil Mechanics</td>
<td>22</td>
<td>100%</td>
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<td>CE 321</td>
<td>Civil Engineer Materials</td>
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<td>CE 425</td>
<td>Foundation Engineering</td>
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<td>Spring 2013</td>
<td>ENGR 102</td>
<td>Introduction to CAD</td>
<td>24</td>
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<td>12</td>
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<td>CE 321</td>
<td>Civil Engineer Materials</td>
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<td>Foundation Engineering</td>
<td>18</td>
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<tr>
<td>Fall 2012</td>
<td>CE 241</td>
<td>Introduction to Geomatics</td>
<td>11</td>
<td>50%</td>
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<tr>
<td>Fall 2012</td>
<td>CE 241</td>
<td>Introduction to Geomatics</td>
<td>15</td>
<td>50%</td>
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<tr>
<td>Spring 2012</td>
<td>ENGR 453</td>
<td>Senior Design Projects</td>
<td>23</td>
<td>100%</td>
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<tr>
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<td>Soil Mechanics</td>
<td>18</td>
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<td>CE 322</td>
<td>Soil Mechanics</td>
<td>18</td>
<td>100%</td>
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<tr>
<td>Fall 2011</td>
<td>CE 321</td>
<td>Civil Engineer Materials</td>
<td>18</td>
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<td>Fall 2011</td>
<td>CE 321</td>
<td>Civil Engineer Materials</td>
<td>15</td>
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<td>Fall 2011</td>
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<td>Engineer Prac &amp; Design</td>
<td>20</td>
<td>51%</td>
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<tr>
<td>Fall 2011</td>
<td>CE 425</td>
<td>Foundation Design</td>
<td>8</td>
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<td>Senior Design Projects</td>
<td>11</td>
<td>100%</td>
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<td>Spring 2011</td>
<td>CE 322</td>
<td>Soil Mechanics</td>
<td>21</td>
<td>100%</td>
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<tr>
<td>Fall 2010</td>
<td>CE 425</td>
<td>Foundation Design</td>
<td>8</td>
<td>100%</td>
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</table>

**NOTE:** Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

**Contracts, Grants and Sponsored Research**

McCormick, R. F. (Co-Principal), Huffman, J. T. (Co-Principal), Wahjudi, P. (Co-Principal), Wait, I. W. (Principal), Sponsored Research, “Collaborative Research: Implementing and Assessing Strategies for...

Huffman, J. T. (Principal), Sponsored Research, "Measurement of bearing pressures beneath mechanically stabilized earth walls (Short listed for consideration)(Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 1, 2014 - December 31, 2014).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Measurement of lateral earth pressures behind fully integral bridge abutments by measuring nonlinear vibration response to vehicle loads (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 1, 2014 - December 31, 2014).

Huffman, J. T. (Principal), Sponsored Research, "Measurement of bearing pressures beneath mechanically stabilized earth walls (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Detection of Bridge Damages Using Nonlinear Vibration-Based Health Monitoring (Not Funded)", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).

Huffman, J. T. (Principal), Sponsored Research, "Measurement of bearing pressures beneath mechanically stabilized earth walls (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).

Huffman, J. T. (Co-Principal), Chen, G. (Co-Principal), Sponsored Research, "Measurement of lateral earth pressures behind fully integral bridge abutments by measuring nonlinear vibration response to vehicle loads (Not Funded).", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (October 31, 2012 - December 31, 2013).


McIntosh, J. D. (Co-Principal), Chen, G. (Principal), Huffman, J. T. (Co-Principal), Sponsored Research, "Development of an Illigent Diagnosis Systeym to Evaluate Roof Bolt Integrity", Alpha Foundation, Private, $80,000.00, Not Funded. (March 15, 2013 - May 15, 2013).

Huffman, J. T., Alberico, A. M. (Co-Principal), Harsh, S. (Co-Principal), Grant, "Determination of Laminotomy Limits Based on Finite Element Analysis and Confirmation Testing of Vertebra Geometry and Bone Strength - Not Funded", Joan C. Edwards School of Medicine, Marshall University, $25,000.00, Not Funded. (October 10, 2012 - January 14, 2013).

Wahjudi, P. (Principal), Aluthge, A. (Co-Principal), Huffman, J. T. (Co-Principal), Hanrahan, E. E. (Co-Principal), Han, H. (Co-Principal), Grant, "STEP Type 1A: STEM Retention and Outreach Cooperation to Keep Students Succeeding (STEM ROCKSS)", National Science Foundation, Federal, $1,000,000.00, Not Funded. (October 1, 2012 - December 30, 2012).

Huffman, J. T. (Co-Principal), Zatar, W. A. E. M. (Co-Principal), Sponsored Research, "Deployment of High-Performance Concrete Bridge Overlays in West Virginia", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (December 23, 2011 - December 31, 2011).

Huffman, J. T. (Co-Principal), Zatar, W. A. E. M. (Co-Principal), Sponsored Research, "Development of Material Specification for Implementation of High-Performance Concrete for Bridge Decks", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (December 23, 2011 - December 31, 2011).

Huffman, J. T. (Principal), Sponsored Research, "Measurement of bearing pressures beneath mechanically stabilized earth walls.", West Virginia Department of Transportation Research and Special Studies, State,
Huffman, J. T. (Principal), Sponsored Research, "Measurement of lateral earth pressure behind fully integral bridge abutments with various wing wall configurations.", West Virginia Department of Transportation Research and Special Studies, State, $250,000.00, Not Funded. (December 23, 2011 - December 31, 2011).

Intellectual Contributions

Howe, S., Huffman, J. T. (2014). CDHub 2.0 (WWW.CDHub2.ORG) Internet Website.


Presentations


Huffman, J. T. (Panelist), Other, Capstone Design Conference 2014, Capstone Design Conference, Columbus, Ohio, "Invited Panelist for panel on "Project Definition - Panel Discussion"", Panel, Academic, National, Invited. (June 2, 2014).


Wahjudi, P. (Presenter & Author), Huffman, J. T. (Presenter & Author), Pierce, C. (Presenter & Author), Oral Presentation, EFFECTs presentation to Fairmont State University, Fairmont State University, Fairmont, WV, "EFFECT in Engineering and Computer Science", Workshop, Academic, Local, Invited. (August 16, 2013).

Huffman, J. T. (Author Only), Other, 120th Annual Conference & Exposition, American Society of Engineering Educators, Atlanta, Georgia, "A Capstone Design Course Pedagogy to Prepare Civil Engineering Students for Their First Engineering Position (Abstract Accepted)", Conference, Academic, National, Accepted. (September 21, 2012).


Research Currently in Progress


Huffman, Jeffery T, Dale Miller, George M. Filz, PhD, P.E., "Strength and Deformation Properties of Soil-Cement.", Writing Results, Scholarly.

Huffman, Jeffery T, Chen, Gang, "Utilizing Nonlinear Vibrations to Evaluate Lateral Earth Pressures Against Concrete Structures", On-Going, Scholarly.

Huffman, Jeffery T, Chen, Gang, "Utilizing Nonlinear Vibrations to Evaluate Mine Roof Bolt Bonding", On-Going, Scholarly.

Directed Student Learning and Research


Walters, A., Learning, Comprehensive Master's Degree Project, Engineering Department, TE, 699, "Reworking MAPP to Fit Smaller Projects", Completed. (December 9, 2014).


Chappell, D., Learning, Comprehensive Master's Degree Project, Engineering Department, TE, 699, "Planning and Design of an Auxiliary Turn Lane: A Case Study in Ona, West Virginia.", Completed. (February 1, 2013 - August 10, 2013).

Caldwell, J., Gaum, R., Learning, Supervised Teaching Activity, Computer Science Department, CS, 490, "Creation of the Inventory College of Information Technology and Engineering (IN-CITE) Project for Real-Time Management of Laboratory Equipment", In-Process. (September 5, 2012 - April 26, 2013).

2) Service

Department

SAME-ASCE Student Chapter, Faculty Advisor, (May 1, 2011 - Present).

Scholarship Committee, Committee Member, (April 1, 2011 - Present).

BSE Advisory Board, Attendee, Meeting, (March 6, 2011 - Present).

BSE Curriculum Committee, Committee Member, (January 7, 2011 - Present).


Honors Convocation, Division Representative at Honors Convocation, (May 2, 2014).

Senior Assessment, Coordinator of Senior Assessment Activities, (February 2014 - April 2014).


Structural Engineering Faculty Search Committee, Committee Member, (October 9, 2012 - March 1, 2013).

Merit Badge College - Theta Tau, Faculty Advisor, (February 1, 2013 - February 16, 2013).


Laboratory Technician Search Committee, Committee Member, (September 3, 2012 - November 17, 2012).

Fletcher Chair Search Committee, Committee Member, (December 7, 2011 - August 10, 2012).

ASCE Virginias Conference, Faculty Advisor, (March 29, 2012 - April 1, 2012).


Theta Tau Fraternity, Faculty Advisor, (October 3, 2011 - December 31, 2011).

Geological Engineering Emphasis Exploration Committee, Committee Member, (August 1, 2011 - December 15, 2011).

Internship Coordinator, Committee Chair, (April 1, 2011 - December 15, 2011).


CITE Homecoming Parade, Advised overall design and towed the CITE float in the homecoming parade., (October 13, 2011).

Fundamental of Engineering Review Session, Provided FE Review Session on Geotechnical Engineering, (February 17, 2011).

SAME - Engineering Career Day, Committee Member, (February 8, 2011).

Engineers Without Borders Student Chapter, Faculty Advisor, (March 1, 2009 - January 24, 2011).

**College**

SAME - Engineering Career Day 2015, Committee Member (December 1, 2014 - Present).


Freshman Summer Orientation, Faculty Advisor (June 2014 - August 2014).

SAME - Engineering Career Day 2014, Committee Member (December 8, 2013 - February 20, 2014).

Outreach Hurricane High School, Outreach Presentation (November 20, 2013).

Outreach Hurricane High School, Outreach Presentation (November 15, 2013).

Freshman Summer Orientation, Faculty Advisor (May 18, 2013 - August 2, 2013).

West Point Bridge Design Contest, Co-Coordinator for WPB Design Contest (May 17, 2013 - May 18, 2013).

Outreach - Discovering Engineering Day, Participated in Outreach Activity (February 23, 2013).

SAME - Engineering Career Day 2013, Committee Member (October 8, 2012 - February 21, 2013).


Freshman Summer Orientation, Faculty Advisor (June 19, 2012 - August 3, 2012).

West Point Bridge Design Contest, Co-Coordinator for WPB Design Contest (May 11, 2012 - May 12, 2012).

Outreach Poca High School, Outreach Presentation (March 16, 2012).

Outreach - Discovering Engineering Day, Participated in Outreach Activity (February 25, 2012).

Recruitment, CITE and BSE recruitment (March 22, 2011 - December 20, 2011).

Summer Orientation, Faculty Advisor (June 24, 2011 - August 5, 2011).

Exploring Engineering: Academy of Excellence, Committee Member (May 1, 2011 - July 8, 2011).

**University**

Revising University Academic Appeal Policy, Chairman of subcommittee (November 22, 2013 - Present).

Academic Appeals Board, Committee Member (September 5, 2011 - Present).

Budget and Academic Policy Committee, Committee Member (September 5, 2011 - Present).
**Professional**

American Society of Civil Engineers, Officer, President/Elect/Past, Huntington, West Virginia (September 28, 2013 - Present).

American Society of Civil Engineers, Officer, Vice President, Huntington, West Virginia (September 28, 2013 - Present).

Society of American Military Engineers, Director of Professional Organization, Huntington, West Virginia (January 12, 2010 - Present).

American Society of Civil Engineers, Officer, Treasurer, Huntington, West Virginia (September 16, 2011 - September 28, 2013).

**Community**

Cheyenne Valley Homeowner Association, Officer, President/Elect/Past, Teays Valley, West Virginia (June 1, 2008 - June 1, 2013).

Project Lead The Way Steering Committee, Committee Member, Wayne, West Virginia (December 20, 2011).

Putnam County Schools Advisory Committee, Committee Member, Eleanor, West Virginia (March 31, 2011).

Real World Design Challenge, Presentation Judge, Huntington, West Virginia (February 12, 2011).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

**Professional Memberships**

Deep Foundation Institute, DFI, Member, Deep Foundation Institute promotes the technical aspects of deep foundation in practice. DFI hold numerous technical conference, publishes a journal, and a bi-monthly magazine. (December 1, 2014 - Present).

American Society of Civil Engineers, ASCE, President, President of ASCE West Virginia Section. Responsible for operation of WV Section meeting and oversight of five branches within the State of West Virginia. (September 2, 2014 - Present).


American Society of Civil Engineers, ASCE, Member, ASCE member. Attended monthly, quarterly and annual meetings of the society. (December 1, 1991 - Present).

American Society of Civil Engineers, ASCE, Vice President, Vice President of ASCE West Virginia Section. Responsible for operation of WV Section meetings and WV Section participation in the WVEXPO. (September
American Society of Civil Engineers, ASCE, Treasurer, Treasurer of ASCE West Virginia Section. Responsible for financial operation of WV Section and oversight of five branches within the State of West Virginia. (September 16, 2011 - September 28, 2013).

**Faculty Development Activities Attended**


Conference Attendance, "WV EXPO", Contractors Association of West Virginia, American Institute of Architects - WV, WV Society of Professional Engineers, Charleston, West Virginia, 0 credit hours. (March 26, 2014 - March 27, 2014).


Conference Attendance, "WV EXPO", Contractors Association of West Virginia, American Institute of Architects - WV, WV Society of Professional Engineers, Charleston, West Virginia, 0 credit hours. (March 20, 2013 - March 21, 2013).

Conference Attendance, "Center for Geotechnical Research and Practice Annual Lecture Program", VPI & SU (Virginia Tech), Blacksburg, Virginia, 0 credit hours. (February 28, 2013).


Professional Society Meeting, "ASCE Quarterly Meeting", American Society of Civil Engineers, Montgomery, West Virginia, 0 credit hours. (November 15, 2012).

Professional Society Meeting, "ASCE Annual Meeting", American Society of Civil Engineers, Hawk's Nest, West Virginia, 0 credit hours. (September 28, 2012 - September 30, 2012).

Self-Study Program, "Independent Applying the QM Rubric", Marshall University, Center for Teaching & Learning, Huntington, WV. (August 14, 2012 - September 13, 2012).


Professional Society Meeting, "ASCE Quarterly Meeting", American Society of Civil Engineers, Huntington, West Virginia, 0 credit hours. (January 26, 2012).

Workshop, "ASCE Workshop for Student Chapter Leaders", American Society of Civil Engineers, Nashville, Tennessee, 0 credit hours. (January 20, 2012 - January 22, 2012).

Workshop, "SAME Workshop for Student Chapter Leaders", Society of American Military Engineers, Detroit, Michigan, 0 credit hours. (December 9, 2011 - December 10, 2011).

Professional Society Meeting, "ASCE Quarterly Meeting", American Society of Civil Engineers, Montgomery, West Virginia, 0 credit hours. (November 17, 2011).

Seminar, "ASCE Section & Branch Accounting and Financial Webinar", American Society of Civil Engineers, Huntington, West Virginia, 0 credit hours. (November 15, 2011).

Professional Society Meeting, "ASCE Annual Meeting", American Society of Civil Engineers, Snowshoe, West Virginia, 0 credit hours. (September 16, 2011 - September 18, 2011).


Professional Society Meeting, "ASCE Quarterly Meeting", American Society of Civil Engineers, Charleston, West Virginia, 0 credit hours. (March 23, 2011).

Seminar, "Ethics in Engineering", American Society of Civil Engineers, Huntington, West Virginia, 0 credit hours. (February 23, 2011).


Professional Society Meeting, "ASCE Quarterly Meeting", American Society of Civil Engineers, Huntington, West Virginia, 0 credit hours. (January 27, 2011).

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

Awards and Honors

Organization Advisor of the Year (Marshall University), SAME-ASCE Student Chapter, (May 2, 2014).

Nominated for Pickens Queen Teacher Award, Marshall University Center for Teaching and Learning, (August 20, 2012).

Student Chapter Leader of the Year, Society of American Military Engineers, (December 3, 2011).
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Greg Michaelson
Rank: Assistant Professor

Start Date at Marshall as a Faculty Member: August 17, 2014

Status: Probationary

Highest Degree Earned: Ph D Date Degree Received: 2014

Conferring Institution: West Virginia University, Morgantown, WV

Area of Degree Specialization: Civil Engineering- Structural Engineering

Professional Registration/Licensure: Engineering Intern

Field of Registration/Licensure: WV EI Certificate #9959 (No Expiration Date)

Agency: West Virginia State Board of Registration for Professional Engineers

Date Obtained, Expiration Date Obtained: October 1, 2014

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. *(Expand the table as necessary)*

<table>
<thead>
<tr>
<th>Term/Year</th>
<th>Course</th>
<th>Title</th>
<th>Enrolled</th>
<th>% Respon</th>
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<tr>
<td>Spring 2015</td>
<td>CE 614</td>
<td>Advanced Reinforced Concrete Structure Design and Behavior</td>
<td>7 100%</td>
<td>100</td>
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<tr>
<td>Spring 2015</td>
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<td>Comprehensive Project</td>
<td>1 100%</td>
<td>100</td>
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<tr>
<td>Spring 2015</td>
<td>CE 413</td>
<td>Reinforced Concrete Design</td>
<td>22 100%</td>
<td>100</td>
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<tr>
<td>Spring 2015</td>
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<td>Senior Design Projects</td>
<td>10 34%</td>
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<td>Spring 2015</td>
<td>CE 414</td>
<td>Structural Steel Design</td>
<td>22 100%</td>
<td>100</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>CE 618</td>
<td>Bridge Engineering</td>
<td>6 100%</td>
<td>100</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>TE 699</td>
<td>Comprehensive Project</td>
<td>1 100%</td>
<td>100</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>CE 241</td>
<td>Introduction to Geomatics</td>
<td>10 75%</td>
<td>75</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>CE 241</td>
<td>Introduction to Geomatics</td>
<td>18 75%</td>
<td>75</td>
</tr>
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</table>

NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.
1) Scholarship/Research

Contracts, Grants and Sponsored Research

Michaelson, G. K. (Co-Principal), Barth, K. E. (Principal), Barker, M. G. (Co-Principal), Contract, "Technical Program Management for the Short Span Steel Bridge Alliance and Development of the Bridge Technology Center at WVU", American Iron & Steel Institute, Federal, $89,819.00, Funded. (May 1, 2015 - December 31, 2015).

Michaelson, G. K. (Co-Principal), Barth, K. E. (Principal), Barker, M. G. (Co-Principal), Contract, "Testing of Shallow Steel Press-Brake Tub Girders", American Iron & Steel Institute, Federal, $73,816.00, Funded. (May 1, 2015 - December 31, 2015).

Intellectual Contributions


Barth, K. E., Michaelson, G. K., Morgan, S. A. (2011). *Serviceability Evaluation of ITD 9th Street Bridge*. Boise,
Presentations

Michaelson, G. K. (Presenter & Author), Other, Infrastructure Week 2015, American Galvanizers Association, Webinar, "Innovative, Cost-Effective Options for Short Span Steel Bridge Design", Other, Non-Academic, National, peer-reviewed/refereed, Accepted. (May 12, 2015).


Barth, K. E. (Author Only), Michaelson, G. K. (Presenter & Author), Oral Presentation, Virginia DOT Headquarters Meeting, Virginia DOT, Richmond VA, “Redundancy Requirements for Steel Truss Bridges”, Other, Non-Academic, State, peer-reviewed/refereed, Invited. (July 22, 2013).


Barth, K. E. (Author Only), Michaelson, G. K. (Presenter & Author), Oral Presentation, Ohio DOT Headquarters Meeting, Ohio DOT, Columbus, OH, "Redundancy Requirements for Steel Truss Bridges", Other, Non-Academic, State, peer-reviewed/refereed, Invited. (August 17, 2012).


Directed Student Learning and Research


Petrie, W., Research, Master's Comprehensive Project Committee Member, Engineering Department, TE, 699, 3 credit hours, "A Feasibility Study of Retro-fitting Green Roofs on an Existing Structure on Marshall University’s Campus", Completed. (January 12, 2015 - May 1, 2015).

Barido, M., Research, Directed Individual/Independent Study, Engineering Department, TE, 699, 3 credit hours,


2) Service

Department

Marshall University Theta Tau Colony, Faculty Advisor, (January 12, 2015 - Present).

Scholarship Committee, Committee Member, (January 7, 2015 - Present).

Search Committee (Mechatronics Position), Committee Member, (November 14, 2014 - Present).


College


University

"Incredibles" Committee, Committee Member (August 29, 2014 - Present).

Community


Cheat Lake Elementary School, Annual Science Fair Judge, Morgantown, WV, USA (October 2011 - October 2013).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Professional Memberships

Engineers Club of Huntington, ECH, Member, Since 1937, ECH has existed as an independent organization in the Huntington, WV area serving professional engineers and scientists in industry, government, education, and private practice. (October 2014 - Present).

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

Awards and Honors

Graduate Research Fellowship, National Science Foundation, (April 2011).
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Dr. Andrew P. Nichols
Rank: Associate Professor

Start Date at Marshall as a Faculty Member: August 17, 2007
Status: Tenured

Highest Degree Earned: Ph.D. Date Degree Received: 2004
Conferring Institution: Purdue University, Lafayette, IN
Area of Degree Specialization: Civil Engineering - Transportation Engineering
Professional Registration/Licensure: Professional Traffic Operations Engineering (PTOE), Professional Engineer (PE)
Field of Registration/Licensure: Completed a six hour exam for individuals with a PE and experience in traffic operations., Licensed Professional Engineer in WV, MD, and SC
Agency: Institute of Transportation Engineers, WV PE Board
Date Obtained, Expiration Date
Obtained: July 22, 2013
Obtained: June 1, 2006

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
<thead>
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<th>% Response</th>
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<tr>
<td>Spring 2015</td>
<td>TE 699</td>
<td>Comprehensive Project</td>
<td>1 100%</td>
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<tr>
<td>Spring 2015</td>
<td>CE 637</td>
<td>Highway Safety Engineering</td>
<td>8 100%</td>
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<tr>
<td>Spring 2015</td>
<td>ENGR 102</td>
<td>Introduction to CAD</td>
<td>22 100%</td>
<td>100</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>CE 342</td>
<td>Transportation Engineering</td>
<td>32 100%</td>
<td>100</td>
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<tr>
<td>Fall 2014</td>
<td>TE 699</td>
<td>Comprehensive Project</td>
<td>1 100%</td>
<td>100</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>TE 699</td>
<td>Comprehensive Project</td>
<td>1 100%</td>
<td>100</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>CE 443</td>
<td>Highway Design</td>
<td>5 100%</td>
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<tr>
<td>Fall 2014</td>
<td>CE 651</td>
<td>SpTp: Highway Engineering</td>
<td>1 100%</td>
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<tr>
<td>Summer 2014</td>
<td>CE 650</td>
<td>SpTp: Roadway Safety Auditing</td>
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<td>Spring 2014</td>
<td>CE 443</td>
<td>Highway Design</td>
<td>8 100%</td>
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</table>
NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

Contracts, Grants and Sponsored Research

Nichols, A. P., Contract, "Intelligent Transportation Systems Management", WVDOT, State, $499,000.00, Funded. (February 1, 2014 - Present).

Nichols, A. P. (Principal), Sponsored Research, "Web-Accessible Crash Database Development", West Virginia Department of Transportation, State, $328,848.00, Funded. (November 1, 2011 - Present).

Nichols, A. P. (Principal), Sponsored Research, "Morgantown Traffic System Improvement Project", West
Virginia Department of Transportation, State, $1,882,096.00, Funded. (November 1, 2010 - Present).

Nichols, A. P. (Principal), Sponsored Research, "Intelligent Transportation Systems in WV", West Virginia Department of Transportation, State, $1,250,000.00, Funded. (November 2007 - Present).


Nichols, A. P. (Principal), Sponsored Research, "Evaluation of the Percent of Overloaded Vehicles Receiving Proper Permits", West Virginia Department of Transportation, State, $160,000.00, Funded. (December 1, 2012 - February 28, 2015).

Nichols, A. P. (Principal), Sponsored Research, "Evaluation of Deer-Vehicle Collision Rates in WV", West Virginia Department of Transportation, State, $125,000.00, Funded. (December 31, 2012 - October 31, 2014).

Nichols, A. P. (Co-Principal), Sponsored Research, "Evaluation of Roundabouts Constructed as Part of the Gateway Connector in Fairmont, WV", West Virginia Department of Transportation, State, $174,955.00, Funded. (December 1, 2010 - August 1, 2013).

Nichols, A. P. (Principal), Sponsored Research, "Signing for Preventing End of Queue Accidents", West Virginia Department of Transportation, State, $180,000.00, Funded. (May 1, 2010 - November 30, 2011).

Nichols, A. P. (Principal), Sponsored Research, "WV 511 Feasibility Study", West Virginia Department of Transportation, State, $224,900.00, Funded. (March 1, 2010 - March 30, 2011).

**Intellectual Contributions**


Nichols, A. P. (in press). GIS Methodology to Map Routes from Truck Permit Database Utilizing Linear


Nichols, A. P. (2014). *Reidentification of Trucks Based on Axle Spacing Measurements to Facilitate Analysis of Weigh-in-Motion Accuracy* 93rd Annual Meeting of the Transportation Research Board.


Presentations


Nichols, A. P. (Panelist), Other, GroupSync Workshop, Rhythm Engineering, Kansas City, MO, "What's next in


Directed Student Learning and Research


Rowe, G., Research, MSE Comprehensive Project Chair, Engineering Department, TE, 699, 3 credit hours, "Overhead Sign Lighting", In-Process. (August 2014 - Present).

Whitt, A., McQuerry, J., Research, Supervised Research, Computer Science Department, "Developing a System to Evaluate Alternative Traffic Detection Technologies", In-Process. (December 1, 2013 - Present).

Yanev, A., Research, Supervised Research, Computer Science Department, "Implementing a Sliding Window Method to Identify Crash Hot Spots", In-Process. (December 1, 2013 - Present).


Barido, M., Research, MSE Comprehensive Project Committee, Engineering Department, TE, 699, 3 credit hours, "Bridge Abutment Investigation", Completed. (August 2014 - December 2014).


2) **Service**

**Department**

West Point Bridge Design Competition, Committee Member, (October 1, 2013 - May 17, 2014).

Structures Faculty Search Committee, Committee Chair, (December 1, 2013 - May 1, 2014).

ASCE Student Chapter Virginia’s Conference, Faculty Advisor, (April 4, 2014 - April 6, 2014).

Faculty Travel Policy, Committee Chair, (September 1, 2013 - November 30, 2013).

Structures Faculty Search Committee, Committee Member, (October 1, 2012 - May 15, 2013).

West Point Bridge Design Competition, Committee Member, (October 1, 2012 - May 15, 2013).

Engineering Chair Search Committee, Committee Member, (December 1, 2012 - May 1, 2013).

ASCE Student Chapter Virginia’s Conference, Faculty Advisor, (April 4, 2013 - April 6, 2013).

Clay Center Engineering Day, Faculty Advisor, (February 1, 2013 - February 25, 2013).

West Point Bridge Design Competition, Committee Member, (October 1, 2011 - May 15, 2012).

Mechanical Engineering Faculty Search, Committee Member, (September 1, 2011 - April 30, 2012).

ASCE Student Chapter Virginia’s Conference, Faculty Advisor, (March 29, 2012 - March 31, 2012).

Pi Day Student Chapter Fundraiser, Target, (March 14, 2012).


West Point Bridge Design Competition, Committee Member, (January 1, 2011 - May 15, 2011).


**College**

Personnel Committee, Committee Member (August 2014 - Present).

CITE Website Committee, Committee Member (February 1, 2013 - Present).

CITE Curriculum Committee, Committee Chair (January 1, 2011 - Present).

AEC Building Space Committee, Committee Member (December 2014 - May 2015).

Dean Search Committee, Committee Member (September 2, 2012 - April 30, 2013).

Lab Technician Search Committee, Committee Member (April 1, 2012 - June 30, 2012).

University

Faculty Senate, Committee Member (August 2014 - Present).

Honors College Curriculum and Policies Committee, Committee Member (August 2014 - Present).

Reynolds Outstanding Teaching Award, Committee Member (August 2014 - Present).

University Curriculum Committee, Committee Member (January 1, 2011 - Present).

December Commencement, CITE Marshall (December 14, 2014).

Distinguished Artists and Scientists Award (DASA), Committee Member (January 2014 - April 2014).

Marshall University Campus Master Plan, Attendee, Meeting (December 1, 2012 - March 30, 2013).

Professional

WV Autonomous Vehicle Task Group, Committee Member, Charleston, WV, USA (October 2014 - Present).

Governor's Blue Ribbon Commission on Highways, Member, Charleston, WV, USA (September 1, 2012 - Present).

Transportation Research Board Conference and Journal, Reviewer, Conference Paper (August 1, 2012 - Present).


North American Travel Monitoring Exhibition and Conference Organizing Committee, Committee Member, Miami, FL, USA (November 2014 - May 2016).

Council of University Transportation Centers Student Award Reviewer, Reviewer, Ad Hoc Reviewer, Washington, DC, USA (November 1, 2013 - November 30, 2013).

Expert Task Group on LTPP Traffic Data, Member, Washington, DC, USA (March 2010 - April 2013).

Council of University Transportation Centers Student Award Reviewer, Reviewer, Ad Hoc Reviewer, Washington, DC, USA (November 1, 2012 - November 30, 2012).

Community

KYOVA Technical Advisory Committee, Member, Huntington, WV, USA (January 1, 2012 - Present).

WV First Lego League, Coach, Huntington, WV, USA (September 1, 2014 - November 13, 2014).

Ohio River Sweep, Attendee, Meeting, Huntington, WV, USA (June 21, 2014).

Hal Greer Boulevard Road Safety Audit, Attendee, Meeting, Huntington, WV, USA (June 10, 2014 - June 11, 2014).

Ohio River Sweep, Attendee, Meeting, Huntington, WV, USA (June 14, 2013).


10th Street Viaduct Cleaning Crew, Volunteer, Huntington, WV, USA (May 18, 2012).

Boy Scouts of America, Pack 14 Cubmaster, Huntington, WV, USA (January 1, 2011 - December 31, 2011).

YMCA Soccer League, Assistant Coach, Huntington, WV, USA (January 1, 2011 - December 31, 2011).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

**Professional Memberships**

Intelligent Transportation Systems America, ITSA. (January 2008 - Present).

Transportation Research Board, TRB, Committee Member, Appointed member of Highway Traffic Monitoring committee (ABJ35), which focuses on research issues related to transportation data collection. (August 2007 - Present).


Institute of Transportation Engineers, ITE. (August 2000 - Present).

American Society of Civil Engineers, ASCE. (August 1999 - Present).

American Society for Testing and Materials, ASTM, Committee Member, Develops standards and specifications for national use. (August 1998 - Present).

**Faculty Development Activities Attended**

Conference Attendance, "WV American Society of Civil Engineers Annual Meeting", ASCE, Wheeling, WV, USA, 6 credit hours. (September 26, 2014 - September 28, 2014).

Workshop, "Ohio Department of Transportation Research Summit", ODOT, Columbus, OH, USA, 6 credit hours. (September 19, 2014).


Workshop, "Transit Crash Investigation 2", FHWA, Tampa, FL, USA, 30 credit hours. (June 23, 2014 - June 27, 2014).

Workshop, "Transit Crash Investigation 1", FHWA, Baltimore, MD, USA, 30 credit hours. (May 19, 2014 - May 23, 2014).

Workshop, "ABET Assessment Workshop", CITE, Huntington, WV, USA, 6 credit hours. (February 8, 2014).


Conference Attendance, "WV American Society of Civil Engineers Annual Meeting", ASCE, Beckley, WV, USA, 6 credit hours. (September 27, 2013 - September 28, 2013).

Conference Attendance, "iPED Teaching Conference", Marshall University, Huntington, WV, USA, 4 credit hours. (August 20, 2013).

Continuing Education Program, "MU Winter Technical Conference", Marshall University ASCE-SAME Student Chapter, Huntington, WV, USA, 6 credit hours. (January 24, 2013).


Conference Attendance, "FHWA Everyday Counts Summit", Federal Highway Administration, Baltimore, MD, USA, 8 credit hours. (October 16, 2012 - October 17, 2012).

Conference Attendance, "West Virginia DOT Transportation Planning Conference", West Virginia Department of Transportation, Shepherdstown, WV, USA, 4 credit hours. (October 2, 2012 - October 3, 2012).

Seminar, "Academic Affairs Summer Retreat", Marshall University, Huntington, WV, USA, 3 credit hours. (August 17, 2012).


Workshop, "GroupSync", Rhythm Engineering, Kansas City, MO, USA, 8 credit hours. (June 13, 2012 - June 15, 2012).

Conference Attendance, "North American Travel Monitoring Exposition and Conference", Transportation Research Board, Dallas, TX, USA, 16 credit hours. (June 4, 2012 - June 6, 2012).

Workshop, "WV Freight Forum", Federal Highway Administration, Morgantown, WV, USA, 4 credit hours. (May 31, 2012).


Workshop, "Roundabout Design", West Virginia Department of Transportation, Charleston, WV, USA, 8 credit hours. (June 15, 2011 - June 16, 2011).


Conference Attendance, "SAME Technical Conference", SAME Student Chapter at Marshall University, Huntington, WV, USA, 8 credit hours. (January 22, 2011).

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

Awards and Honors

Hedrick Outstanding Faculty Award, Marshall University, (December 2014).
Appendix I  
Faculty Data Sheet  
May 15, 2010 - May 15, 2015  

Name: Dr. William Pierson  
Rank: Professor  

Start Date at Marshall as a Faculty Member: January 1, 2000  
Status: Tenured  

Highest Degree Earned: Ph D  
Date Degree Received: 1976  
Conferring Institution: University of Missouri - Rolla, Rolla, Missouri  
Area of Degree Specialization: Electrical Engineering  
Professional Registration/Licensure: Professional Engineer, WV  
Field of Registration/Licensure: Registered Professional Engineer, #6740  
Agency: WV Board of Registration for Professional Engineers  

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<th>% Responded</th>
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NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.

1) Scholarship/Research

Contracts, Grants and Sponsored Research


Pierson, W. (Co-Principal), Grant, "2010 Exploring Engineering: Academy of Excellence", Chesapeake Energy & Rahall Transportation Institute, State, $50,000.00, Funded. (June 20, 2010 - June 26, 2010).

Presentations


2) Service

College

University Assessment Committee, Attendee, Meeting.

University

BSE Search Committees, Committee Member (January 2013 - Present).

Professional

ABET, Alternate to B.O.D. for NCEES (January 2012 - Present).

WV Board of Registration for Prof. Engineers, Officer, Vice President, Charleston, WV (2008 - Present).

NCEES, Member of FE Exam Committee, Clemson, SC (1990 - Present).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Professional Memberships

WV Board of Registration for Professional Engineers, WV PE Board, Vice-Chair, Appointed by Governor Manchin in 2006. The purpose of the Board is to regulate professional engineering licensure and practice in order to protect the health, welfare, and safety of the public. (October 20, 2005 - Present).

National Council of Examiners of Engineering and Surveying, NCEES, Representative to ABET BOD; Chair of FE Exam Committee and EE Subcommittee, NCEES is the publisher of national exams required for licensure as a professional engineer and surveyor. (February 1990 - Present).

National Council of Examiners of Engineering and Surveying, NCEES, Chair of FE Exam Committee and EE
Subcommittee, NCEES is the publisher of national exams required for licensure as a professional engineer and surveyor. (February 1990 - Present).

American Society of Engineering Education, ASEE, Professional organizations for engineering education. (March 1, 1984 - Present).

4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I
Faculty Data Sheet
May 15, 2010 - May 15, 2015

Name: Sarder Sadique
Rank: Assistant Professor

Start Date at Marshall as a Faculty Member: August 17, 2014

Status: Probationary

Highest Degree Earned: Ph D Date Degree Received: 2006

Conferring Institution: National University of Singapore, Singapore

Area of Degree Specialization: Mechanical Engineering- Manufacturing

Professional Registration/Licensure:

Field of Registration /Licensure:

Agency:

Date Obtained, Expiration Date

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (Expand the table as necessary)

<table>
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<th>Term/Year</th>
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NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.
1) Scholarship/Research

**Research Currently in Progress**

Sadique, Sarder E, "Influence of rough surfaces on static frictional characteristics and sliding mechanics", Writing Results, Scholarly.


2) Service

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

**Professional Memberships**


4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

**Awards and Honors**

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. (*Expand the table as necessary*)

<table>
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**NOTE:** Part-time adjunct faculty do not need to fill in the remainder of this document.
1) Scholarship/Research

Contracts, Grants and Sponsored Research

Salem, A. (Co-Principal), Sponsored Research, "A NEW HEATING AND COOLING COGENERATION SYSTEM: INTEGRATION OF FUEL CELLS AND HEAT PUMPS", DOE, Federal, $200,000.00, Currently Under Review. (December 17, 2014 - Present).

Salem, A. (Principal), Grant, "Siemens PLM/ CA Software for Academia USE", Siemens, Private, $134,000,000.00, Funded. (September 15, 2014 - Present).


Salem, A. A. (Principal), Contract, "LNG Cooling Systems", Qatar Gas, Private, $97,000.00, Not Funded. (December 1, 2012 - May 1, 2014).

Research Currently in Progress

Salem, Asad A, "A DESIGN AND PARAMETRIC STUDY OF CANOPY AIR CURTAIN (CAC)", On-Going, Scholarly.


Directed Student Learning and Research

Research, Master's Thesis Committee Chair.

Foudh, K., Research, Master's Thesis Committee Chair. (February 2013 - May 2014).

2) Service

Department

Chair of the Applied Science Search Committee, Committee Chair, (January 1, 2014 - August 15, 2014).

ME Search Committee, Committee Chair, (January 1, 2014 - August 15, 2014).

ME Search Committee, Committee Chair, (November 20, 2013 - December 31, 2013).


College

Assessment Committee, Committee Chair (January 1, 2014 - December 31, 2014).

Assessment Committee, Committee Chair (August 17, 2013 - December 31, 2013).

University

CLA- University Assessment Committee, Faculty Mentor (January 1, 2014 - December 31, 2014).

CLA- University Assessment Committee, Faculty Mentor (September 1, 2013 - December 31, 2013).

3) Professional development activities, including professional organizations to which you belong and
state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

**Professional Memberships**


**Faculty Development Activities Attended**


4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.
Appendix I  
Faculty Data Sheet  
May 15, 2010 - May 15, 2015

Name: Dr. Isaac William Wait        Rank: Associate Professor

Start Date at Marshall as a Faculty Member: January 2, 2009

Status: Tenured

Highest Degree Earned: Ph.D.     Date Degree Received: 2005

Conferring Institution: Purdue University, West Lafayette, IN

Area of Degree Specialization: Civil Engineering, Environmental Engineering

Professional Registration/Licensure: West Virginia License #18909, Professional Engineer, Ohio License #69553, Professional Engineer

Field of Registration/Licensure: State of West Virginia, State of Ohio

Date Obtained, Expiration Date
Obtained: January 1, 2009
Obtained: January 1, 2005

List courses you taught during the final two years of this review. If you participated in a team-taught course, indicate each of them and what percentage of the course you taught. For each course include the year and semester taught (summer through spring), course number, course title and enrollment. *(Expand the table as necessary)*

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<td>Spring 2013</td>
<td>CE 480</td>
<td>SpTp: Watershed Modeling</td>
<td>1</td>
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<tr>
<td>Spring 2013</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>ENGR 318</td>
<td>Fluid Mechanics</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>CE 433</td>
<td>Hydrologic Engineering</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>ENGR 104</td>
<td>The Engineering Profession</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Summer 2012</td>
<td>ENGR 221</td>
<td>Engineering Economy</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>FYS 100</td>
<td>First Year Seminar</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>CE 331</td>
<td>Hydraulic Engineering</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2012</td>
<td>CE 331</td>
<td>Hydraulic Engineering</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2011</td>
<td>ENGR 318</td>
<td>Fluid Mechanics</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2011</td>
<td>CE 433</td>
<td>Hydrologic Engineering</td>
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<tr>
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<td>ENGR 107</td>
<td>Intro to Engineering</td>
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<tr>
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<td>Intro to Engineering</td>
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<tr>
<td>Summer 2011</td>
<td>ENGR 221</td>
<td>Engineering Economy</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>CE 434</td>
<td>Adv Water/Wastewater</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>FYS 100</td>
<td>First Year Seminar</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>CE 331</td>
<td>Hydraulic Engineering</td>
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<td>100%</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>ENVE 616</td>
<td>Principles of Bio Waste Treat</td>
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<td>Fall 2010</td>
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<td>Fluid Mechanics</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>CE 433</td>
<td>Hydrologic Engineering</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>ENGR 107</td>
<td>Intro to Engineering</td>
<td>2</td>
<td>33%</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>ENGR 107</td>
<td>Intro to Engineering</td>
<td>2</td>
<td>33%</td>
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<tr>
<td>Summer 2010</td>
<td>ENGR 221</td>
<td>Engineering Economy</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

NOTE: Part-time adjunct faculty do not need to fill in the remainder of this document.
1) Scholarship/Research

Contracts, Grants and Sponsored Research


Wait, I. W. (Co-Principal), Huffman, J. T. (Co-Principal), Wahjudi, P. (Co-Principal), Wait, I. W. (Principal), Sponsored Research, "Decision support model using remotely sensed data for enhancing green highway infrastructure and stormwater management", Mid-Atlantic Transportation Sustainability Center, Other, $134,960.00, Not Funded. (October 15, 2014).

Wait, I. W. (Supporting), Contract, "WVDEP & CEGAS West Virginia Water Resources Project", West Virginia Department of Environmental Protection, State, $120,000.00, Funded. (July 1, 2012 - June 30, 2014).


Wait, I. W. (Principal), Sponsored Research, "Drinking water price, operational costs, and relationship to utility ownership structure.", Marshall University Faculty Senate, Marshall University, $2,000.00, Funded. (July 1, 2013 - December 31, 2013).

Wait, I. W. (Co-Principal), Wolfe, J. (Co-Principal), Contract, "HUC8 Watershed Modeling - Phase 2 [Not Funded/Pending]", West Virginia Department of Environmental Protection, State, $33,000.00, Not Funded. (2013).

Wait, I. W., Grant, "EPSCoR Mini-Grant Program: Gridded hydrologic analysis of active and reclaimed mining sites for runoff flow and water quality prediction [Not Funded]", West Virginia Higher Education Policy Commission Division of Science & Research, State, $5,000.00, Not Funded. (2013).

Wait, I. W. (Supporting), Hora, M. T. (Principal), Sponsored Research, "Developing an online infrastructure for coordinating large-scale studies of STEM teaching and learning using the Instructional Systems of Practice (ISOP) framework. [Not Funded]", National Science Foundation, Federal, Not Funded. (2013).


Wait, I. W. (Principal), Sponsored Research, "Development and implementation of broadband enabled virtualization of lab and software applications", West Virginia Geological & Economic Survey, State, $52,848.00, Not Funded. (2012).

Wait, I. W. (Principal), Sponsored Research, "Academic Integrity and Student Perception of Faculty Attitudes", Marshall University Faculty Senate, Marshall University, $2,000.00, Funded. (July 1, 2012 - July 30, 2012).

Wait, I. W. (Co-Principal), Sponsored Research, "Analysis of West Virginia Marcellus Shale Water use and Large Quantity Water Users", West Virginia Water Research Institute, State, $87,518.00, Not Funded. (2011).

Wahjudi, P. (Principal), Aluthge, A. (Co-Principal), Wait, I. W. (Co-Principal), Conlon, J. P. (Co-Principal), Gudivada, V. (Co-Principal), Grant, "STEP Type 1A: Advancing STEM Success, Retention and Recruitment in the Tri-state (ASSeRRT)", National Science Foundation, Federal, $1,000,000.00, Not Funded. (August 1, 2011 - December 30, 2011).

**Intellectual Contributions**

Wait, I. W. *Concept inventory for engineering hydrology - development and implementation* Annual Conference & Exposition, American Society of Engineering Education, Seattle, WA.


**Presentations**


Research Currently in Progress

Wait, Isaac W, Armin Eberlein, "Academic Integrity Among Undergraduate Engineering Students - Comparison of International and Domestic Students", Writing Results, Scholarly.


Wait, Isaac W, "Drinking water price, operational costs, and relationship to utility ownership structure.", On-Going, Scholarly.


Wait, Isaac W, Mike, Bradley, "Virtualization of Software and Laboratory Instruction", On-Going, Scholarly.

2) Service

Department

Environmental Search Committee, Committee Chair, (November 2014 - Present).

BSE Scholarship Committee, Committee Member, (August 2013 - Present).

MS Examination Committee - Adam Petrie, Committee Member, (December 9, 2014).

Engineering & Technology Expo, Committee Member, (November 16, 2013).

Mechanical Search Committee, Committee Member, (January 3, 2013 - October 23, 2013).
MS Examination Committee - Darwan Pursoo, Committee Member, (October 16, 2013).

MS Examination Committee - Alexander Neal, Committee Member, (April 26, 2012).

Temporary Faculty Member Search Committee, Committee Member, (October 2011 - December 2011).

Engineers Without Borders, Faculty Advisor, (January 2011 - December 2011).

MS Examination Committee - Dana Moses, Committee Member, (December 14, 2011).

MS Examination Committee - Larry Riggleman, Committee Member, (November 5, 2011 - December 5, 2011).

MS Examination Committee - Jacob Fishel, Committee Member, (April 7, 2011).

College

Personnel Committee (Tenure & Promotion), Committee Member (March 2014 - Present).

Week of Welcome - Freshman Presentation, BSE program representative (August 24, 2012).

Computer Science Camp, Presentation (June 27, 2012).

EFFECTs training workshop, Lead Coordinator (March 2012 - May 2012).

Dean Search Committee, Committee Member (October 2011 - April 2012).

Green and White Day, Showcase Presenter (November 11, 2011).

Presentation to UNI 102, Presenter (October 11, 2011).

Summer Orientation 2011, Faculty Advisor (June 2011 - August 2011).

High School Open House, Speaker (April 2, 2011).

University

Hedrick Outstanding Faculty Member Award Committee, Committee Member (November 2014 - Present).

Multidisciplinary and Interdisciplinary Degree Program Development Committee, Committee Member (March 2014 - Present).

General Education Committee, Committee Member (January 2009 - Present).

General Education Committee, Committee Chair (August 2012 - April 2014).

Peer Orientation and Development (POD), Faculty Mentor (August 2012 - May 2013).

Academic Affairs Leadership Academy, Attendee, Meeting (January 2012 - November 2012).

Pickens-Queen Teaching Award Committee, Committee Chair (August 2011 - August 2012).

Pickens-Queen Teaching Award Committee, Committee Member (October 2010 - August 2012).

FYS Instructor Focus Group, Guest Speaker (April 20, 2012).
iPED Fall Conference, Session Chair (August 16, 2011).

FYS Summer Work Group, Guest Speaker (June 2011).

FYS Instructor Focus Group, Guest Speaker (February 22, 2011).

**Professional**


Desalination and Water Treatment, Reviewer, Journal Article, Hopkinton, MA, USA (August 2011 - Present).

National Council of Examiners for Engineering and Surveying - FE Exam Development Committee, Committee Member, Clemson, South Carolina (November 2010 - Present).

Water Environment Research, Reviewer, Journal Article (September 2010 - Present).

National Science Foundation, Graduate Research Fellowship Committee, Committee Member (November 2013 - January 2014).

NCEES Standard Setting Study, Member, Atlanta, GA, USA (September 14, 2012 - September 16, 2012).


Environmental Engineering Division, ASEE, Reviewer, Conference Paper (January 2012 - February 2012).


American Society of Civil Engineers - Tractive Force Committee, Officer, Secretary, Washington, District of Columbia (August 2008 - July 2011).


**Community**

Stormwater Runoff Reduction - Lattas, Committee Member, Huntington, WV (August 2014 - Present).

Huntington High School - Engineering Academy Advisory Board, Board Member, Huntington, West Virginia (January 2011 - Present).


Huntington Sanitary Board, Facilitated Student Research Project, Huntington, WV, USA (August 2012 - December 2012).
Huntington High School - Engineering Academy Activity, Developed and Administered Learning Activity, Huntington, West Virginia (March 5, 2012 - March 16, 2012).

WV Department of Environmental Protection, Stormwater Workgroup, Committee Member, Charleston, WV, USA (January 2011 - December 2011).

Huntington Sanitary Board, Facilitated Student Research Project, Huntington, WV, USA (August 1, 2011 - December 5, 2011).

Discover the Real WV Foundation, Guest Speaker, Huntington, WV, USA (June 1, 2011 - June 2, 2011).

3) Professional development activities, including professional organizations to which you belong and state, regional, national, and international conferences attended. List any panels on which you chaired or participated. List any offices you hold in professional organizations.

Professional Memberships

American Society for Engineering Education, ASEE.


Faculty Development Activities Attended


NCEES Fundamentals of Engineering Examination Committee Meeting, NCEES, Clemson, SC. (October 31, 2014 - November 1, 2014).


Antonio, TX, USA. (June 10, 2012 - June 13, 2012).


4) Awards/honors (including invitations to speak in your area of expertise) or special recognition.

**Awards and Honors**

Environmental Engineering Division Early Career Grant, American Society for Engineering Education, (June 2011).
## Appendix II
Students’ Entrance Abilities for Past Five Years of Graduates: Engineering (BSE)

<table>
<thead>
<tr>
<th>Year</th>
<th>$N$</th>
<th>Mean High School GPA</th>
<th>Mean ACT</th>
<th>Mean SAT Verbal</th>
<th>Mean SAT Quantitative</th>
<th>Mean SAT Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>13</td>
<td>3.56</td>
<td>23.6 ($n = 12$)</td>
<td>446.7 ($n = 3$)</td>
<td>520.0 ($n = 3$)</td>
<td>----</td>
</tr>
<tr>
<td>2011-2012</td>
<td>20</td>
<td>3.79</td>
<td>26.2 ($n = 16$)</td>
<td>595.0 ($n = 4$)</td>
<td>587.5 ($n = 4$)</td>
<td>----</td>
</tr>
<tr>
<td>2012-2013</td>
<td>26</td>
<td>3.71</td>
<td>25.3 ($n = 20$)</td>
<td>543.3 ($n = 6$)</td>
<td>581.7 ($n = 6$)</td>
<td>535.0 ($n = 6$)</td>
</tr>
<tr>
<td>2013-2014</td>
<td>20</td>
<td>3.55</td>
<td>25.4 ($n = 16$)</td>
<td>526.3 ($n = 8$)</td>
<td>601.3 ($n = 8$)</td>
<td>524.0 ($n = 8$)</td>
</tr>
<tr>
<td>2014-2015</td>
<td>18</td>
<td>3.58</td>
<td>24.9 ($n = 14$)</td>
<td>473.3 ($n = 6$)</td>
<td>528.3 ($n = 6$)</td>
<td>475.0 ($n = 6$)</td>
</tr>
</tbody>
</table>
Appendix III
Exit Abilities for Past Five Years of Graduates: Engineering (BSE)

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Mean GPA</th>
<th>Licensure Exam Results</th>
<th>Certification Test Results</th>
<th>Other Standardized Exam Results</th>
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</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>13</td>
<td>2.83</td>
<td>----</td>
<td>----</td>
<td>----</td>
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<tr>
<td>2011-2012</td>
<td>20</td>
<td>3.12</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>2012-2013</td>
<td>26</td>
<td>3.16</td>
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<tr>
<td>2013-2014</td>
<td>20</td>
<td>3.23</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>2014-2015</td>
<td>18</td>
<td>3.21</td>
<td>----</td>
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</tbody>
</table>
Appendix IV: Assessment Summary

Assessment Summary

Component Area/Program/Discipline: Bachelor of Science in Engineering (BSE)
A. Student Outcomes

The division implements a continuous improvement process that involves assessing the degree of attainment of the student outcomes. This process involves evaluating the assessment results, identifying improvement needs and opportunities, and recommending actions to be taken. An overview of this process, which is administered by the division faculty, is shown in Figure 1. For this cycle, the assessment process was done annually. In the future, it is planned to conduct two assessments per each ABET accreditation cycle. This continuous improvement process is regular, documented, appropriate, and systematic. A summary of the assessment and evaluation results for student outcomes is provided in the following sections.

It is generally understood that Student Outcomes are the skills, knowledge, attitudes, values, and behaviors that students demonstrate at the time of graduation. The BSE Student Outcomes (SOs), which were approved by the BSE Advisory Board, are:

a) an ability to apply knowledge of mathematics, science, and engineering;
b) an ability to design and conduct experiments, as well as to analyze and interpret data;
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
d) an ability to function on multidisciplinary teams;
e) an ability to identify, formulate, and solve engineering problems;
f) an understanding of professional and ethical 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 the need for, and an ability to engage in life-long learning;
j) a knowledge of contemporary issues;
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
**Student Outcomes assessment process:**
Data collected are analyzed and interpreted for continuous improvement. Assessment is based on:
- **Direct sources of information:**
  - Students’ performance in coursework
  - Assessment results of senior design projects
  - Focus Groups
  - Faculty course assessment reports
  - FE exam
- **Indirect sources of information:**
  - Faculty
  - Student self-assessment
  - Extra-Curricular Activities
  - Senior exit surveys
  - Alumni surveys
  - Program advisory board feedback

---

**Figure 1. Assessment and Continuous Improvement Process**
1. Assessment Processes

A full description of the BSE assessment, evaluation and continuous improvement processes is listed in Appendix E.

The SOs are assessed through a variety of direct and indirect assessment methods. A summary of these are listed in Table 1 and explained below.

<table>
<thead>
<tr>
<th>Direct Assessment Methods (D)</th>
<th>Indirect Assessment Methods (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Exams, Quizzes and select Homework</td>
<td>Focus groups</td>
</tr>
<tr>
<td>Written Lab Reports</td>
<td>Alumni Surveys</td>
</tr>
<tr>
<td>FE exam results</td>
<td>Graduate school placement rates</td>
</tr>
<tr>
<td>Written student self-reflection on what they have learned</td>
<td>Number of students taking FE exam</td>
</tr>
<tr>
<td>Focus groups evaluating student work</td>
<td>Participation in professional organizations and competitions</td>
</tr>
<tr>
<td>Evaluation of a performance or oral presentation</td>
<td>Senior exit survey</td>
</tr>
<tr>
<td>Capstone and Project Reports</td>
<td>CLO self-assessment survey</td>
</tr>
</tbody>
</table>

**Course-based Assessment (Direct and Indirect)**

Faculty members prepare exams, assignments, projects, and other course evaluation tools that address the Course Learning Objectives (CLOs). Some of the CLOs are mapped to related SOs to facilitate the assessment of SOs using direct methods. In order to map the CLOs and SOs, Performance Indicators (PIs) and Performance Learning Levels (PLLs) were defined that indicate the specific things that the students must do to demonstrate they have achieved the SO.

The PIs for each SO were divided into three Performance Learning Levels (PLLs) to reflect the depth of learning. These PLLs are defined as:

- **Level 1: Introductory.** The introductory level resembles the “Knowledge” level in Bloom’s taxonomy. Learning activities associated with the SO must be a required part of the course, but there is no minimum performance requirement for the students to meet. To assess student achievement of introductory level with respect to a SO, the instructor must document that all students have been exposed to information related to the SO.

- **Level 2: Milestone.** The milestone level resembles the “Comprehension and Application” levels in Bloom’s taxonomy. Learning activities related to the SO must be a required part of the course, and there must also be clearly defined assessment activities with clearly defined minimum performance requirements that the students must meet to demonstrate ability with respect to the SO. The achievement of this level can be demonstrated by defining an acceptable level of performance on an appropriate assessment activity and directly assessing whether or not each student meets or exceeds that level of performance.

- **Level 3: Capstone.** The capstone level resembles the “Analysis, Synthesis, and Evaluation” levels in Bloom’s taxonomy. Learning activities related to the SO must be a required part of the course, there must be assessment activities with clearly defined minimum performance requirements that the students must meet to demonstrate both ability and understanding, there must be significant formative feedback given to the students on the learning activities and/or assessment activities, and there must be some required reflection to force the students to synthesize and process information related to the outcome.
Various courses throughout the BSE curriculum provide coverage of one or more of the SOs. PLL 1 and 2 are only used for diagnostics purposes in the assessment process. All assessment data and evaluations reported in this self-study are related to PLL 3. Table 4.2 lists the required courses in the BSE program in which PLL 3 is used to assess each SO. When additional areas of emphasis are added, the CE courses will be replaced with equivalent courses from that emphasis. Table 4.34.3 lists the PIs that are used to assess each of the SOs in those courses with PLL 3.

Achievement of the SOs in these courses is primarily based on student scores on a tool (e.g., exam problem or homework problem) or a rubric specifically developed for SO assessment. New or existing rubrics were developed, modified or tailored to help faculty and students to better assess and understand the goal of each assignments or tasks. To assess student work, the rubric, usually includes the following components:

- One or more traits that function as the basis for assessment
- A scale or value to grade each trait
- Definitions and examples to explain the meaning of each trait

Faculty members report the results of the CLO and SO assessment in each course using the Faculty Course Assessment Report (FCAR), which includes a methodology to write assessment reports in a standardized format that is conducive for use in both course and program outcomes assessment. The FCAR also includes the students’ self-assessment of the CLOs. Students are asked to rate how well they feel they have achieved the course outcomes based on a qualitative scale.

### Table 4.2 Mapping of BSE Courses with Student Outcomes and Performance Learning Levels

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Course Number</th>
<th>Performance Learning Levels (PLL)</th>
<th>Assessment Frequency and Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENGR 201</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(a)</td>
<td>ENGR 216</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(b)</td>
<td>ENGR 219</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(c)</td>
<td>ENGR 319</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(d)</td>
<td>CE 312</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(e)</td>
<td>CE 432</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(f)</td>
<td>ENGR 451</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(g)</td>
<td>ENGR 452</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(h)</td>
<td>ENGR 453</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(i)</td>
<td></td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(j)</td>
<td></td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>(k)</td>
<td></td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Performance Indicators</td>
<td>Course</td>
<td>Relationship to Course Learning Objectives</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------</td>
<td>--------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>(a)</strong></td>
<td>an ability to apply knowledge of mathematics, science, and engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The student must do the following: Complete an assignment that requires the selection and application of the appropriate engineering principles.</td>
<td>ENGR 216</td>
<td>Analyze stress and strain: stress-strain curve, solution of stress/strain problems using Mohr’s Circle to, thin-walled pressure vessels. Apply statics, equations of stress-strain and compatibility condition in the solution of determinate and indeterminate axially loaded members, and problems involving torsion. Apply statics and stress formula in the solution of normal and shear stresses in beams. Apply integration and the moment-area methods in the solution of beam deflections. Determine critical buckling stress for long column using Euler’s equation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENGR 219</td>
<td>Analyze the three mechanisms of heat transfer: conduction, convection, and radiation. Apply equations of state in the solution of moving boundary work. Apply first and second law of thermodynamics to basics power cycles. Determine energy conversion efficiencies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE 312</td>
<td>Analyze reactions and internal forces of determinate beams/frames and trusses. Apply integration and conjugate beam method in the solution of beam deflections. Apply the virtual work method in the solution of beam/frame and truss deflections. Apply ASCE 7 code in the determination of live and dead loads on structures. Introduce SAE2000 program to model beams and truss. Determine influence lines for beams and trusses. Apply force method and displacement method in the solution of indeterminate of structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CE 432</td>
<td>Calculate head loss through a granular media filter using the Kozeny Equation. Apply first order kinetics to the disinfection of bacteria by chlorine application. Calculate the required surface area and depth of a waste stabilization pond using appropriate design factors.</td>
</tr>
<tr>
<td><strong>(b)</strong></td>
<td>an ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                 | The student must do either of the following:  
• Design an experiment to determine the solution to a given problem, or:  
• Apply the results of an experiment to a practical situation not directly related to the initial problem | ENGR 201 | Given a circuit schematic, students will construct the circuit using a breadboard or a circuit simulation system such as MultiSim. Students measure key circuit parameters such as resistance, voltage, current, power, and frequency using test instruments such as digital multimeters, wattmeters, and oscilloscopes. Students will compare experimental data to theoretical data. Students will explain observed differences between experimental and theoretical results. |
<p>|                 | | ENGR 319 | Develop and describe an experimental procedure and instructions on how to collect data for this experiment. Prepare a tabular summary of data and calculations performed, including a description of equations used in computing table entries. Identify, quantify, and comment on the significance of trends illustrated by the experimental results. |
|                 | | CE 432 | Conduct the coagulation dosages and filtration labs collecting all appropriate data as outlined in the given procedure. Analyze the collected data and present the results in a suitable written format. Apply these results to the design of a filtration system to treat the Ohio River water to drinking water quality. |</p>
<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Performance Indicators</th>
<th>Course</th>
<th>Relationship to Course Learning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
<td><em>The student must do all of the following:</em> Complete a design without clearly defined objectives and standards. Select the appropriate analysis techniques to complete the design, Evaluate the non-technical issues in the design process. Consider alternatives in the design process and select the best alternative. Present a design in a professional manner.</td>
<td>CE 432</td>
<td>Use appropriate standards to design a coagulation/flocculation/sedimentation process to treat Ohio River water as part of a potable water treatment system. Consider alternatives such as a solids contact unit as well as traditional separate processes. Present the results in an appropriate written format.</td>
</tr>
<tr>
<td>(d) an ability to function on multidisciplinary teams</td>
<td><em>The student must do all of the following:</em> Complete and present a major design project as a team, where each team member is responsible for a different aspect of the project. Evaluate their own performance and the performance of their team members.</td>
<td>ENGR 451</td>
<td>Collaborate with other class members to complete an economic feasibility analyses for a construction project.</td>
</tr>
<tr>
<td>(e) an ability to identify, formulate, and</td>
<td><em>The student must do all of the following:</em></td>
<td>ENGR 453</td>
<td>Collaborate with design team members and other design teams to design systems or components of a multisystem or multicomponent project. Exchange information between design teams to facilitate the design a project. Evaluate the performance of team members’ work ethic, work quality, contribution, participation, and cooperation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>use appropriate standards to design a coagulation/flocculation/sedimentation process to treat Ohio River water as part of a potable water treatment system. Consider alternatives such as a solids contact unit as well as traditional separate processes. Present the results in an appropriate written format.</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Performance Indicators</td>
<td>Course</td>
<td>Relationship to Course Learning Objectives</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>solve engineering problems</td>
<td>Identify an engineering problem with limited given data</td>
<td>ENGR 453</td>
<td>Determine the systems or components that are need for a real world project. Select the appropriate analysis/design technique to complete the design of systems or components. Optimize the design systems or components with real world constraints.</td>
</tr>
<tr>
<td>(f) an understanding of professional and ethical responsibility</td>
<td>The student must do the following: Complete a case study dealing with ethics where appropriate resolutions must be identified.</td>
<td>ENGR 452</td>
<td>Complete assigned tasks in a timely fashion Present work in a clear, clean, precise manner Behave in an appropriate manner in professional contexts. Recognize an ethical dilemma Identify those impacted by the dilemma Discuss the consequences of alternatives for resolution Develop an appropriate resolution Apply engineering codes of ethics to practical situations</td>
</tr>
<tr>
<td>(g) an ability to communicate effectively</td>
<td>The student must do either of the following: Writing – Complete a writing intensive assignment on an open-ended topic that meets established criteria (e.g., a research paper) Verbal – Give a project-related presentation in front of an audience and respond to questions posed by the audience.</td>
<td>ENGR 451</td>
<td>Prepare a professional report that include illustrations and tabular data Prepare and present an oral presentation that includes power point presentation Demonstrate effective written communication skills – Organization, content, grammar, appearance, and format Demonstrate effective oral presentation skills – Organization, content, multi-media, body language, appearance, and delivery</td>
</tr>
<tr>
<td>(h) the broad education</td>
<td>The student must do the following:</td>
<td>ENGR 453</td>
<td>Present final design recommendations in a professional written design report. Present design issues and recommendations in a professional oral presentation. Complete a writing assignment from an assigned review of a case study that has global implications and respond to specific questions addressing when and how engineering designs have global consequences</td>
</tr>
<tr>
<td>Student Outcome</td>
<td>Performance Indicators</td>
<td>Course</td>
<td>Relationship to Course Learning Objectives</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------</td>
<td>--------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</td>
<td>Complete an assignment or project where the student must discuss the impacts of their solution related to these items.</td>
<td>ENGR 453</td>
<td>Complete a written assignment that demonstrates an understanding of the environmental, economic, societal, or global impact that may arise from a system or component that they are designing.</td>
</tr>
<tr>
<td>(i) a recognition of the need for, and an ability to engage in life-long learning</td>
<td>The student must do either of the following: Participate in a life-long learning activity off campus (e.g., attend a meeting of a local engineering society where a technical presentation is given) Ability to apply course concepts in an independent manner</td>
<td>CE 432</td>
<td>Attend a technical meeting such as a Huntington Post SAME meeting or WVU Tech’s Fall ASCE Technical Conference and write an essay addressing this question: How does attendance and participation in a conference/meeting such as this facilitate the life-long learning of engineers? As an alternative to attendance at a professional meeting, write a one to two page document addressing these three topics: (a) Define life-long learning (b) Explain the importance of life-long learning for engineers. (c) Give at least three detailed examples of how engineers have participated in life-long learning during their careers. An example of this would be engineers who are in their 50’s and 60’s who went to college when the main instrument available for performing engineering calculations was the slide rule.</td>
</tr>
<tr>
<td>(j) a knowledge of contemporary issues</td>
<td>The student must do the following: Write an opinion paper on a contemporary issue that is controversial and defend that position.</td>
<td>ENGR 452</td>
<td>Independently determine and obtain the necessary information to design systems or components of a project. Attend a professional engineering society meeting where a technical presentation is given. Learn a new engineering skill, new design code/standard/manual or new computer software required for the analysis or design of a project. Research and write an opinion paper on a controversial contemporary issue defending your position.</td>
</tr>
<tr>
<td>(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice</td>
<td>The student must do all of the following: Use of a modern engineering tool for analysis Use of a modern engineering tool for data collection Use of a modern engineering tool for design.</td>
<td>CE 432</td>
<td>Conduct the coagulation dosages and filtration labs collecting all appropriate data as outlined in the given procedure Analyze the collected data and present the results in a suitable written format Apply these results to the design of a filtration system to treat the Ohio River water to drinking water quality As part of this process, use an Excel spreadsheet or other software in the analysis and/or design portion of the project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENGR 453</td>
<td>Use modern software or hardware to analysis or design systems or components of a project. Examples include: Excel (high level), CAD, project management, finite element programs.</td>
</tr>
</tbody>
</table>
Senior Exit Survey (Indirect)
Upon completing the graduation requirements, each graduate is asked to complete a survey (see Appendix F-1). This survey collects the student evaluation of their experience throughout the program from beginning to end. Based on the students’ qualitative feedback, attainments to the student outcomes are calculated.

FE Exam (Direct)
Data from the FE exam is used to assess multiple SOs and is readily available from NCEES.

Focus Groups (Direct)
Every year a focus group of local Professional Engineers is assembled to review and evaluate samples of student work in ENGR 453 Senior Projects (See Appendix F-4).

Student extracurricular activities such as active participation in relevant engineering professional organizations such as American Society of Civil Engineers (ASCE) and Society of American Military Engineers (SAME) and their sponsored engineering competitions such as concrete canoe and steel bridge can contribute greatly to Student Outcomes (h), (i) and (j). Participating in such activities can increase the student’s knowledge of contemporary engineering issues, and it can educate, prepare, and make students aware of the impact of engineering solutions in a global, economic, environmental and societal context. It also can facilitate, engage, and provide students with life-long learning activities. Taking the FE exam is a strong indicator of the student’s readiness and understanding of the importance of becoming a professional engineer (PE). Pursing a graduate degree is also a strong indicator the of the student’s readiness for life-long learning.

2. Assessment Frequency
Most of the courses taught in the BSE program are offered once per academic year. The student work to be assessed is collected each time that particular course is offered. At the beginning of each semester, the BSE faculty meet to go over what items need to be collected and assessed that semester. The faculty member responsible for the course then collects and assesses that work. At the end of each semester, the faculty spend a work day (assessment day) evaluating the results, and deciding on any continuous improvement steps necessary.

Currently, student outcomes are assessed annually. Starting Fall 2015 the student outcomes will be assessed twice in each ABET six-year accreditation cycle. The assessment process will take place in the third year of the accreditation cycle, whereas the evaluation process takes place in the midterm break that follows the assessment process. Exit surveys are collected annually from graduating students. Alumni and Employer surveys will collected every three years.

For this cycle, the assessment process was completed in Fall 2013, Spring 2014, Fall 2014 and Spring 2015, whereas the evaluation process was done in the inter-semester break in the following semesters. The Alumni Surveys were completed in during summer of 2012. The next Alumni Survey is scheduled during 2015-16 academic year.

To assess the extent to which each of SOs is being met, direct and indirect assessment tools are used. These tools are listed in Table 1.
3. Expected Level of Attainment

Table 4.4 Performance Targets for Student Outcomes by Tool

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>Assessment Tool</th>
<th>Performance Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>a, b, c, d, e, f, g, h, i, j, &amp; k</td>
<td>Exams, Quizzes, Reports &amp; Others</td>
<td>At least 70% of students evaluated will demonstrate Competent performance (3 or higher on a 4-point scale)</td>
</tr>
<tr>
<td>a, b, c, e, f &amp; k</td>
<td>FE Exam</td>
<td>MU BSE graduates shall perform at or above the national average</td>
</tr>
<tr>
<td>f &amp; j</td>
<td>Students Surveys, Professional Organizations Participation, Competitions and Memberships &amp;others</td>
<td>25% of MU BSE students become members or participate in professional organizations activities</td>
</tr>
<tr>
<td>i</td>
<td>FE Exam &amp; Student Surveys</td>
<td>50% of MU BSE graduates take FE exam</td>
</tr>
</tbody>
</table>

4. Summary of Evaluation Process Results

Sample Assessment
A sample of the assessment for SO (j) is shown in Table 4.5. Note that the evaluation form is made up of two sections: a matrix to relate the student’s response on specific assessment tools to the overall course outcomes, and a report that analyzes the results from the matrix as well as the students’ responses on the outcome survey.

Table 4.5 Assessment and Evaluations of Student Outcome (j).

Student Outcome (j): A Knowledge of Contemporary Issues

Course: ENGR 452- Senior Engineering Seminar- Fall 2013

Level 3- Capstone:

Performance Indicated by:
*Research and write an opinion paper on a controversial contemporary issue defending your position.*

Performance Target: At least 70% of students evaluated will demonstrate competent Performance.

In order to assess Student Outcome (j) for our Engineering Program we developed several tools. These tools will allow us to gather information about student knowledge of contemporary issues, as well as serve as means for improving student knowledge in this area.

Written Assignment.
The purpose of the Written Assignment is to educate students further in contemporary issues relevant to engineers. For this assignment students will be asked to independently research topics that can be considered contemporary issues for engineers. The students were assigned to write an opinion paper on a contemporary issue that is controversial and defend that position. During Fall of 2013 (ENGR 452 — Senior Engineering Seminar), the students were given the following written assignment:

Identify a controversial contemporary issue and examine it by explaining the causes that contributed to its existence. Propose and evaluate solutions to this issue and present the impact of these solutions into society, economy, and environment.

**Class Discussions.**

This assignment also serves the purpose of increasing student knowledge of contemporary issues, through learning from peers, and discussing various points of view on the same issue. Students will each be given about five minutes to present the topic they chose for their Written Assignment to the class. In five minutes students will have to present the topic, answer questions from classmates, and debate their point of view.

**Rubric.**

The rubric will be used to evaluate students’ answers to the Two-Question Survey, the Written Assignment, and the oral Class Discussions. The rubric is developed and used by faculty to score students work in items (a) and (b), giving us an objective way to evaluate how well Student Outcome (j) is achieved.

**Student Satisfaction Survey.**

This survey will gather information about students’ impression of the entire contemporary issues assessment. This survey, while not part of the direct assessment itself, is a useful tool for faculty to gather feedback from students on the entire assessment. The feedback can be especially useful the first couple of administrations of the new assessment.

Using the three instruments described above, faculty believe a picture of students’ knowledge of contemporary issues will emerge, together with ways to improve the process in the future.

**Assessment Results and Discussion**

Raw data was collected from:

- the short paper Written Assignment by students on a topic of their choice described above in (a)-(Direct Assessment- Tangible)
  - Class Discussions as described above in (b) (Direct- Observational)
  - Student Satisfaction Survey as described above in (d) (Indirect)
- The data collected from instruments (a), and (b) was scored by faculty using the rubric described in (c). This Rubric is presented in Table 1 below.
- Rubric for assessing Student Outcome (j): Contemporary Issues Assignments.
- The rubric is used to evaluate students: the Written Assignment, and the oral Class Discussions. The rubric is developed and used by faculty to score students work in items (a) and (b), giving us an objective way to evaluate how well Program Outcome (j) is achieved.

**Evaluation of Assessment Data:**

As it is evident in Figures 1, 2, and 3, the Performance Targets were achieved in Outcome (j). Figure 1 shows that a total of 26 students of a total of 28 (93%) achieved competent levels (Outstanding or Satisfactory), while only two students were marginal in the written assignment. However, Figure 2 shows, that 24 students have achieved competent levels (85%) in the class discussions. Figure 3 shows the students achievement level based on self-assessment in Outcome (j). It is evident that All Performance Targets in three assessment methods were 70% or higher.

Table 1: Rubric for Assessing Outcome (j): Contemporary Issues Assignments
### Table: Knowledge of Contemporary Issues

<table>
<thead>
<tr>
<th>Outcome (j): Knowledge of Contemporary Issues</th>
<th>4- Outstanding</th>
<th>3- Satisfactory</th>
<th>2-Marginal</th>
<th>1- Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Assignment</td>
<td>Source written with Audience in no errors in spelling or grammar</td>
<td>One item from Very Good not included</td>
<td>Two items Very Good criteria not included</td>
<td>No items from Very Good criteria included</td>
</tr>
<tr>
<td>Class Discussions</td>
<td>Clear presentation and explanation of issue, includes source or not within ideal time</td>
<td>Does not include source or not within ideal time</td>
<td>Does not source or not within ideal range, does clearly present the issue</td>
<td>Issue not clearly Presented, source not Mentioned, not within the Time range</td>
</tr>
</tbody>
</table>

Figure 1: Students achievement levels in written assignment

Figure 2: Students achievement levels in Class Discussions

Figure 3: Students Achievement levels –Self Assessment
**ACTION:**
As indicated by the graph above the target is attained. No action is required. Continue to assess and evaluate.

**Direct Assessment Results**
Figure 2 to Figure 11 summarize the assessment of the SOs in the courses through direct assessment (course-based). Compared to our performance target of 70% for each assessment tool, all SOs were attained. Figure 13 summarizes the focus group assessment of ENGR 453 during the Spring 2014 semester. Figure 14 and Figure 40 summarize the results and actions taken for improvement based on the FE exam results (SOs: a, b, c, e, f & k). Note that the FE Exam format and reporting changed starting 2014. Therefore, Figure 38 and Figure 39 summarize the results for 2014 and Figure 40 summarize the result for 2015.
### Student Outcome: (a)

**MU BSE Target Performance**

(a) An ability to apply knowledge of mathematics, science, and engineering

- **Target Performance:** 70%

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.

**Figure 2. Direct Assessment of Student Outcome (a)**

### Student Outcome: (b)

**MU BSE Target**

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

- **Target Performance:** 70%

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.
### Figure 3. Direct Assessment of Student Outcome (b)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.  
**Action:** Continue to monitor; no action at this time.

### Figure 4. Direct Assessment of Student Outcome (c)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(d) An ability to function on multidisciplinary teams.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.  
**Action:** Continue to monitor; no action at this time.
### Figure 5. Direct Assessment of Student Outcome (d)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e) An ability to identify, formulate, and solve engineering problems.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.

### Figure 6. Direct Assessment of Student Outcome (e)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) An understanding of professional and ethical responsibility.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.
<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(g) An ability to communicate effectively.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.

---

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.
Figure 9. Direct Assessment of Student Outcome (h)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) A recognition of the need for, and an ability to engage in life-long learning.</td>
<td>70%</td>
</tr>
</tbody>
</table>

Observations: The target is attained.

Action: Continue to monitor; no action at this time.

Figure 10. Direct Assessment of Student Outcome (i)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(j) A knowledge of contemporary issues.</td>
<td>70%</td>
</tr>
</tbody>
</table>

Observations: The target is attained.

Action: Continue to monitor; no action at this time.
Figure 11. Direct Assessment of Student Outcome (j)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</td>
<td>70%</td>
</tr>
</tbody>
</table>

Observations: The target is attained.
Action: Continue to monitor; no action at this time.

Figure 12. Direct Assessment of Student Outcome (k)

<table>
<thead>
<tr>
<th>Student Outcome</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus Group</td>
<td>70%</td>
</tr>
</tbody>
</table>

Observations: The target is attained.
Action: Continue to monitor; no action at this time.
Figure 13. Focus Group Assessment of Student Outcomes in ENGR 453 (Spring 2014)

<table>
<thead>
<tr>
<th>Percent FE Examinees Passing Comparison</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform at or above the national average</td>
<td></td>
</tr>
</tbody>
</table>

![Percent Examinees Passing Chart]

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.

Figure 14. Percent FE Examinees Passing Comparison

<table>
<thead>
<tr>
<th>Percent MU Graduated Students Attempted FE Exam</th>
<th>MU BSE Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

![Percent MU Graduated Students Attempted FE Exam Chart]

**Observations:** The target is attained.

**Action:** Continue to monitor; no action at this time.
Observations: MU student performance appears to be statistically equivalent to national level, but consistently lower.

Action: Continue to monitor; more emphasis will be given to this area during the FE exam reviews. Faculty should explore ways to strengthen performance in this important subject area.

Observations: MU student performance appears to be statistically equivalent to national level, except in Oct 2012.

Action: Continue to monitor; no action at this time.
Figure 17. MU BSE FE AM Performance: Probability and statistics

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

Observations: MU student performance appears to be statistically equivalent to national level of performance.

Action: Continue to monitor; no action at this time

Figure 18. MU BSE FE AM Performance: Chemistry

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
Observations: MU student performance appears to be statistically equivalent to national level of performance.

Action: Continue to monitor; no action at this time.

Figure 19. MU BSE FE AM Performance: Computers

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethics and Business Practice</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

![Graph](image)

Observations: MU student performance appears to be higher than the national level of performance.

Action: Continue to monitor; no action at this time.

Figure 20. MU BSE FE AM Performance: Ethics and Business Practices

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Economics</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
**Observations:** MU student performance appears to be higher than national level, except in 2011.

**Action:** Continue to monitor; no action at this time.

**Figure 21. MU BSE FE AM Performance: Engineering Economics**

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Mechanics: Statics</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations:** MU student performance appears to be statistically equivalent to national level. Relative to the national average there seems of having improvement from year to year.

**Action:** Continue to monitor and emphasize subject during FE review. BSE faculty should explore ways to strengthen performance in this important subject area.

**Figure 22. MU BSE FE AM Performance: Engineering Mechanics (Statics)**

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
</table>
**Engineering Mechanics: Dynamics**

At or above the national average

**Observations**: MU student performance appears to be statistically equivalent to national level, but consistently lower. There seems to have been improvement relative to the national average in 2013.

**Action**: Continue to monitor and emphasize during FE reviews.

*Figure 23. MU BSE FE AM Performance: Engineering Mechanics (Dynamics)*

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength of Materials</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations**: MU student performance appears to be statistically equal or above the national level of performance except in 2011.

**Action**: Continue to monitor; no action at this time.

*Figure 24. MU BSE FE AM Performance: Strength of Materials*
<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Properties</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Figure 25. MU BSE FE AM Performance: Material Properties**

**Observations:** MU student performance appears to be statistically equivalent to national level of performance.

**Action:** Continue to monitor; no action at this time.

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid Mechanics</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Figure 25. MU BSE FE AM Performance: Fluid Mechanics**

**Observations:** MU student performance appears to be statistically equivalent to or higher than the national level of performance.

**Action:** Continue to monitor; no action at this time.
Figure 26. MU BSE FE AM Performance: Fluid Mechanics

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity and Magnetism</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations**: MU student performance appears to be statistically equivalent to national level of performance.

**Action**: Continue to monitor; no action at this time.

Figure 27. MU BSE FE AM Performance: Electricity and Magnetism

<table>
<thead>
<tr>
<th>FE AM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermodynamics</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations**: MU student performance appears to be statistically equivalent higher than national level, except in 2011.
**Action**: Continue to monitor; no action at this time.

**Figure 28. MU BSE FE AM Performance: Thermodynamics**

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveying</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FE Comparison: Surveying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr-11 Oct-11 Apr-12 Oct-12 Apr-13 Oct-13</td>
</tr>
</tbody>
</table>

**Observations**: MU student performance shows improvement in 2013 relative to national level of performance.

**Action**: Continue to monitor; no action at this time.

**Figure 29. MU BSE FE PM Performance: Surveying**

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulics &amp; Hydrologic Systems</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FE Comparison: Hydraulics &amp; Hydrologic Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr-11 Oct-11 Apr-12 Oct-12 Apr-13 Oct-13</td>
</tr>
</tbody>
</table>
Observations: MU student performance appears to be statistically equivalent to national level of performance.

Action: Continue to monitor; no action at this time.

Figure 30. MU BSE FE PM Performance: Hydraulics and Hydrologic Systems

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Mechanics &amp; Foundations</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

Observations: MU student performance appears to be statistically equivalent to national level of performance.

Action: Continue to monitor; no action at this time

Figure 31. MU BSE FE PM Performance: Soil Mechanics and Foundations

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Engineering</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
**Observations:** MU student performance appears to be statistically equivalent to national level of performance.

**Action:** Continue to monitor; no action at this time.

**Figure 32. MU BSE FE PM Performance: Environmental Engineering**

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Figure 33. MU BSE FE PM Performance: Transportation**

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Analysis</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
**Observations:** MU student performance appears to be statistically equivalent to national level of performance.

**Action:** Continue to monitor; no action at this time.

*Figure 34. MU BSE FE PM Performance: Structural Analysis*

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Design</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations:** MU student performance appears to be statistically equivalent to or above the national level of performance.

**Action:** Continue to monitor; no action at this time

*Figure 35. MU BSE FE PM Performance: Structural Design*

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Management</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
Observations: MU student performance appears to have improved significantly relative to national level. This improvement is likely due to the addition of a required project management course that focuses on construction management topics.

Action: Continue to monitor; no action at this time.

Figure 36. MU BSE FE PM Performance: Construction Management

<table>
<thead>
<tr>
<th>FE PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering Materials</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

Observations: MU student performance appears to be statistically equivalent to or above the national level of performance.

Action: Continue to monitor; no action at this time.

Figure 37. MU BSE FE PM Performance: Civil Engineering Materials

<table>
<thead>
<tr>
<th>FE AM and PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>
Observations: MU student performance appears to be statistically equivalent to the national level of performance.

Action: Continue to monitor; no action at this time.

Figure 38. MU BSE FE PM Performance: Fall 2014 (New Exam Format)

<table>
<thead>
<tr>
<th>FE AM and PM Subject Matter Area</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

Observations: MU student performance appears to be statistically equivalent to the national level of performance.

Action: Continue to monitor; no action at this time.

Figure 39. MU BSE FE PM Performance: Spring 2014 (New Exam Format)

Results of the computer based FE exam for first half of 2015 is shown in figure 40.
<table>
<thead>
<tr>
<th>FE Subject Matter Area: Civil Engineering-New Format</th>
<th>MU BSE Target Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>At or above the national average</td>
</tr>
</tbody>
</table>

**Observations:** MU student performance appears to be statistically equivalent to the national level of performance.

**Action:** Continue to monitor; no action at this time.

*Figure 40. MU BSE FE Performance: Spring 2015 (New Exam Format)*
InDirect Assessment Results
In-direct assessment of student outcomes such as Senior Exit and Alumni surveys are listed in appendix F.

Indirect Assessment Results for Student Outcomes (f), (i), and (j)
Table 4.6 presents a summary of BSE student headcount and their participation in various activities that are assessed as part of SO (f), (i), and (j) for each year from 2011-2014. The targets for each activity are also shown, which indicates that all were met based on the 2013-14 academic year. The same data is summarized in Figure 41 for each academic year since 2011-12.

Table 4.6. Summary of Student Extra-Curricular Activities Related to Outcomes (h), (i), & (j)

<table>
<thead>
<tr>
<th>Year</th>
<th>BSE Students</th>
<th>Juniors &amp; Seniors</th>
<th>Seniors</th>
<th>ASCE-SAME Members</th>
<th>ASCE-Steel Bridge Team</th>
<th>ASCE-Concrete Canoe Team</th>
<th>Winter Conference Attendance</th>
<th>Took FE Exam</th>
<th>Admitted to Graduate Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>188</td>
<td>45</td>
<td>20</td>
<td>46</td>
<td>8</td>
<td>26</td>
<td>60</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>2012-13</td>
<td>198</td>
<td>48</td>
<td>25</td>
<td>48</td>
<td>12</td>
<td>15</td>
<td>40</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>2013-14</td>
<td>201</td>
<td>55</td>
<td>28</td>
<td>52</td>
<td>14</td>
<td>15</td>
<td>53</td>
<td>17*</td>
<td>7*</td>
</tr>
</tbody>
</table>

% (13-14) -- -- -- 26% 25%* 27%* 26% 61%* 25%*
Target -- -- -- 25% 15% 15% 25% 50% 10%

* Initial number and are subjected to change
# Ratio of Juniors and Seniors
^ Ratio of only graduating Seniors

Figure 41. Summary of Student Extra-Curricular Activities Related to Outcomes (f), (i) and (j)

In summary; a robust, progressive, agile, multifaceted, and continuous assessment, evaluation, and improvement process was implemented since last ABET accreditation visit. Compared to our targets, all the student outcomes are being attained.
5. Assessment Results Documentation and Maintenance

For documentation purposes, hardcopies of the FCARs for all courses are kept in course files. These reports are also maintained by instructors in an electronic format.

B. Continuous Improvement

The aim of our assessment and continuous improvement efforts is to assure quality and recognize the need for curriculum improvements and modifications. Since the last ABET visit many improvements and modifications were done. Some of these improvements came as a direct result of the continuous assessment and evaluation process, and some came as results of inputs from the BSE program constituencies. The following is a summary of the most significant improvements:

- Bachelor of Science in Engineering Core

  o ENGR 107 Introduction to Engineering divided into 3 courses. ENGR107 Introduction to Engineering (3 HR) was deleted and replaced with three 1-HR courses that cover the same content – ENGR 102- Introduction to CAD, ENGR 103- Freshman Engineering Seminar, and ENGR 104 -The Engineering Profession. The BSE faculty felt that the material in the course could be better taught as 3 independent classes. The separation also facilitated scheduling of sections and allowed more frequent offerings of some sections. For example, all students in ENGR 107 would meet together for the seminar portion of the class, but due to computer lab size limitations, they couldn’t all meet at the same time or location for that lab. This led to confusion among students trying to remember where they needed to show up to class on certain days.

  o Lab moved from CE 331 Hydraulics to ENGR 318 Fluid Mechanics. Fluid mechanics laboratory was previously taught as part of CE 331 Hydraulics, making it a 4 HR course. The faculty felt that this laboratory experience should be part of the core curriculum for all engineering majors to take, not just students in the civil engineering emphasis. Therefore, CE 331 was reduced from 4 HR to 3 HR and ENGR 318 Fluid Mechanics was increased from 3 HR to 4 HR to account for the lab. ABET outcome b (an ability to design and conduct experiments, as well as to analyze and interpret data) is assessed in this lab and moving this to the engineering core will allow its assessment for all emphasis areas.

  o 3 HR ENGR 452 Engineering Practice & Design converted to 1 HR Senior Seminar. ENGR 452 Engineering Practice & Design was a 3 HR course that covered FE exam preparation, development of effective communication skills, and professional responsibility and professional practice. ENGR 451 Project Management was developed as a writing intensive course and added to the curriculum as a required course. Therefore, the effective communication skills aspect is no longer needed in ENGR 452 and justifies the reduction of 1 HR. Since the FE exam will become computerized and available for students to take virtually year-round, it was decided by the faculty to begin offering review sessions outside of class time, which justified the reduction of an additional 1 HR. This results in a 1 HR Senior Seminar course that still covers professional responsibility and professional practice through the use of guest speakers and lectures on these topics. These 2 HR are shifted to the Areas of Emphasis.
ENGR 451 - Project Management:

- Issue: It was noted, during a series of engineering faculty meetings and in Figure 36 of the annual BSE Assessment Report that the average score of Marshall Students on the "Construction Management" section of the FE examination was significantly below the national average, through April 2011. In addition, many - if not most - of the BSE students were being employed in either firms or agencies where knowledge of construction contracts, construction processes and procedures, and related issues are important. Finally, student feedback indicated that they wanted more exposure to critical path method and other scheduling tools, as well as more discussion and practice regarding construction methods and processes. This relates to attainment of several student outcomes, but most prominently (e), (f), (i), and (k).

- Action: The engineering faculty made the decision to offer a special topics class in Construction Management during the spring semester of 2012. Senior students either took the course in addition to ENGR 451 (which was being offered as a "traditional" project management class, by instructors without an engineering or construction background, and open to all CITE majors) or took as a replacement for ENGR 451. In fall 2012, a fairly significant Construction Management module was added to the ENGR 451 class, although a traditional Project Management book was used and there were some students from other degree programs in the class. After the semester ended, CITE's other degree programs decided to offer their own Project Management courses and/or modules, so the ENGR 451 class was changed entirely to a Construction Project Management format in fall 2013, with changes to the book selection and approximately 2/3 of the historical course content. Appropriate changes were made to performance indicators and outcomes in the course.

- Results of action: Beginning with the spring 2012 administration of the FE examination, Marshall Students have scored well above the national average on the Construction Management section of the exam. In addition, average scores in "Ethics and Business Practices" (also covered in the ENGR 451 course) have remained strong and above the national average.

- Future action: No further changes are expected for ENGR 451 in fall 2014. However, faculty will review the action and results, and make a decision regarding whether or not to maintain the revised content structure of ENGR 451 or to create an elective course in Construction Management, similar to the spring 2012 "special topics" offering.

- Create ENGR 319 Fluid Mechanics Lab: The lab was removed from ENGR 318 (4HR) and was given a new designation as ENGR 319. The main reason for this split is to enhance assessment and continuous improvement process of student outcome b. The faculty needed a separate course where CLOs and PIs can be targeted to enhance assessment. In addition to the stated reason, having this course (ENGR 319) will benefit in the following:

  - Scheduling flexibility. Students in numerous occasions have requested to split the lab from the course. Having the fluid mechanics lab as a separate course (i.e., ENGR 319) makes it easier to split students into small groups for the time that they will be spending in lab. This creates the opportunity to give students more flexibility in scheduling their other classes, since there would be a diminished need to block out the same time period for every student in the class. Additionally, there is the option for teaching simultaneous lab sections (i.e., at the same time) with different instructors, which would enable smaller class size and a more hands-on approach to the lab.
- **Assessment.** When the lab is embedded in the lecture, it was typical for a relatively small fraction of the course grade (e.g., 15%) to be assigned to the lab activities. In this approach, the importance of lab was sometimes obscured in the eyes of students, since the grading of any one lab report had a relatively small impact on their overall combined course grade. Having the lab as a completely separate course creates the opportunity for the importance of the lab to be more accurately represented by course grade, since the grade for ENGR 319 will depend entirely on the students’ work on lab assignments and reports. In short, it is hoped that this change will increase student awareness of the relationship between work level and grade outcome for their efforts in the lab.

- **Multiple instructors.** Having the lab (ENGR 319) separate from the lecture (ENGR 318) creates the opportunity for different instructors to be teaching the lecture vs. lab. At Marshall there are two faculty members with an environmental / water resources background, and so having the lecture and lab separated could create the opportunity for a teamed approach where one faculty member focuses on the lab and another focuses on the lecture. Also, at some institutions a tenured / tenure-track faculty member will teach the lecture, and a staff lab instructor or graduate teaching assistant would teach the lecture. With these changes ENGR 318 is (3HR). Both courses are co-req.

  - **ENGR 102 CAD:** was increased to 2 HR from 1 HR. Faculty recommended the changes to reinforce course content.

- **Civil Engineering Area of Emphasis**
  
  - **Increase CE 321 Engineering Materials from 3 HR to 4 HR.** CE 321 Engineering Materials was traditionally taught as two 1-hr lectures and a 3-hr lab each week. The faculty felt that an additional hour of lecture each week was necessary to provide more in-depth coverage of existing topics in the course, particularly civil engineering materials including asphalt and composites. These changes result in a 4 HR course.
  
  - **Increase CE 322 Soil Mechanics from 3 HR to 4 HR.** CE 322 Soil Mechanics was traditionally taught as two 1-hr lectures and a 3-hr lab each week. The faculty felt that an additional hour of lecture each week was necessary to provide more in-depth coverage of existing topics in the course, including slope stability, shallow and deep foundations, and lateral earth pressures. The additional hour would also allow the inclusion of computer software widely used by geotechnical engineers. These changes result in a 4 HR course.

  - **Change in Title of CE 425 from Foundation Design to Foundation Engineering.** CE 425 Foundation Design was a course title that was established during the offering of the WVU Tech BSCE degree on the Marshall University campus. The faculty felt that the course should instead be titled Foundation Engineering to better reflect the materials being covered in the course because the term Engineering is inclusive of both design and the analysis used to arrive at the design. Students can take this course to satisfy the CE design elective or technical.

  - **CE 241 Int. to Geometrics:** was reduced to 3HR from 4 HR due to changes in ENGR 102 CAD. Subjects related CAD was removed from course to avoid duplications.

In addition to the above listed improvements. Faculty are in continuous efforts of fine-tuning the curriculum by adjusting the prerequisites as well as co-requisites for the courses.
SENIOR EXIT INTERVIEW SUMMARY

Spring 2015

Background

As part of the ongoing effort to continuously improve the MU BSE program and the educational experience of the BSE students, an anonymous Senior Exit Survey was conducted during the spring 2015 semester. The participants consisted of all students enrolled in ENGR453 Senior Design, and most of the 19 students in the class completed their MU BSE degrees at the end of the spring semester. Some of the students are scheduled to finish by December, 2015 (10 of 19).

The survey is designed to solicit opinions and perceptions regarding the MU BSE program, with questions broken down into three major categories:

1. General items dealing with the overall educational environment affected by factors such as faculty, staff, facilities, and related issues;
2. Specific questions regarding the level of achievement for each of the eleven (a-k) MU BSE; learning outcomes; and
3. Open-ended statements describing the perceived strengths and weaknesses of the MU BSE program.

This survey will be administered each spring to students enrolled in ENGR453. Survey results will be shared with faculty, staff, and the BSE Advisory Board in order to seek ways to improve the BSE program. Results will also be tracked and compared from year-to-year in order to identify any significant trends — positive or negative — that may develop. In addition, these survey results will be compared with data acquired from other assessment tools to provide a degree of “triangulation”.

Summary of Results: Learning Outcomes

Students perceive that all of the (a) – (k) learning outcomes are being attained.

Detailed Responses: Overall Educational Environment

<table>
<thead>
<tr>
<th>Question 1: While in school, how many terms (summers or semesters) did you work as an Engineering intern?</th>
</tr>
</thead>
</table>

![Term worked](image)
Question 2: How important was your internship experience in preparing you for a career?

![Importance of Internship Chart]

Question 3: Did internship lead to an offer of employment?

![Employment Offer Chart]

Question 4: Did you pass the Fundamentals of Engineering exam?

![FE Exam Results Chart]

Question 5: Does your career path require licensure as a PE?
Question 6: Do you plan to take the PE when eligible?

Question 7: What is your overall level of satisfaction with the level of technical preparation received?

Question 8: What is your overall level of satisfaction with engineering instruction?
<table>
<thead>
<tr>
<th>Question 9:</th>
<th>What is your overall level of satisfaction with non-engineering instruction?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Instruction</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 10:</th>
<th>What is your overall level of satisfaction with grading and fairness of assignment and exams?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Engineering Instruction</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 11:</th>
<th>What is your overall level of satisfaction with engineering faculty (knowledge, accessibility, fairness, etc.)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairness of Grading</td>
<td></td>
</tr>
<tr>
<td>Question 12:</td>
<td>What is your overall level of satisfaction with engineering staff (non-teaching)?</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><img src="image1" alt="Engineering Staff Attributes" /></td>
</tr>
<tr>
<td>Question 13:</td>
<td>What is your overall level of satisfaction with non-engineering (math, science, etc.)?</td>
</tr>
<tr>
<td></td>
<td><img src="image2" alt="Non-Engineering Staff Attributes" /></td>
</tr>
<tr>
<td>Question 14:</td>
<td>What is your overall level of satisfaction with the content of engineering courses?</td>
</tr>
<tr>
<td></td>
<td><img src="image3" alt="Engineering Faculty Attributes" /></td>
</tr>
</tbody>
</table>
Question 15: What is your overall level of satisfaction with the content of non-engineering courses?

Question 16: What is your overall level of satisfaction with engineering laboratories?

Question 17: What is your overall level of satisfaction with textbooks?
<table>
<thead>
<tr>
<th>Question 18:</th>
<th>What is your overall level of satisfaction with academic advising?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="chart1.png" alt="Textbooks graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 19:</th>
<th>What is your overall level of satisfaction with the overall learning environment?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="chart2.png" alt="Advising graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 20:</th>
<th>What is your level of satisfaction with computing facilities?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="chart3.png" alt="Learning Environment graph" /></td>
</tr>
</tbody>
</table>
Question 21: What is your level of satisfaction with library facilities?

Question 22: What is your overall level of satisfaction with student organizations (SAME, ASCE, etc.?)

Question 23: Would you recommend the Marshall BSE program to others?
Outcome a: MU BE graduates shall have an ability to apply knowledge of mathematics, science, and engineering.

Outcome b: MU BE graduates shall have an ability to design and conduct experiments, as well as to analyze and interpret data.

Outcome c: MU BE graduates shall have an ability to design a system, component, or process to meet desired needs.
Outcome d: MU BE graduates shall have an ability to function on multidisciplinary teams.

Outcome e: MU BE graduates shall have an ability to identify, formulate, and solve engineering problems.

Outcome f: MU BE graduates shall have an understanding of professional and ethical responsibility.
Question g: MU BE graduates shall have an ability to communicate effectively.

Question h: MU BE graduates shall have the broad education necessary to understand the impact of engineering solutions.

Question i: MU BE graduates shall have a recognition of the need for, and an ability to engage in life-long learning.
MU BE graduates shall have a knowledge of contemporary issues.

MU BE graduates shall have an ability to use the techniques, skills, and modern engineering tools.

F-2: ALUMNI SURVEY SUMMARY
Summer 2012

Background:
The first scheduled administration of alumni was administered in summer 2012, and a next is scheduled for summer of 2015. The alumni survey results are encouraging. Over 70% (42) of the alumni responded, and the highlights of the survey results are provided below.

**Assessment Detail: Alumni Survey Results**

A survey of MU BSE graduates from years 2008 – 2012 was administered during the summer of 2012. In total, 34 of the 58 graduates responded for a 59% response rate. A summary of the results is provided below.

**Demographic and General Information**

*FE Passage Rate*

- 97% of the respondents have taken this voluntary exam
- 82% of the respondents have passed the exam, a key step in becoming a registered professional engineer.

*State of Residence*

*Year Degree Granted*
Employment Status

Type of Employment

Length of Employment

Relationship of Position to Degree
Professional Affiliations and Continuing Education
Satisfaction, Strengths, and Areas for Improvement

Satisfaction with MU BSE Degree
(All but one of the 24 respondents indicated satisfaction)

**Effort Required to Progress in Career**

**Would Recommend MU BSE Degree to Others**

Program Strengths
Suggestions for Improvement

- Faculty: 22
- Small Classes: 12
- Curriculum: 6

Variety of Electives: 8
More Engineering Software: 6
More Real-World Applications: 8
Co-op: 2
# Appendix V

## Program Course Enrollment: Engineering (BSE)

<table>
<thead>
<tr>
<th>CRSE</th>
<th>TITLE</th>
<th>Camp</th>
<th>Case Type</th>
<th>Su10</th>
<th>Fa10</th>
<th>Sp11</th>
<th>Su11</th>
<th>Fe11</th>
<th>Sp12</th>
<th>Su12</th>
<th>Fe12</th>
<th>Sp13</th>
<th>Su13</th>
<th>Fe13</th>
<th>Sp14</th>
<th>Su14</th>
<th>Fe14</th>
<th>Sp15</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR</td>
<td>102</td>
<td>Introduction to CAD</td>
<td>Huntington</td>
<td>None</td>
<td>67</td>
<td>95</td>
<td>76</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGR</td>
<td>103</td>
<td>Freshman Engineering Seminar</td>
<td>Huntington</td>
<td>None</td>
<td>68</td>
<td>23</td>
<td>68</td>
<td>111</td>
<td>12</td>
<td></td>
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<td></td>
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### Appendix VI
#### Program Enrollment: Engineering (BSE)

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Figure 1. Trend Line for Total Enrollment and Program Graduates: Engineering (BSE)
Appendix VII
Job and Graduate School Placement Rates: Engineering (BSE)

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<th>Year</th>
<th># of graduates employed in major field</th>
<th># of graduates employed in related fields</th>
<th># of graduates employed outside field</th>
<th># of graduates accepted to Graduate Programs</th>
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Appendix VIII: Letters from the Assessment Office: Engineering (BSE)

Office of Assessment & Program Review

April 24, 2015

Dr. Asad Salem, Chair
Weisberg Division of Engineering
College of Information Technology and Engineering

Dear Asad:

The University Assessment Committee reviewer and I have completed our evaluations of the BSE (Engineering) program’s assessment of student learning for academic year 2013 – 2014. This letter will provide general comments and suggestions for improvement. Please refer to the attached assessment rubric for additional comments from your reviewer.

You have the start of a good assessment plan, which has been developed according to ABET accreditation guidelines. I look forward to seeing your revised and finished product. As you know, assessment is a continuous process and it is always acceptable to change parts of the assessment plan as informed by data.

Reports for academic year 2014 – 2015 are officially due on May 15. If you need additional time to complete data analysis, please let me know and I ask that your final report be submitted no later than September 15.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds, Associate Vice President for Assessment and Quality Initiatives

C: Dr. Wael Zatar, Dean, CITEL
Dr. William Pierson, Chair
Engineering
College of Information Technology and Engineering

Dear Bill:

The University Assessment Committee reviewers and I have completed our evaluations of the BSE's [Engineering] assessment of student learning for academic year 2011 – 2012, submitted in the fall of 2012 and of the additional report for academic year 2012 – 2013, as submitted in the Open Pathways Project report last updated in May 2013. This letter will provide general comments and suggestions for improvement. Please refer to the attached assessment rubric for additional comments from reviewers. Please note that the reviewers' comments are based on the reports you submitted in February 2013, so may not be appropriate for your final report.

Your program's outcomes, which are dictated by ABET, emphasize higher orders of learning. As evidenced in both reports, you also have made a nice start on your rubrics and you use a variety of assessment measures that are integrated throughout your curriculum. Results reported in your report for academic year 2011 – 2012 are comprehensive for the outcomes assessed and analyzed in detail. Your report shows that you are using the results to improve your program. No results were reported in the Open Pathways report. I assume they will be reported in the fall.

During the academic year 2013 – 2014, programs will continue to report assessment results and plan actions using the online reporting form used last year. These reports will be due at the end of the academic year. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds, Associate Vice President
Assessment and Quality Initiatives

C: Dr. Wael Zatar, Dean, CITE
Office of Assessment & Program Review

June 21, 2012

Dr. Bill Pierson, Chair
Engineering
College of Information Technology and Engineering

Dear Bill,

The University Assessment Committee and I have completed our evaluation of the BSE’s (Engineering) assessment of student learning. This letter will provide general comments and suggestions for improvement. I have included the scoring rubric we used to evaluate your assessment report in a separate document.

This is an excellent assessment report! Although not all of your outcomes are written in measurable terms, I realize that they are mandated by ABET and they emphasize higher levels of cognition. You use complementary assessment measures composed of a healthy mix of direct (standardized exam and rubrics used to assess authentic projects) and indirect (student satisfaction surveys tied directly to outcomes) assessments of student learning. Your assessment plan is well conceived, with assessments integrated throughout the curriculum. Your measures give enough detail to inform improvement and, most importantly, your report shows that you have analyzed and used assessment data to inform ongoing improvements in your program.

During the coming academic year, it will be important that you follow the plan you developed as part of the first two activities of the Open Pathways Demonstration Project. The project’s steering committee will provide more feedback regarding next steps in that project at summer’s end. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Wael Zatar, Dean, CITE