**Outcome CS-e.** Have knowledge of software engineering principles and be able to design, implement and analyze moderately complex and robust systems.

The assessment is performed with respect to the key abilities that the students are expected to acquire in specific courses that have been identified with respect to this outcome.

<table>
<thead>
<tr>
<th>Course</th>
<th>Performance indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 230</td>
<td>Discuss the software production process, various life cycle models, and process improvement techniques and standards.</td>
</tr>
<tr>
<td>CS 230</td>
<td>Identify and explain the key points of functionality.</td>
</tr>
<tr>
<td>CS 230</td>
<td>Write and validate requirements specifications.</td>
</tr>
<tr>
<td>CS 230</td>
<td>Apply classical and object oriented analysis methodologies.</td>
</tr>
<tr>
<td>CS 450</td>
<td>Participate as a member of a software development project group.</td>
</tr>
<tr>
<td>CS 450</td>
<td>Carry out the development of a significant OS implementation project using the C language.</td>
</tr>
<tr>
<td>CS 480</td>
<td>Design a product or process that meets the needs of a prospective client or customer using a formally recognized and accepted engineering design process.</td>
</tr>
<tr>
<td>CS 480</td>
<td>Design laboratory or field tests to verify performance and validate the finished design.</td>
</tr>
<tr>
<td>CS 481</td>
<td>Carry out a detailed design of a technological artifact (hardware or software).</td>
</tr>
</tbody>
</table>
**Tools used:**
Embedded Course assessments and Graduating Senior Survey

**Data Collection:**
Embedded Course Assessments, Student Grades, Senior Design Project Evaluations, and Senior Exit Survey responses.

**Frequency of data collection:**
The data are collected every time courses are taught.

**Data Analysis:**
Every course evaluated by embedded assessments every 4th offering if offered twice an academic year, 3rd offering if offered once an academic year and every other offering if offered less than every academic year.

**Closing the loop:**
This outcome is subject to review every year based on performance criteria and metrics and specific action items are developed, if necessary, to revise the content of the courses. The analyzed data are presented to the CS curriculum committee which considers the results.

**Performance criteria and metrics:**

a) Embedded course assessments administered in CS 230/450/480/481 with average grades $\geq$ C on assignments and test which cover the performance indicators.

b) Final grades in selected CS courses must be $\geq$ C.

c) Final grades for BSCS students in senior design must be $\geq$ C.

d) Student responses to relevant question on graduating senior exit surveys must be $\geq$ 3.5/5.
Assessment Tool:

Undergraduate In-Course
Program Outcomes Assessment Form
Assessment of student preparedness for this course at the start of this term:

At the **beginning** of this term:

<table>
<thead>
<tr>
<th>Nearly 100%</th>
<th>About 75%</th>
<th>About 50%</th>
<th>About 25%</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students had the prerequisite <strong>math</strong> skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Students had the prerequisite <strong>laboratory</strong> skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Students had the prerequisite <strong>problem solving</strong> skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Students had the prerequisite <strong>design</strong> skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Students were capable of using the necessary <strong>tools</strong> (e.g. hardware/software, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Students had the necessary <strong>programming</strong> skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Students had the necessary <strong>communication</strong> skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Course Learning Outcomes** *(assessed within course)*

<table>
<thead>
<tr>
<th>Course Learning Outcomes * How/Where Assessed**</th>
<th>Student Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min Pass %</td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>

* Indicate which program outcome each course outcome maps into.
** For example “exam 1, problem 1”
*** For Grade give the class average on an “A=4.0, B=3.0” basis.

**Recommendations:** Include which outcomes require more attention within the course to improve student performance, and how the course should be altered in the future to improve results.
Assessment Tool:

Graduating Senior Survey
WVU Benjamin M. Statler College of Engineering and Mineral Resources
Graduating Senior Survey 2014/15

This portion of the survey asks for contact information regarding alumni events and news. Information from this part will be kept separate from the rest of the survey.

Personal Information:

Name ______________________________________________

New Mailing Address ______________________________________________

Permanent Address (if different) ______________________________________________

Email address (permanent) ______________________________________________

Phone number ______________________________________________

Degree Earned ______________________________________________

Department ______________________________________________

Employer Information:

Name of Employer ______________________________________________

Job Title ______________________________________________

Address ______________________________________________

Country ______________________________________________

Phone Number ______________________________________________

Additional Information ______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________
Please provide the following information. All responses in this part of the survey will be kept confidential, and only aggregate data is used in reporting.

Graduation Month: Dec / May / Aug

Major (check all that apply):

- [ ] Aerospace Engineering
- [ ] Computer Science
- [ ] Petroleum and Natural Gas Engineering
- [ ] Biometric Systems
- [ ] Electrical Engineering
- [ ] Biomedical Engineering
- [ ] Chemical Engineering
- [ ] Industrial Engineering
- [ ] Geology
- [ ] Civil Engineering
- [ ] Mechanical Engineering
- [ ] Other:__________________
- [ ] Computer Engineering
- [ ] Mining Engineering

Overall GPA: ____ / 4.0  Gender: M / F  Home State/Country: ______________________

Race/Ethnicity: ___ African-American  ___ Hispanic  ___ Caucasian  ___ Other

For Race/Ethnicity, please select all that apply. If you are an international student, please select Foreign National.

1. Please mark each program(s) that you participated in during you undergraduate studies.
   a. ___Co-op;  b. ___Internship;  c. ___Study abroad;  d. ___Service Learning;  e. ___Undergraduate Research

2. If you’ve participated in any of the above activities in question 1, please list the organization(s) and location(s):

   ______________________________________________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

3. How long ago did you begin the job/graduate school search process?
   __ <3 months;     __ 3-6 months;     __ 6-9 months;     __ >9 months

4. Which of the following best describes your immediate employment/education status following graduation?
   __ a. I do not plan to work in my field or continue my education. (Please complete the other side of this form)
   __ b. I am still interviewing/searching for a job or graduate school. (Please complete the other side of this form)
   __ c. I have a job offer(s) but have not yet accepted. (Please complete the other side of this form)
   __ d. I have been accepted into graduate school. (Please go to question 5)
   __ e. I have accepted a job position in my professional area. (Please go to questions 6 through 10)

5. University Name:______________________________________________________________
   a. Program: ___ MS ;   ___Ph.D.;    Professional Degree   MBA;   MD;   DDS;   Law
   b. Were you offered an assistantship/fellowship/etc?   ___ Yes;   ___ No;
   c. If you have an assistantship, my monthly stipend is: __ < $1,000          __ $1,000-1,500   __$ 1,500-2,000
   ______ $ 2,000-2,500    __$ 2,500+
   
   Please complete the other side of this form

6. My employer’s name is ________________________________

7. My employer’s business is best described as _______
   F. Government/military    G. Healthcare    H. Manufacturing    I. Service    J. Other

8. My employment is located in: _____ WV; _____ MD; _____ NJ; _____ NC; _____ OH; _____ PA; _____ VA; _____ Other
   If other, please specify where: ____________________________

9. My starting annual salary is approximately (in units rounded to the nearest $1000):
   __ < $30k;  __ $30-34k;  __ $35-39k;  __ $40-44k;  __ $45-49k;  __ $50-54k;  __ $55-59k;  __ $60-64k;
   __ $65-69k;  __ $70-74k;  __ $75-79k;  __ $80-84k;  __ $85-89k;  __ $90-94k;  __ $95-99k;  __ $100k+
   
   Please complete the other side of this form
To help the assessment activities of the college and your major we ask that you take a few minutes to provide us feedback on your perception of how your undergraduate program prepared you in a number of important educational outcome areas. All entries will be treated as confidential.

Please give your assessment for items “a” through “q” and “r”, if it applies, using the following rating scale.

5 - strongly agree; 4 - agree; 3 - neutral; 2 - disagree; 1 - strongly disagree; N/A – not applicable (for r. i. & ii.)

10. Through the education and training I attained with my baccalaureate degree I have acquired the knowledge, skill or ability to:

a. ___ Use the basic principles and practices of my engineering discipline
b. ___ Recognize available opportunities and need to pursue continuing education and lifelong learning
c. ___ Apply knowledge of mathematics to solve equations or systems of equations necessary for the solution of engineering problems
d. ___ Apply knowledge of chemistry and physics effectively in solution of engineering problems
e. ___ Design and conduct experiments relevant to the needs of my engineering discipline
f. ___ Acquire, analyze and interpret data and information relevant to the needs of my engineering discipline
g. ___ Design a component, system, or process to meet desired engineering outcomes and needs
h. ___ Function on multidisciplinary teams to manage engineering projects
i. ___ Translate a general problem description into a specific engineering approach
j. ___ Understand professional and ethical responsibilities of a professional engineer
k. ___ Effectively communicate my ideas, recommendations, etc. to others verbally
l. ___ Effectively communicate my ideas, recommendations, etc. in memos, reports, etc.
m. ___ Appreciate the impact of engineering from multi-cultural and global perspectives
n. ___ Appreciate my engineering discipline’s impact on contemporary environmental and societal issues
o. ___ Conduct economic evaluation of importance cost factors in engineering designs
p. ___ Recognize the impact of engineering design on worker or public safety
q. ___ Utilize software to solve problems relevant to the needs of engineers practicing my discipline in industry
r. ___ If you transferred to WVU from another institution or department how would you agree with the following statements:
   i. ___ The procedure for accepting my transfer was relatively seamless and straightforward
   ii. ___ The procedure for validating credit for courses taken elsewhere was efficient

COMMENTS: __________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

Note: If you’ve indicated that you are still searching for a job or graduate school, would you be willing to participate in a follow up survey? If so, could you please provide an email address we may use to contact you with the survey? Thanks!

e-mail: _________________________________