**McWhorter School of Building Science – BSCI Degree Program Assessment & Implementation Plan & Report 2016**

**Assessment Plan**

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## ACCE Accreditation Requirements

**From the American Council for Construction Education – Document 103 – STANDARD AND CRITERIA FOR ACCREDITATION OF POSTSECONDARY CONSTRUCTION EDUCATION DEGREE PROGRAMS**

* + 1. ***Degree Program Assessment Plan***

*The degree program shall provide evidence of its effectiveness in preparing construction practitioners based on the results of surveys of the graduates, employers of the graduates, industry advisory board, exit interviews, comprehensive exams, capstone projects, or other systematically structured information.*

*The mission, goals, and objectives shall reflect both short-range and long-range considerations and shall be clear as to the educational and institutional results expected.*

*At a minimum, the degree program Assessment Plan shall include the following:*

* + - 1. *Mission Statement of the degree program. The mission statement expresses the underlying purposes and values of the degree program.*

*Degree Program Objectives. The Degree Program Objectives shall be clearly defined and stated in a manner that permits an assessment of achievement.*

*Program Learning Outcomes. These Program Learning Outcomes shall meet or exceed the ACCE Student Learning Outcomes (section 3.2.2) and be regularly formulated, evaluated, and reviewed with the appropriate participation of faculty, students, industry advisory board, and other pertinent parties.*

*Assessment tools. These tools shall measure degree program objectives and learning outcomes as stated in B and C above. The frequency for using the tools, and procedures for data collection also shall be stated.*

*Performance criteria. These criteria shall be used to measure the achievement of the degree program objectives and learning outcomes as stated in B and C above.*

*Evaluation methodology. This methodology shall be followed for data collection.*

*Degree programs shall comprehensively describe their assessment plan and document the results for review by the Visiting Team.*

## Mission Statement of Degree Program

The mission of the McWhorter School of Building Science as it relates to the BSCI Degree Program was developed at its Strategic Planning Meeting held from December 8-9, 2011.

*Creating stimulating learning experiences by engaging in the discovery of the techniques and management of construction*

## BSCI Program Goals & Objectives Definitions:

*A goal is an overarching principle that guides decision-making. Objectives are specific, measurable steps that can be taken to meet the goal.*

## Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI (AU Strategic Goal 2)

* Objective 1.1: Increase the number of high school students accepted to PBSCI
* Objective 1.2: Increase the number of freshman enrolling in PBSCI
* Objective 1.3: Increase the number of unrepresented students in the McWhorter School of Building Science.
* Objective 1.4: Increase the academic ability of students entering PBSCI & BSCI
* Objective 1.5: Increase the number of students enrolled in PBSCI & BSCI

**3.2 Goal 2: The McWhorter School of Building Science will provide an enriching educational experience consistent with the needs of its stakeholders.**

* Objective 2.1: Implement and assess a student learning outcomes based curriculum consistent with the standards of the American Council for Construction Education and the needs of stakeholders

Objective 2.2: Increase opportunities for students to have an enriching educational experience

**3.3 Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry. (AU Strategic Priority 1 – Strategic Goal 1G)**

* Objective 3.1: Enhance advisement & preparedness for a career in construction management
* Objective 3.2: Enhance assistance to students to obtain entry-level construction management positions within the southeast United States and beyond
* Objective 3.3: Increase placement of graduates in entry-level positions across diverse sectors of the construction industry.

## BSCI Program Learning Outcomes

* 1. **Defining Learning Outcomes**

In accordance with ACCE Document 103: Standards and Criteria for Accreditation of Postsecondary Construction Education Degree Programs - 3.2.2.2 Student Learning Outcomes applicable to 4-year degree programs the following Program Learning Outcomes have been assessed.

Note:

In defining the learning outcomes for a 4-year degree programs, the following verbs consistent with Bloom’s taxonomy are used:

*Remember:* The lowest level of the taxonomy requires students to do very little with the information they are learning. They may be asked to recall, list, or name an idea or concept.

*Understand:* At the next level, students demonstrate that they understand the content by explaining, summarizing, classifying, or translating the given information.

*Apply:* At this level, students begin to put the information they are learning into context. Here they are able to integrate ideas across multiple situations, or utilize the content in a new way.

*Analyze:* Students begin to develop higher order thinking. They may be asked to compare and contrast or take a concept and break it into parts to explore the relationships present. *Evaluate:* At this stage, students are asked to judge an idea. This may involve predicting, experimenting, critiquing, or making an argument from evidence.

*Create:* At the highest level, students are producing new ideas or products that integrate the knowledge they have gained. When students are involved in creating new artifacts, they are actively engaged in the subject matter.

Upon graduation from an accredited ACCE 4-year degree program, a graduate shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multi-disciplinary team.
10. Apply electronic-based technology to manage the construction process.
11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems

## Mapping ACCE Student Learning Outcomes

Section 3.1.5.3 - Determination of Achievement of Student Learning Outcomes of ACCE Document 103 requires all programs at the time of the accreditation visit to “Provide an index, cross-tab, curriculum map, or other form of summary clearly relating Course Learning Outcomes to Program Learning Outcomes and, further, to the Student Learning Outcomes”. The curriculum maps in Appendix B, show instruction and assessment mapped between the 20 ACCE SLO’s and

the Pre-BSCI classes, BSCI 3000 level classes and BSCI 4000 level classes respectively. Instruction with regards to each SLO is identified at 3 levels: I = Introduce; R = Reinforce; M = Master. In addition, the class or classes where program assessment occurs are also identified.

## Assessment Tools

The following assessment tools, the frequency for using the tools, and procedures for data collection used to measure the Degree Program Objectives and Program Learning Outcomes are set out below:

## Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI

* + - **Objective 1.1: Increase the number of high school students accepted to PBSCI**
      * Measure: Application #’s & Deposits annually – data collected periodically between October and April by CADC Student Services

1. Number of Accepted PBSCI Students (Track Numbers at end of each month (October to April))
2. Number of PBSCI students paying deposits (Track Numbers at end of each month (October to April))

## Objective 1.2: Increase the number of freshman enrolling in PBSCI

* + - * Measure: Enrollment #’s, yield rate annually – data collected every fall by CADC Student Services

1. Number of PBSCI students enrolling by end of July
2. Yield Rate - % of accepted students that enroll

* Objective 1.3: Increase the number of unrepresented students in the McWhorter School of Building Science.
  + - * Measure: #, % of unrepresented groups annually - data collected every fall by CADC Student Services.

1. Percentage of Female students in PBSCI & BSCI
2. Percentage of African America, American Indian, Asian and Hispanic students in PBSCI & BSCI

## Objective 1.4: Increase the academic ability of students entering PBSCI & BSCI

* + - * Measure: Incoming ACT, Formula GPA - data collected by CADC Student Services.

1. Average, Min & Max ACT Scores of incoming PBSCI Freshman – measured each fall
2. Average, Min & Max Formula GPA for incoming BSCI students – measured each semester

## Objective 1.5: Increase the number of students enrolled in PBSCI & BSCI

* + - * Measure: Enrollment in spring, summer & fall semesters

1. PBSCI Enrollment each semester
2. BSCI Enrollment each semester

5.2 Goal 2: The McWhorter School of Building Science will provide an enhanced educational experience consistent with the needs of its stakeholders.

o **Objective 2.1: Implement and assess a student learning outcomes based curriculum consistent with the standards of the American Council for Construction Education and the needs of stakeholders**

Measure: Evaluation of Student Learning Outcomes; Direct & Indirect – measured every semester

1. Directly measure the students’ ability to meet the 20 ACCE Student Learning Outcomes a **–** data collected by Undergraduate Program Chair and compiled by School Head.
   1. Create written communications appropriate to the construction discipline.
   2. Create oral presentations appropriate to the construction discipline.

* *Assessed in BSCI 3200 Construction Communication. Case Study Presentation accounts for 15% of final grade. Oral Presentation Rubric - measures performance over 5 specific criteria*
  1. Create a construction project safety plan.
* *Assessed in BSCI 4990 – Thesis. Safety Plan accounts for 5% of Thesis grade. Grading Rubric 4 – Safety- measures performance over 8 specific criteria.*
  1. Create construction project cost estimates.
* *Assessed in BSCI 4990 – Thesis. Project Estimate accounts for 15% of Thesis grade. Grading Rubric 1 – Estimate - measures performance over 5 specific criteria.*
  1. Create construction project schedules.
* *Assessed in BSCI 4990 – Thesis. Project Schedule accounts for 10% of Thesis grade. Grading Rubric 5 – Estimate - measures performance over 5 specific criteria.*
  1. Analyze professional decisions based on ethical principles.
  2. Analyze construction documents for planning and management of construction processes.
  3. Analyze methods, materials, and equipment used to construct projects.
  4. Apply construction management skills as a member of a multi- disciplinary team.
  5. Apply electronic-based technology to manage the construction process.
  6. Apply basic surveying techniques for construction layout and control.
     + *Assessed in BSCI 3300 – Field Surveying. Final Examination accounts for 10% of final grade. Field Book accounts for 10% of final grade.*
  7. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
  8. Understand construction risk management.
  9. Understand construction accounting and cost control.
  10. Understand construction quality assurance and control.
  11. Understand construction project control processes.
  12. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
  13. Understand the basic principles of sustainable construction.
* *Assessed in BSCI 4990 – Thesis. LEED Assessment accounts for 5% of Thesis grade. Grading Rubric 2 – Sustainability - measures performance over 5 specific criteria.*
  1. Understand the basic principles of structural behavior.
* *Assessed in BSCI 4990 – Thesis. Structural Assessment accounts for 5% of Thesis grade. Grading Rubric 3 – Structural - measures performance over 7 specific criteria.*
  1. Understand the basic principles of mechanical, electrical and piping systems
     + *Assessed in BSCI 4700 Mechanical Systems in Buildings & BSCI 4750 Electrical Systems in Buildings*
       - *Mechanical Systems are assessed by the Final Examination in BSCI 4700 using multiple format questions such as matching, multiple choice, true/false, short answer, identification and problem solving*
       - *Electrical Systems are assessed by 3 examinations in BSCI 4750 using multiple choice, short answer, true/false and problem solving questions.*
       - *Plumbing Systems are assessed by the Mid-term Examination in BSCI 4700 using multiple format questions such as matching, multiple choice, true/false, short answer, identification and problem solving*

1. Indirectly measure the students’ perception of their ability to meet the 20 ACCE Student Learning Outcomes using an exit survey that assesses how strongly they agree they have met the 20 outcomes - data collected by Administrative Assistant and compiled by School Head.
2. Indirectly measure the student’s level of satisfaction with their education and preparation for their career using an exit survey- data collected by Administrative Assistant and compiled by School Head.

## Objective 2.2: Increase opportunities for students to have an enriching educational experience

* + - * Measure: Participation in enriching educational experiences

1. Participation in service learning projects (AU Strategic Goal 7B) 1.Student Exit Survey – Participation in service learning projects -

data collected every semester by Administrative Assistant and compiled by School Head.

2. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators – collected by AU Office of Institutional Research & Assessment

1. Participation in study abroad, student exchange programs
   1. Student Exit Survey – Participation in study abroad, student exchange programs -data collected every semester by Administrative Assistant and compiled by School Head.
   2. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators – collected by AU Office of Institutional Research & Assessment
2. Participation in competition teams
   1. Student Exit Survey – Participation in student competitions --data collected every semester by Administrative Assistant and compiled by School Head.
3. Participation in ePortfolio program (AU Strategic Goal – 3C)
   1. Student Exit Survey – Participating in ePortfolio program - -data collected every semester by Administrative Assistant and compiled by School Head.
4. Participation in Industry Internship or co-op
   1. Student Exit Survey – Participation in Industry Internship or co-op - data collected every semester by Administrative Assistant and compiled by School Head.
   2. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators – collected by AU Office of Institutional Research & Assessment

**5.2 Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry. (AU Strategic Priority 1 – Strategic Goal 1G)**

* + - **Objective 3.1: Enhance advisement & preparedness for a career in construction management**
      * Measure: Enhance advisement & preparedness for a career in construction management

1. Number of students seeking advisement through BSCI Career Office
   1. Student Exit Surveys – BSCI Career Office advisement -data collected every semester by Administrative Assistant and compiled by School Head.
   2. BSCI Career Office Tracking -data collected every semester by BSCI Career Services Specialist and compiled by School Head.
2. Number of students submitting Resume’s to AU Career Development Center
   1. Student Exit Surveys – Resume submission -data collected every semester by Administrative Assistant and compiled by School Head.
3. Number of company presentations to students
   1. Student Exit Surveys – Attended Company Presentation - -data collected every semester by Administrative Assistant and compiled by School Head.
   2. BSCI Career Office Tracking -data collected every semester by BSCI Career Services Specialist and compiled by School Head.

* **Objective 3.2: Enhance assistance to students to obtain entry-level construction management positions within the southeast United States and beyond**
  + - * Measure: Assistance provided to students to obtain entry-level construction management positions within the southeast United States and beyond -data collected every semester by BSCI Career Services Specialist and compiled by School Head.

1. Number of companies attending campus interviews
   1. BSCI Career Office Tracking
2. Number of companies attending career expos
   1. BSCI Career Office Tracking
3. Number of students attending career expos & interviews
   1. BSCI Career Office Tracking
   2. Student Exit Surveys – attending career expos & interviews -data collected every semester by Administrative Assistant and compiled by School Head.
4. Diversity of companies recruiting; commercial, residential, infrastructure, industrial etc.
   1. BSCI Career Office Tracking

* **Objective 3.3: Increase placement of graduates in entry-level positions across diverse sectors of the construction industry.**
  + - * Measure: Placement of graduates in entry-level positions across diverse sectors of the construction industry

1. Placement rates within 3 months of graduation.
   1. Student Exit Surveys -data collected every semester by Administrative Assistant and compiled by School Head.
   2. BSCI Career Office Tracking -data collected every semester by BSCI Career Services Specialist and compiled by School Head.
2. Diversity of companies hiring; Commercial, residential, infrastructure, industrial etc.
   1. Student Exit Surveys -data collected every semester by Administrative Assistant and compiled by School Head.
   2. BSCI Career Office Tracking -data collected every semester by BSCI Career Services Specialist and compiled by School Head.
3. Diversity of initial hiring position; Pre-construction, project management, field operations etc.
   1. Student Exit Surveys - -data collected every semester by Administrative Assistant and compiled by School Head.
   2. BSCI Career Office Tracking - -data collected every semester by BSCI Career Services Specialist and compiled by School Head.

## Performance Criteria

The school collected assessment data through Spring 2017 and met at the annual Quality Improvement Meeting on May 9, 2017 to set specific performance criteria for the 2017/18 academic year and beyond.

## Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI (AU Strategic Goal 2)

* + - **Objective 1.1: Increase the number of high school students accepted to PBSCI**
      * Performance Criteria:

a. Target 120 Fall Freshman Accepted into PBSCI by 2022

## Objective 1.2: Increase the number of freshman enrolling in PBSCI

* + - * Performance Criteria:

1. Target 80 Fall Freshman Enrolled into PBSCI by 2022
2. Yield Rate of PBSCI Freshman admits enrolling above university average

* **Objective 1.3: Increase the number of unrepresented students in the McWhorter School of Building Science.**
  + - * Performance Criteria:

a. Increase Percentage of overall Female, African America, American Indian, Asian and Hispanic students in PBSCI & BSCI by 2% by 2022

## Objective 1.4: Increase the academic ability of students entering PBSCI & BSCI

* + - * Performance Criteria:

1. Increase Average ACT Scores of incoming PBSCI Fall Freshman to within 0.5 of the AU average.
2. All students entering the professional program will meet the minimum

2.60 Formula GPA requirement

## Objective 1.5: Increase the number of students enrolled in PBSCI & BSCI

* + - * Performance Criteria:

1. Increase PBSCI Enrollment
   * Spring – 360
   * Summer – 0
   * Fall - 360
2. Increase BSCI Enrollment
   * Spring – 210
   * Summer – 60
   * Fall - 210

* **Goal 2: The McWhorter School of Building Science will provide an enriching educational experience consistent with the needs of its stakeholders.**

o **Objective 2.1: Implement and assess a student learning outcomes based curriculum consistent with the standards of the American Council for Construction Education and the needs of stakeholders**

Performance Criteria

1. Direct Assessment of Student Learning Outcomes
   1. For each of the assessment measures used to evaluate the student learning outcomes, 70% of the students will achieve an overall score of 70% or above. Any student learning outcome that falls below this threshold for 4 consecutive semesters will be evaluated by a faculty review.
2. Indirect Assessment of Student Learning Outcomes
   1. 80% of graduating students should agree they have met the learning outcomes. Any student learning outcome that falls below this threshold for 4 consecutive semesters will be evaluated by a faculty review.
   2. No more than 10% of graduating students should disagree that they have met the learning outcomes. Any student learning outcome that falls below this threshold for 4 consecutive semesters will be evaluated by a faculty review.
3. Indirectly measure the student’s level of satisfaction with their education and preparation for their career
   1. Graduating students should on average be at least *very satisfied* (4 out of 5 on a likert scale) with their education
   2. Graduating students should on average *feel quite a bit prepared* (4 out of 5 on a likert scale) for their career.

## Objective 2.2: Increase opportunities for students to have an enriching educational experience

* + Performance Criteria

1. Participation in service learning projects
   1. 100% of graduating students participating in one or more service learning projects. Not meeting this target for 4 consecutive semesters will result in a faculty review.
   2. BSCI mean participation rate is higher than AU over multi-year period.
2. Participation in study abroad, student exchange programs
   1. 20% of graduating students participating in study abroad, student exchange programs. Not meeting this target for 4 consecutive semesters will result in a faculty review.
   2. BSCI mean participation rate is higher than AU over multi-year period.
3. Participation in competition teams
   1. 30% of graduating students participating in competition teams. Not meeting this target for 4 consecutive semesters will result in a faculty review.
4. Participation in ePortfolio Program
   1. 80% of graduating students creating ePortfolio. Not meeting this target for 4 consecutive semesters will result in a faculty review.
5. Participation in Industry Internship or co-op
   1. 80% of graduating students participating in Industry Internship or co-op. Not meeting this target for 4 consecutive semesters will result in a faculty review.
   2. BSCI mean participation rate is higher than AU over multi-year period.

**6.2 Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry. (AU Strategic Priority 1 – Strategic Goal 1G)**

* **Objective 3.1: Enhance advisement & preparedness for a career in construction management**
  + Performance Criteria

1. Number of students seeking advisement through BSCI Career Office
   1. 50% of BSCI graduates sought advisement through BSCI Career Office
2. Number of students submitting Resume’s to AU Career Development Center
   1. 50% of BSCI graduates submited Resume’s to AU Career Development Office
3. Number of company presentations to students
   1. 70% of graduating students attended at least one company presentation
   2. At least 15 companies make presentations during the academic year

* **Objective 3.2: Enhance assistance to students to obtain entry-level construction management positions within the southeast United States and beyond**
  + Performance Criteria

1. Number of companies attending campus interviews
   1. At least 15 companies attending campus interviews per year
2. Number of companies attending career expos
   1. At least 70 companies attending the spring and summer career expos.
3. Number of students attending career expos & interviews
   1. At least 30% of total PBSCI & BSCI enrollment attend career expo per semester
   2. At least 20% of BSCI students attend campus interviews per semester
4. Diversity of companies recruiting; commercial, residential, infrastructure, industrial etc.
   1. At least 15% of companies attending career expo are from outside the commercial construction sector
   * **Objective 3.3: Increase placement of graduates in entry-level positions across diverse sectors of the construction industry.**
   * Performance Criteria
5. Placement rates within 3 months of graduation.
   1. 90% of students obtain employment or attend graduate school
6. Diversity of companies hiring; Commercial, residential, Infrastructure, industrial etc.
   1. 15% of students obtain employment outside of the commercial sector
7. Diversity of initial hiring position: Pre-construction, project management, field operations etc.
   1. At least 10% of students obtain employment in each of the hiring positions

## Evaluation Methodology

* 1. **Data Collection**

1. Data on students accepted into PBSCI & Deposits paid collected October through April – Action – School Head
2. Data on students entering PBSCI and calculation of yield rate collected at start of fall semester – Action - School Head
3. Data on diversity of PBSCI & BSCI students collected early in fall semester - Action

– School Head

1. Data on ACT scores of incoming PBSCI students collected each fall semester. Data on incoming formula GPA of BSCI students collected at start of each semester – Action – School Head
2. Data on student enrollment collected each semester – Action OIRA & School Head
3. Data from direct measures for student learning outcomes collected at the end of each semester using grading rubric – Action – Faculty member assessing outcome & Undergraduate Chair
4. Data from undergraduate student surveys collected at the end of each semester – Action – Administrative Assistant & School Head
5. Data from undergraduate student surveys collected at the end of each semester – Action – Administrative Assistant & School Head
6. Data from NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators Survey collected each semester by Office of Institutional Research & Assessment – OIRA & School Head
7. Data from undergraduate student surveys collected at the end of each semester – Action – Administrative Assistant & School Head
8. Data on students seeking advisement and companies interviewing students collected continuously and collated each semester – Action – BSCI Career Services Specialist & School Head
9. Data from undergraduate student surveys collected at the end of each semester – Action – Administrative Assistant & School Head
10. Data on students and companies attending interviews and career expo collected continuously and collated each semester – Action – BSCI Career Services Specialist & School Head
11. Data from undergraduate student surveys collected at the end of each semester – Action – Administrative Assistant & School Head
12. Data on student job placement and diversity of companies hiring students collected each semester – Action – BSCI Career Services Specialist & School Head

## Analysis of Data

The data collected above is collated by the School Head and compiled into a comprehensive report for the preceding calendar year at the end of each spring semester. An annual quality improvement meeting is held in May of every year to review this report and make recommendations for improving the program. Any proposed changes made to the program are developed through the summer and discussed further at the August Retreat. The annual AU Assessment report is submitted to the college in June and the university in July.

## Data for 2016 Calendar year and previous year’s data.

* 1. **Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI**
     1. **Objective 1.1: Increase the number of high school students accepted to PBSCI**
        1. Measure: Application #’s
           1. Number of Accepted PBSCI Students (Track Numbers at end of each month (October to April))
           2. Number of PBSCI students paying deposits (Track Numbers at end of each month (November to April))

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year |  | October | November | January | February | March | April |
| 2013/14 | Accepted | 28 | 44 | 59 | 73 | 74 | 74 |
|  | Deposited | 12 | 23 | 34 | 38 | 45 | 47 |
| 2014/15 | Accepted | 35 | 51 | 69 | 75 | 77 | 84 |
|  | Deposited | 16 | 26 | 41 | 48 | 54 | 58 |
| 2015/16 | Accepted | 26 | 64 | 80 | 94 | 96 | 96 |
|  | Deposited | 9 | 10 | 38 | 55 | 62 | 63 |
| 2016/17 | Accepted | 37 | 85 | 103 | 104 | 107 | 114 |
|  | Deposited | 13 | 17 | 63 | 67 | 75 | 81 |

## Objective 1.2: Increase the number of freshman enrolling in PBSCI

* + - 1. Measure: Enrollment #’s, yield rate.
         1. Number of PBSCI students enrolling by end of July
         2. Yield Rate - % of accepted students that enroll

|  |  |  |  |
| --- | --- | --- | --- |
| Year | No. Accepted | No. Enrolled | Yield Rate |
| Fall 2014 | 86 | 59 (37 from 86) | 43% |
| Fall 2015 | 82 | 76 (76 from 82) | 92.6% |
| Fall 2016 | 106 | 69 | 65% |

**8.1.3 Objective 1.3: Increase the number of unrepresented students in the McWhorter School of Building Science.**

* + - 1. Measure: #, % of unrepresented groups
         1. Percentage of Female students in PBSCI & BSCI
         2. Percentage of African America, American Indian, Asian and Hispanic students in PBSCI & BSCI

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number & Percentage of unrepresented groups in undergraduate program | | | | | | | | | |
| Year | Females | | African American | | American Indian | | Asian | | Hispanic | |
| Fall 2014 | 25 | 6% | 10 | 2% | 5 | 1% | 1 | 0% | 5 | 1% |
| Fall 2015 | 26 | 6% | 9 | 2% | 3 | 1% | 3 | 1% | 8 | 2% |
| Fall 2016 | 32 | 6% | 9 | 2% | 4 | 1% | 6 | 1% | 20 | 4% |

## Objective 1.4: Increase the academic ability of students entering PBSCI & BSCI

* + - 1. Measure: Incoming ACT, Formula GPA
         1. Average, Min & Max ACT Scores of incoming PBSCI Freshman
         2. Average, Min & Max Formula GPA for incoming BSCI students

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ACT Scores of Incoming Freshman | | | |
| Year | Average | Min. | Max. | AU Average |
| Fall 2014 | 24.60 | 18 | 33 | 27.0 |
| Fall 2015 | 24.96 | 19 | 33 | 27.3 |
| Fall 2016 | 26.33 | 21 | 32 | 27.4 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Formula GPA for incoming BSCI students | | |
| Semester | Average | Min. | Max. |
| Spring 2014 | 2.92 | 2.31 | 3.82 |
| Summer 2014 | 3.08 | 2.22 | 3.76 |
| Fall 2014 | 3.38 | 3.06 | 4.00 |
| Spring 2015 | 2.98 | 2.30 | 3.94 |
| Summer 2015 | 2.97 | 2.20 | 3.72 |
| Fall 2015 | 3.36 | 2.50 | 3.94 |
| Spring 2016 | 3.13 | 2.38 | 4.00 |
| Summer 2016 | 3.11 | 2.22 | 4.00 |
| Fall 2016 | 3.53 | 3.12 | 3.94 |

## Objective 1.5: Increase the number of students enrolled in PBSCI & BSCI

**8.4.4.1 Measure Student Enrollment**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Student Enrollment | | |
| Semester | PBSCI | BSCI | Total |
| Spring 2014 | 183 | 164 | 357 |
| Summer 2014 | 60 | 133 | 193 |
| Fall 2014 | 239 | 161 | 400 |
| Spring 2015 | 219 | 188 | 407 |
| Summer 2015 | 45 | 144 | 199 |
| Fall 2015 | 300 | 173 | 473 |
| Spring 2016 | 279 | 196 | 475 |
| Summer 2016 | 60 | 146 | 206 |
| Fall 2016 | 353 | 186 | 539 |
| Spring 2017 | 309 | 213 | 522 |

**8.2 Goal 2: The McWhorter School of Building Science will provide an enhanced educational experience consistent with the needs of its stakeholders.**

* + 1. **Objective 2.1: Implement a student learning outcomes based curriculum consistent with the standards of the American Council for Construction Education and the needs of stakeholders. Full implementation prior by Spring 2020.**
       1. Measure: Evaluation of Student Learning Outcomes; Direct & Indirect

1. Directly measure the students’ ability to meet the 20 ACCE Student Learning Outcomes.

**See Appendix A – Data for Assessment of Student Learning Outcomes Reported to Auburn University Director of Academic Assessment**

1. Indirectly measure the students’ perception of their ability to meet the 20 ACCE Student Learning Outcomes using an exit survey that assesses how strongly they agree they have met the 20 outcomes.

**See Appendix A – Data for Assessment of Student Learning Outcomes Reported to Auburn University Director of Academic Assessment**

1. Indirectly measure the student’s level of satisfaction with their education and preparation for their career using an exit survey. *Using the rating scale shown below, please answer the following question.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fall 2014 (8 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 0 | 0 | 5 | 3 | 4.38 |
|  | Not at | A little | Somewhat | Quite a bit | Very | Average |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | all prepared | prepared | prepared | prepared | much prepared |  |
| How well did your education in Building Science prepare you for your future career? | 0 | 0 | 1 | 2 | 5 | 4.50 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Spring 2015 (28 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 0 | 0 | 10 | 18 | 4.64 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 0 | 1 | 8 | 19 | 4.64 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Summer 2015 (21 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 0 | 2 | 8 | 11 | 4.43 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 0 | 1 | 6 | 14 | 4.62 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015 (20 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 1 | 2 | 8 | 9 | 4.25 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 1 | 3 | 8 | 8 | 4.15 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016 (21 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 0 | 2 | 12 | 7 | 4.24 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 2 | 1 | 9 | 9 | 4.19 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016 (24 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 2 | 2 | 11 | 9 | 4.13 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 1 | 4 | 12 | 7 | 4.04 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016 (27 Reporting)** | Not at all satisfied | Slightly satisfied | Moderately satisfied | Very satisfied | Extremely satisfied | Average |
| What is your overall satisfaction with the education you received in the Building Science program? | 0 | 0 | 0 | 12 | 14 | 4.48 |
|  | Not at all prepared | A little prepared | Somewhat prepared | Quite a bit prepared | Very much prepared | Average |
| How well did your education in Building Science prepare you for your future career? | 0 | 0 | 3 | 9 | 15 | 4.44 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Semester | Percentage of Students | | | |
| *Very satisfied* | *Slightly satisfied* | *Quite a bit prepared* | *Little bit prepared* |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fall 2014 | 100% | 0% | 88% | 0% |
| Spring 2015 | 100% | 0% | 96% | 0% |
| Summer 2015 | 90% | 0% | 95% | 0% |
| Fall 2015 | 85% | 0% | 80% | 5% |
| Spring 2016 | 90% | 0% | 86% | 10% |
| Summer 2016 | 83% | 8% | 79% | 4% |
| Fall 2016 | 100% | 0% | 89% | 0% |

**8.1.2 Objective 2.2: Increase opportunities for students to have an enriching educational experience**

8.1.2.1 Measure: Participation in enriching educational experiences

1. Participation in service learning projects (AU Strategic Goal 7B)
   1. Student Exit Survey – Participation in service learning projects *- The McWhorter School strives to provide an Enriching Educational Experience for Building Science students by providing a number of opportunities for students outside of the classroom. The following questions inquire about your participation in Enriching Educational Experiences.*

|  |  |  |  |
| --- | --- | --- | --- |
| a. Did you participate in a service learning experience as part of a BSCI class? | Yes | No | %  Participation |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 25 | 3 | 89% |
| Summer 2015 | 20 | 1 | 95% |
| Fall 2015 | 20 | 0 | 100% |
| Spring 2016 | 19 | 2 | 90% |
| Summer 2016 | 23 | 1 | 96% |
| Fall 2016 | 26 | 1 | 96% |

* 1. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators - *In your experience at your institution during the current school year, about how often have you done each of the following? 1=Never, 2=Sometimes, 3=Often, 4=Very often*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Mean Response | | | BSCI  > |
|  | Year | BSCI | CADC | AU |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | AU? |
| Participated in a community-based project (e.g. service learning) as part of a regular course | 2013/FY | 1.88 | 1.71 | 1.60 | Yes |
| 2013/SY | 2.31 | 2.13 | 1.79 | Yes |
| 2015/FY | 1.75 | 1.47 | 1.46 | Yes |
| 2015/SY | 2.12 | 1.96 | 1.67 | Yes |

1. Participation in study abroad, student exchange programs
   1. Student Exit Survey – Participation in study abroad, student exchange programs - *The McWhorter School strives to provide an Enriching Educational Experience for Building Science students by providing a number of opportunities for students outside of the classroom. The following questions inquire about your participation in Enriching Educational Experiences.*

*-*

|  |  |  |  |
| --- | --- | --- | --- |
| b. Did you participate in a study abroad program or another international experience as part of the Building Science Program? | Yes | No | %  Participation |
| Fall 2014 | 3 | 5 | 37.5% |
| Spring 2015 | 3 | 25 | 11% |
| Summer 2015 | 7 | 14 | 33% |
| Fall 2015 | 3 | 17 | 15% |
| Spring 2016 | 6 | 15 | 29% |
| Summer 2016 | 7 | 17 | 29% |
| Fall 2016 | 5 | 22 | 19% |

* 1. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators - *Which of the following have you done or do you plan to do before you graduate from your institution? (Recoded: 0=Have not decided, Do not plan to do, Plan to do; 1=Done. Thus, the mean is the proportion responding "Done" among all valid respondents.)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Mean Response | | | BSCI >AU? |
|  | Year | BSCI | CADC | AU |
| Study Abroad | 2013/FY | 0.02 | 0.01 | 0.01 | Yes |
| 2013/SY | 0.09 | 0.28 | 0.13 | No |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 2015/FY | 50% | 62% | 28% | Yes |
| 2015/SY | 52% | 59% | 39% | Yes |

1. Participation in competition teams
   1. Student Exit Survey – Participation in student competitions *- The McWhorter School strives to provide an Enriching Educational Experience for Building Science students by providing a number of opportunities for students outside of the classroom. The following questions inquire about your participation in Enriching Educational Experiences.*

|  |  |  |  |
| --- | --- | --- | --- |
| c. Did you participate in a student competition while you were in the Building Science Program? | Yes | No | %  Participation |
| Fall 2014 | 5 | 3 | 62.5% |
| Spring 2015 | 17 | 11 | 61% |
| Summer 2015 | 10 | 11 | 48% |
| Fall 2015 | 6 | 14 | 30% |
| Spring 2016 | 8 | 13 | 38% |
| Summer 2016 | 7 | 17 | 29% |
| Fall 2016 | 9 | 18 | 33% |

1. Participation in ePortfolio program (AU Strategic Goal – 3C)
   1. Student Exit Survey – Participating in ePortfolio program *- The McWhorter School strives to provide an Enriching Educational Experience for Building Science students by providing a number of opportunities for students outside of the classroom. The following questions inquire about your participation in Enriching Educational Experiences.*

|  |  |  |  |
| --- | --- | --- | --- |
| d. Did you create an ePortfolio while you were in the Building Science Program? | Yes | No | %  Participation |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 28 | 0 | 100% |
| Summer 2015 | 17 | 4 | 81% |
| Fall 2015 | 20 | 0 | 100% |
| Spring 2016 | 21 | 0 | 100% |
| Summer 2016 | 18 | 6 | 75% |

|  |  |  |  |
| --- | --- | --- | --- |
| Fall 2016 | 24 | 3 | 89% |

1. Participation in Industry Internship or Co-op
   1. Student Exit Survey – Participation in Industry Internship or co-op - *The McWhorter School strives to provide an Enriching Educational Experience for Building Science students by providing a number of opportunities for students outside of the classroom. The following questions inquire about your participation in Enriching Educational Experiences.*

|  |  |  |  |
| --- | --- | --- | --- |
| e. Did you participate in an industry internship or co- op while you were in the Building Science Program? | Yes | No | %  Participation |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 25 | 3 | 89% |
| Summer 2015 | 18 | 3 | 86% |
| Fall 2015 | 19 | 1 | 95% |
| Spring 2016 | 17 | 4 | 81% |
| Summer 2016 | 21 | 3 | 88% |
| Fall 2016 | 25 | 2 | 93% |

* 1. NSSE (National Survey of Student Engagement) Multi-Year Benchmark Indicators - *Which of the following have you done or do you plan to do before you graduate from your institution? (Recoded: 0=Have not decided, Do not plan to do, Plan to do; 1=Done. Thus, the mean is the proportion responding "Done" among all valid respondents.)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Mean Response |  |  | BSCI > AU? |
|  | Year | BSCI | CADC | AU |
| Practicum, internship, field experience, co-op experience, or clinical assignment | 2013/FY | 0.10 | 0.05 | 0.04 | Yes |
| 2013/SY | 0.76 | 0.60 | 0.51 | Yes |
| 2015/FY | 75% | 84% | 87% | Yes |
| 2015/SY | 93% | 87% | 77% | Yes |

**8.3 Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry. (AU Strategic Priority 1 – Strategic Goal 1G)**

**8.3.1 Objective 3.1: Enhance advisement & preparedness for a career in construction management**

* + 1. Measure: Enhance advisement & preparedness for a career in construction management

1. Number of students seeking advisement through BSCI Career Office
   1. Student Exit Surveys – BSCI Career Office advisement

|  |  |  |  |
| --- | --- | --- | --- |
| Did you seek advisement through BSCI Career Office? | Yes | No | %  Participation |
| Fall 2014 | 7 | 1 | 87.5% |
| Spring 2015 | 20 | 8 | 71.4% |
| Summer 2015 | 13 | 8 | 62% |
| Fall 2015 | 10 | 10 | 50% |
| Spring 2016 | 15 | 6 | 71% |
| Summer 2016 | 6 | 18 | 25% |
| Fall 2016 | 22 | 5 | 81% |

* 1. BSCI Career Office Tracking

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Semester | No. of students advised per. semester | | | |
|  | PBSCI | BSCI | GRAD | OTHER |
| Spring 2015 | 13 | 11 | 4 | 0 |
| Summer 2015 | 0 | 1 | 1 | 0 |
| Fall 2015 | 34 | 19 | 7 | 4 |
| Spring 2016 | 15 | 16 | 1 | 4 |
| Summer 2016 | 2 | 0 | 2 | 1 |
| Fall 2016 | 15 | 14 | 13 | 1 |

1. Number of students submitting Resume’s to AU Career Development Center
   1. Student Exit Surveys – Resume submission

|  |  |  |  |
| --- | --- | --- | --- |
| Did you submit a Resume to AU Career Development Center? | Yes | No | %  Participation |
| Fall 2014 | 5 | 3 | 62.5% |
| Spring 2015 | 14 | 14 | 50% |
| Summer 2015 | 12 | 9 | 57% |
| Fall 2015 | 13 | 7 | 65% |
| Spring 2016 | 13 | 8 | 62% |

|  |  |  |  |
| --- | --- | --- | --- |
| Summer 2016 | 12 | 12 | 50% |
| Fall 2016 | 9 | 18 | 33% |

1. Number of company presentations to students
   1. Student Exit Surveys – Attended Company Presentation

|  |  |  |  |
| --- | --- | --- | --- |
| Did you attend a company presentation in Gorrie prior to attending an on campus interview? | Yes | No | %  Participation |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 24 | 4 | 86% |
| Summer 2015 | 14 | 7 | 67% |
| Fall 2015 | 18 | 2 | 90% |
| Spring 2016 | 17 | 4 | 81% |
| Summer 2016 | 17 | 7 | 71% |
| Fall 2016 | 20 | 7 | 74% |

* 1. BSCI Career Office Tracking

|  |  |  |
| --- | --- | --- |
| Semester | Number each semester | |
|  | Companies presenting | Students attending |
| Fall 2014 | 14 | 144 |
| Spring 2015 | 11 | 133 |
| Summer 2015 | 0 | 0 |
| Fall 2015 | 8 | 64 |
| Spring 2016 | 7 | 92 |
| Summer 2016 | 0 | 0 |
| Fall 2016 | 10 | 88 |

**8.3.1 Objective 3.2: Enhance assistance to students to obtain entry-level construction management positions within the southeast United States and beyond**

* + - 1. Measure: Assistance provided to students to obtain entry-level construction management positions within the southeast United States and beyond
         1. Number of companies attending campus interviews

BSCI Career Office Tracking

|  |  |
| --- | --- |
| Semester | Number of companies attending campus interviews (not inc. expo) |
|  |  |
| Fall 2014 | 14 |

|  |  |
| --- | --- |
| Spring 2015 | 11 |
| Summer 2015 | 1 |
| Fall 2015 | 7 |
| Spring 2016 | 6 |
| Fall 2016 | 11 |

* + - * 1. Number of companies attending career expos

BSCI Career Office Tracking

|  |  |
| --- | --- |
| Semester | Number of companies attending BSCI Career Expo |
|  |  |
| Fall 2014 | 62 |
| Spring 2015 | 60 |
| Summer 2015 | 22 |
| Fall 2015 | 77 |
| Spring 2016 | 72 |
| Summer 2016 | 21 |
| Fall 2016 | 85 |

* + - * 1. Number of students attending career expos & campus interviews

BSCI Career Office Tracking

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Semester | Number of students attending BSCI Career Expo | | | | |
|  | PBSCI | BSCI | MBC/MIDC | Other | Total |
| Fall 2014 | 147 | 103 | 17 | 57 | 324 |
| Spring 2015 | 47 | 78 | 17 | 68 | 210 |
| Summer 2015 |  | 64 | | 2 | 66 |
| Fall 2015 | 171 | 101 | 17 | 61 | 350 |
| Spring 2016 | 94 | 104 | 7 | 65 | 270 |
| Summer 2016 |  |  |  |  | 37 |
| Fall 2016 | 161 | 86 | 15 | 67 | 326 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Semester | Number of students attending campus interviews (not inc. expo) | | | | |
|  | PBSCI | BSCI | MBC/MIDC | Other | Total |
| Fall 2014 |  |  |  |  | 144 |
| Spring 2015 |  |  |  |  | 125 |
| Summer 2015 |  | 2 |  | 2 | 4 |
| Fall 2015 |  |  |  |  | 48 |
| Spring 2016 |  |  |  |  | 80 |
| Summer 2016 |  |  |  |  |  |
| Fall 2016 |  |  |  |  | 85 |

Student Exit Surveys – attending career expos & interviews

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2014** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 8 | 0 | 100% |
| Did you attend a BSCI Career Expo? | 7 | 0 | 100% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Spring 2015** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 24 | 4 | 86% |
| Did you attend a BSCI Career Expo? | 27 | 1 | 96% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Summer 2015** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 12 | 9 | 57% |
| Did you attend a BSCI Career Expo? | 20 | 1 | 95% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2015** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 15 | 5 | 75% |
| Did you attend a BSCI Career Expo? | 20 | 0 | 100% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Spring 2016** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 14 | 7 | 67% |
| Did you attend a BSCI Career Expo? | 21 | 0 | 100% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Summer 2016** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 14 | 10 | 58% |
| Did you attend a BSCI Career Expo? | 24 | 0 | 100% |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fall 2016** | Yes | No | %  Participation |
| Did you attend a company interview in Gorrie? | 19 | 8 | 70% |
| Did you attend a BSCI Career Expo? | 25 | 2 | 93% |

* + - * 1. Diversity of companies recruiting; commercial, residential, infrastructure, industrial etc.

BSCI Career Office Tracking

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Semester | Sector of industry –recruiting on campus | | | | |
|  | Commercial | Residential | Infrastructure | Industrial | Other |
| Fall 2014 | 66% | 3% | 6% | 9% | 16% |
| Spring 2015 | 66% | 2% | 11% | 9% | 12% |
| Summer 2015 | 83% | 4% | 4% | 0% | 9% |
| Fall 2015 | 72% | 9% | 6% | 3% | 10% |
| Spring 2016 | 69% | 8% | 3% | 3% | 17% |
| Summer 2016 | 80% | 10% | 0% | 0% | 10% |
| Fall 2016 | 71% | 7% | 4% | 4% | 14% |

**8.3.3 Objective 3.3: Increase placement of graduates in entry-level positions across diverse sectors of the construction industry.**

* + - 1. Measure: Placement of graduates in entry-level positions across diverse sectors of the construction industry
         1. Placement rates within 3 months after graduation.

Student Exit Surveys

|  |  |  |  |
| --- | --- | --- | --- |
| Have you formally accepted a job offer? | Yes | No | %  Participation |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 27 | 1 | 96% |
| Summer 2015\* | 19 | 2 | 90% |
| Fall 2015 | 18 | 2 | 90% |
| Spring 2016\* (3 graduate school) | 17 | 4 | 81% |
| Summer 2016\* (1 graduate school) | 20 | 4 | 83% |
| Fall 2016\*(1 graduate school) | 23 | 4 | 85% |

|  |  |  |  |
| --- | --- | --- | --- |
|  | No. of Formal Job Offers | | |
| Year | Average | Min. | Max. |
| Fall 2014 | 1.75 | 1 | 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| Spring 2015 | 2.04 | 1 | 4 |
| Summer 2015 | 1.67 | 0 | 5 |
| Fall 2015 | 2.10 | 1 | 6 |
| Spring 2016 | 2.29 | 0 | 6 |
| Summer 2016 | 2.09 | 0 | 5 |
| Fall 2016 | 1.41 | 0 | 3 |

BSCI Career Office Tracking

|  |  |  |  |
| --- | --- | --- | --- |
| Semester | Students Interviewed | Job offer or grad school | Placement |
|  |  |  |  |
| Fall 2014 | 19 | 19 | 100% |
| Spring 2015 | 29 | 29 | 100% |
| Summer 2015 | 24 | 24 | 100% |
| Fall 2015 | 26 | 26 | 100% |
| Spring 2016 | 30 | 30 | 100% |
| Summer 2016 | 29 | 29 | 100% |

* + - * 1. Diversity of companies hiring; Commercial, residential, infrastructure, industrial etc.

Student Exit Surveys

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sector of industry | | | | |
| Year | Commercial | Residential | Infrastructure | Industrial | Other |
| Fall 2014 | 87.5% | 0% | 0% | 12.5% |  |
| Spring 2015 | 92.9% | 3.6% | 0% | 3.6% |  |
| Summer 2015 | 81.0% | 14.3% | 0% | 4.8% |  |
| Fall 2015 | 95% | 5% | 0% | 0% |  |
| Spring 2016 | 81% | 5% | 10% | 5% |  |
| Summer 2016 | 88% | 8% | 4% | 0% |  |
| Fall 2016 | 75% | 4% | 4% | 4%% | 12% |

BSCI Career Office Tracking

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sector of industry | | | | |
| Year | Commercial | Residential | Infrastructure | Industrial | Other |
| Fall 2014 | 94.5% | 0% | 0% | 5.5% |  |
| Spring 2015 | 93% | 3.5% | 3.5% | 0% |  |
| Summer 2015 | 90% | 10% | 0% | 0% |  |
| Fall 2015 | 88% | 4% | 4% | 4% |  |
| Spring 2016 | 96% | 0% | 0% | 4% |  |
| Summer 2016 | 85% | 5% | 5% | 5% |  |
| Fall 2016 | 64% | 20% | 0% | 0% | 16% |

* + - * 1. Diversity of initial hiring position; Pre-construction, project management, field operations etc.

Student Exit Surveys

|  |  |  |  |
| --- | --- | --- | --- |
|  | Initial Hiring Position | | |
| Year | Pre-construction | Project Management | Field Operations |
| Fall 2014 | 25% | 62.5% | 12.5% |
| Spring 2015 | 14.3% | 67.9% | 17.9% |
| Summer 2015 | 19.0% | 47.6% | 33.3% |
| Fall 2015 | 5% | 45% | 50% |
| Spring 2016 | 14% | 48% | 38% |
| Summer 2016 | 8% | 58% | 33% |
| Fall 2016 | 11% | 70% | 19% |

BSCI Career Office Tracking

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Initial Hiring Position | | | |
| Year | Pre-construction | Project Management | Field Operations | Unknown |
| Fall 2014 | 17% | 66% | 17% | 0% |
| Spring 2015 | 7% | 84% | 7% | 0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Summer 2015 | 10% | 41% | 18% | 31% |
| Fall 2015 | 4% | 23% | 54% | 31% |
| Spring 2016 | 4% | 57% | 35% | 4% |
| Summer 2016 | 5% | 46% | 29% | 20% |
| Fall 2016 | 7% | 22% | 39% | 29% |

## Annual Quality Improvement Meeting – May 9, 2017

The Minutes from the May 9, 2017 Quality Improvement Meeting are attached to this document as Appendix C.

## Update on Previous Quality Improvement Initiatives

Three updates on previous quality improvement initiatives are presented in Appendix D, E & F. These were discussed at the annual quality improvement meeting on May 9, 2017 and show up as the 2nd item in the minutes in Appendix C.

**Appendix A – Data for Assessment of Student Learning Outcomes Reported to the Auburn University Director of Academic Assessment**

**BS in Building Science (BSCI)**

**Student Learning Outcomes**

The Building Science (BSCI) program is accredited by the American Council for Construction Education (ACCE). The program has been continuously accredited since 1980 and was last reaccredited in 2014. The program will be re-accredited in 2020. The ACCE is implementing a new learning outcomes based standard that will become affective for all programs being accredited from Fall 2016 onwards. The McWhorter School of Building Science has recently completed a curriculum review and the new curriculum will be effective to PBSCI students entering the professional BSCI program from summer 2017 onward and for freshman entering the PBSCI program from Fall 2017 onward.

## Specificity of Outcomes

Please provide a list of program level student learning outcomes. Student learning outcomes articulate the knowledge, skills, and abilities that students are expected to achieve as a result of completing the academic degree program.

In accordance with ACCE Document 103: *Standards and Criteria for Accreditation of Postsecondary Construction Education Degree Programs - 3.2.2.2 Student Learning Outcomes applicable to 4-year degree programs*, the following 20 Student Learning Outcomes are applicable to the Building Science Program:

Note: In defining the learning outcomes for a 4-year degree programs, the following verbs consistent with Bloom’s taxonomy are used:

*Remember:* The lowest level of the taxonomy requires students to do very little with the information they are learning. They may be asked to recall, list, or name an idea or concept.

*Understand:* At the next level, students demonstrate that they understand the content by explaining, summarizing, classifying, or translating the given information.

*Apply:* At this level, students begin to put the information they are learning into context. Here they are able to integrate ideas across multiple situations, or utilize the content in a new way.

*Analyze:* Students begin to develop higher order thinking. They may be asked to compare and contrast or take a concept and break it into parts to explore the relationships present.

*Evaluate:* At this stage, students are asked to judge an idea. This may involve predicting, experimenting, critiquing, or making an argument from evidence. *Create:* At the highest level, students are producing new ideas or products that integrate the knowledge they have gained. When students are involved in creating new artifacts, they are actively engaged in the subject matter.

Upon graduation from an accredited ACCE 4-year degree program, a graduate shall be able to:

* 1. Create written communications appropriate to the construction discipline.
  2. Create oral presentations appropriate to the construction discipline.
  3. Create a construction project safety plan.
  4. Create construction project cost estimates.
  5. Create construction project schedules.
  6. Analyze professional decisions based on ethical principles.
  7. Analyze construction documents for planning and management of construction processes.
  8. Analyze methods, materials, and equipment used to construct projects.
  9. Apply construction management skills as a member of a multi-disciplinary team.
  10. Apply electronic-based technology to manage the construction process.
  11. Apply basic surveying techniques for construction layout and control.
  12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
  13. Understand construction risk management.
  14. Understand construction accounting and cost control.
  15. Understand construction quality assurance and control.
  16. Understand construction project control processes.
  17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
  18. Understand the basic principles of sustainable construction.
  19. Understand the basic principles of structural behavior.
  20. Understand the basic principles of mechanical, electrical and piping systems

## Comprehensive Outcomes

Please provide a brief narrative stating whether or not the list of student learning outcomes is comprehensive (i.e., the student learning outcomes accurately reflect

the current scope of the program). Consider also providing a rationale for the degree/nature of comprehensiveness (e.g., student learning outcomes are aligned with disciplinary standards).

The current list of student learning outcomes is comprehensive and accurately reflects the current scope of the program and are aligned with disciplinary standards.

## Communicating Outcomes

Please provide a brief statement describing if and how the list of student learning outcomes is shared with others (e.g., paper copies are shared with program faculty at a meeting, the outcomes are posted to the departmental website at: [http://cadc.auburn.edu/construction/construction-degrees-programs/accreditation).](http://cadc.auburn.edu/construction/construction-degrees-programs/accreditation))

The Student Learning outcomes are communicated to stakeholders in the following manner:

1. Students.

The Student Learning Outcomes, together with the Goals and Objectives for the program are set out in the Accreditation section of the school’s website at [http://cadc.auburn.edu/construction/construction-degrees-](http://cadc.auburn.edu/construction/construction-degrees-programs/accreditation) [programs/accreditation.](http://cadc.auburn.edu/construction/construction-degrees-programs/accreditation) are distributed to all students attending Camp War Eagle as freshmen and/or when they meet with their advisor for the first time as transfer students. Students are also informed of the student learning outcomes during the Pre-Building Science Convocation which is held during their first semester of study and during the Professional Program Convocation that is held during the first semester of their junior year.

1. Faculty.

An introduction to assessment, accreditation and student learning outcomes is provided to all new BSCI faculty as part of the new faculty orientation process. Existing faculty are informed of the student learning outcomes during faculty meetings and via email correspondence. All faculty are involved in the curriculum review process and documents detailing the student learning outcomes play a central part in this process. All faculty are required to evaluate and grade the Building Science Thesis which is currently used to evaluate five of the 20 student learning outcomes.

1. Industry Advisory Council Members.

To satisfy the ACCE requirements, the school is required to have an Industry Advisory Council which consists of approximately 25 members consisting of senior level managers drawn from construction companies across the region and beyond. Members of the IAC are made aware of the student learning outcomes in two ways. First, members of the IAC were involved in two curriculum review workshops held in July 2015 where they

were presented with the list of SLO’s and asked to review for completeness and the need for any additional SLO’s. Secondly, IAC members are given an abridged version of our annual assessment report at their spring and fall meeting which also contains details of the SLO’s. See attachment Assessment Data IAC Meeting Spring 2017.pdf.

# Curriculum Map

## Curriculum Map:

Please provide a curriculum map that visually represents the alignment between student learning outcomes and required courses/experiences.

See Appendix A.

# Measurement

## Outcome-Measure Alignment

Please provide a description of the assessment measures, noting how they were chosen/developed to align with the student learning outcomes.

The assessment of the 20 American Council for Construction Education (ACCE) Student Learning Outcomes is one of the measures used to evaluate Objective 2.1: *Implement and assess a student learning outcomes based curriculum consistent with the standards of the American Council for Construction Education and the needs of stakeholders.* The outcomes are evaluated using both direct and indirect measures as set out below. Faculty with subject matter expertise develop the assessment measures and accompanying grading rubrics and these are reviewed by the chair of the undergraduate program and the school head.

The table below sets out how each of the outcomes are directly assessed currently and how we plan to assess them after the introduction of the new curriculum:

|  |  |  |
| --- | --- | --- |
| **Student Learning Outcome** | **Where & How Assessed** | **Implementation Date** |
|  |  |  |
| 1. Create written communications appropriate to the construction discipline. | BSCI 3200 Construction Communication (First Semester, Junior Year)– Written Documents & Case Study (30%  of course grade) | Summer 2017 |

|  |  |  |
| --- | --- | --- |
| 2. Create oral presentations appropriate to the construction discipline. | BSCI 3200 Construction Communication (First Semester, Junior Year)– Oral Presentations  (15% of course grade) | Fall 2016 |
| 3. Create a construction project safety plan. | BSCI 4990 – Thesis (2nd Semester,  Senior Year). Safety Plan accounts for 5% of Thesis grade. | Fall 2014 |
| 4. Create construction project cost estimates. | BSCI 4990 – Thesis (2nd Semester,  Senior Year). Project Estimate accounts for 15% of Thesis grade | Fall 2014 |
| 5. Create construction project schedules. | BSCI 4990 – Thesis (2nd Semester, Senior Year). Scheduling Assessment accounts for 10% of  Thesis grade. | Fall 2015 |
| 6. Analyze professional decisions based on ethical principles. | BSCI 3200 – Construction Communication (First Semester, Junior Year)- Written Company Ethics Policy on Gifts and  Entertainment – 5% of course grade | Summer 2017 |
| 7. Analyze construction documents for planning and management of construction  processes. | BSCI 4990 – Thesis (2nd Semester, Senior Year). Construction Documents Assessment accounts  for 10% of Thesis grade. | Summer 2018 |
| 8. Analyze methods, materials, and equipment used to construct projects. | BSCI 4350 - Construction Project Analysis (First Semester, Senior Year). Project Method Statement  accounts for 35% of course grade | Spring 2018 |
| 9. Apply construction management skills as a member of a multi-disciplinary  team. | BSCI 4610 – Scheduling and Field Operations (First Semester, Senior Year). Collaborative Project  accounts for 15% of course grade | Fall 2017 |
| 10. Apply electronic-based technology to manage the construction process. | BSCI 4500 - Information and Communication Technology for Construction (CIT) (First Semester, Senior Year). – 2. Final Project accounts for 20% of course grade | Spring 2018 |
| 11. Apply basic surveying techniques for construction layout and control. | BSCI 3300 – Field Surveying. Final Examination (First Semester, Junior Year) accounts for 10% of final  grade. Field Book accounts for 10% | Summer 2016 |

|  |  |  |
| --- | --- | --- |
|  | of final grade |  |
| 12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction  process. | BSCI 3800 (2nd Semester, Junior Year) – Contracting Business. Test 1 accounts for 24% of course grade. | Spring 2018 |
| 13. Understand construction risk management. | BSCI 4850 Construction Law and Risk Management (2nd Semester, Senior Year). – Specific questions on Tests 2 & 3. Tests 2 & 3 account  for 50% of course grade | Fall 2018 |
| 14. Understand construction accounting and cost control. | BSCI 4610 – Scheduling and Field Operations (First Semester, Senior Year). – Specific questions on Tests 2 & 3. Tests 2 & 3 account for 30%  of course grade | Spring 2018 |
| 15. Understand construction quality assurance and control. | BSCI 4350 Construction Project Analysis (First Semester, Senior Year). Quiz 2 accounts for 30% of  course grade. | Spring 2018 |
| 16. Understand construction project control processes. | BSCI 4610 – Scheduling and Field Operations (First Semester, Senior Year). – Specific questions on Tests  3. Test 3 accounts for 15% of  course grade | Spring 2018 |
| 17. Understand the legal implications of contract, common, and regulatory law to manage a construction project. | BSCI 4850 Construction Law and Risk Management (2nd Semester, Senior Year). – Specific questions on Tests 1, 2 & 3. Tests 1, 2 & 3  account for 75% of course grade | Fall 2018 |
| 18. Understand the basic  principles of sustainable construction. | BSCI 4990 – Thesis (2nd Semester,  Senior Year). LEED Assessment accounts for 5% of Thesis grade | Fall 2014 |
| 19. Understand the basic principles of structural behavior. | Current Curriculum - BSCI 4990 – Thesis (2nd Semester, Senior Year). Structural Assessment accounts for  5% of Thesis grade | Fall 2014 |
|  | New curriculum - BSCI 3440,  Structure of Buildings (First | Fall 2017/Spring 2018 |

|  |  |  |
| --- | --- | --- |
|  | Semester, Junior Year) – II. Final  examination accounts for 20% of course grade. |  |
| 20. Understand the basic principles of mechanical, electrical and piping systems | BSCI 4700 Mechanical Systems in Buildings (2nd Semester, Junior Year). Mid-term and final examination accounts for 40% of course grade. BSCI 4750 Electrical Systems (2nd Semester, Junior Year) in Buildings. Three examinations  accounts for 90% of course grade. | Fall 2016 |

## Direct Measures

Please consider indicating which assessments are direct measures of student learning (e.g., exams, rubric scores).

For the spring semester of 2016 the following ACCE Student Learning Outcomes were assessed using direct measures (Numbering system reflects ACCE Student Learning Outcomes):

*No. 3 Create a construction project safety plan No. 4 Create construction project cost estimates No. 5 Create construction project schedules*

*No. 18 Understand the basic principles of sustainable construction No. 19 Understand the basic principles of structural behavior*

All of the above outcomes are assessed as part of BSCI 4990 – Thesis. All graduating seniors are required to take this class. Grading rubrics are used to assess each outcome. The accompanying document *BSCI 4990 Rules & Regulations 2016.docx* sets out the assessment requirements for the 5 outcomes assessed in BSCI 4990 and also contains the 5 grading rubrics used.

In summer 2016 the following ACCE Student Learning Outcome was assessed in BSCI 3300 Field Surveying for the first time:

*No. 11 Apply basic surveying techniques for construction layout and*

*control.*

This outcome is assessed in BSCI 3300 – Field Surveying. Two measures are reported, individual student performance in the comprehensive final examination which accounts for 10% of final grade. The comprehensive final examination consists of a mixture short true/false and multiple choice questions, together with a number of short and longer calculation problems that evaluate basic surveying

techniques for construction layout and control. The second measure is the students individual grade for the completion of their surveying field book which also accounts for 10% of final grade

In addition to the five outcomes assessed in the spring, the following two ACCE Student Learning Outcome was assessed for the first time during the fall 2016 semester.:

In BSCI 4700 Mechanical Systems in Buildings & BSCI 4750 Electrical Systems in Buildings:

*No. 20 Understand the basic principles of mechanical, electrical and piping systems*

This outcome is assessed in BSCI 4700 Mechanical Systems in Buildings & BSCI 4750 Electrical Systems in Buildings

Mechanical Systems are assessed by the Final Examination in BSCI 4700 using multiple format questions such as matching, multiple choice, true/false, short answer, identification and problem solving

Electrical Systems are assessed by 3 examinations in BSCI 4750 using multiple choice, short answer, true/false and problem solving questions.

Plumbing Systems are assessed by the Mid-term Examination in BSCI 4700 using multiple format questions such as matching, multiple choice, true/false, short answer, identification and problem solving

In BSCI 3200 Construction Communication

*No. 2. Create oral presentations appropriate to the construction discipline*

This outcome is assessed in BSCI 3200 Construction Communication. A case study presentation accounts for 15% of final grade. Oral Presentation Rubric (*Oral Communication Rubric.pdf*) measures performance over 5 specific criteria

With the new curricula starting in Summer 2017, we continue to roll out direct measures of all 20 learning outcomes. As noted in the section above, we anticipate evaluating all outcomes by the end of Spring 2018.

## 6a. Indirect Measures

An exit survey administered to all graduating seniors indirectly measure the students’ perception of their ability to meet the 20 ACCE Student Learning Outcomes. The exit survey assesses how strongly they agree they have met the 20 outcomes.

## Data Collection

Please provide a description of the assessment data collection process (i.e., information on how data were collected, who provided data, and the pertinent methodological details such as rating/scoring design).

Data for both direct and indirect measures are collected each semester. Grading rubrics for each of the SLO’s directly assessed in BSCI 4990 are completed by the faculty grading each student thesis individually. Completed rubrics are collated by the school head into a spreadsheet and this is used to compile the results set out below.

Grading rubrics for data collected in BSCI 3200, BSCI 3300, BSCI 4700 & BSCI 4750 is collected by the faculty teaching the course and passed to the school head for compilation. The exit survey is administered to all graduating seniors each semester approximately 3 weeks before graduation and they are sent reminders to complete the survey.

# Results

## Reporting Results

Please provide assessment results aligned with the student learning outcomes. If historical assessment data is available, consider providing this data to reveal any student learning trends.

The results from both direct and indirect assessment for semesters Fall 2014 through Fall 2016 are set out below.

## ACCE SLO #2 - Create oral presentations appropriate to the construction discipline.

*Assessed in BSCI 3200 Construction Communication. Case Study Presentation accounts for 15% of final grade. Oral Presentation Rubric - measures performance over 5 specific criteria*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Central Message | 14 | 10 | 1 | 0 | 0 | 0 | **4.41** |
| Organization | 16 | 9 | 0 | 0 | 0 | 0 | **4.43** |
| Delivery | 13 | 10 | 2 | 0 | 0 | 0 | **4.29** |
| Content | 20 | 5 | 0 | 0 | 0 | 0 | **4.61** |
| Language | 21 | 4 | 0 | 0 | 0 | 3 | **4.78** |
| **Total (90.09%)** | | | | | |  | **22.52** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2016 | 100% | 100% | 88% | 56% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2016 | *Delivery* |

## ACCE SLO #3 - Create a construction project safety plan.

* + *Assessed in BSCI 4990 – Thesis. Safety Plan accounts for 5% of Thesis grade. Grading Rubric 4 – Safety – initial rubric measured performance over 8 specific criteria. Revised rubric introduced in Fall 2016 measures across 5 criteria.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2014** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 11 | 0 | 1 | 5 | 1 | 0 | **3.83** |
| Emergency Contacts | 11 | 6 | 1 | 0 | 0 | 0 | **4.56** |
| Safety Manager | 10 | 3 | 3 | 1 | 1 | 0 | **4.11** |
| First Aid | 11 | 3 | 1 | 2 | 1 | 0 | **4.17** |
| Emergency Plan | 10 | 4 | 1 | 2 | 1 | 0 | **4.11** |
| Regulations Governing Project | 9 | 5 | 0 | 3 | 1 | 0 | **4.00** |
|  | **25** | **20** | **15** | **10** | **5** | 0 |  |
| Analyze Hazards | 3 | 6 | 4 | 4 | 1 | 0 | **16.67** |
| Create a Safety Plan | 5 | 6 | 4 | 2 | 1 | 0 | **18.33** |
| Create Plan for Compliance | 5 | 6 | 2 | 3 | 0 | 0 | **16.11** |
| **Total (72.27%)** | | | | | |  | **75.89** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 21 | 3 | 3 | 0 | 0 | 0 | **4.67** |
| Emergency Contacts | 21 | 6 | 0 | 0 | 0 | 0 | **4.78** |
| Safety Manager | 17 | 7 | 1 | 2 | 0 | 0 | **4.44** |
| First Aid | 16 | 9 | 0 | 1 | 1 | 0 | **4.41** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Emergency Plan | 18 | 3 | 3 | 2 | 1 | 0 | **4.30** |
| Regulations Governing Project | 19 | 5 | 1 | 2 | 0 | 0 | **4.52** |
|  | **25** | **20** | **15** | **10** | **5** | **0** |  |
| Analyze Hazards | 6 | 11 | 8 | 1 | 1 | 0 | **18.70** |
| Create a Safety Plan | 3 | 15 | 7 | 2 | 0 | 0 | **18.51** |
| Create Plan for Compliance | 4 | 13 | 7 | 3 | 0 | 0 | **18.33** |
| **Total** | | | | | |  | **72.28** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 18 | 2 | 2 | 0 | 0 | 0 | **4.73** |
| Emergency Contacts | 17 | 4 | 0 | 1 | 0 | 0 | **4.68** |
| Safety Manager | 12 | 3 | 5 | 1 | 1 | 0 | **4.09** |
| First Aid | 14 | 3 | 3 | 1 | 1 | 0 | **4.27** |
| Emergency Plan | 15 | 2 | 2 | 2 | 1 | 0 | **4.27** |
| Regulations Governing Project | 11 | 2 | 7 | 1 | 0 | 1 | **3.91** |
|  | **25** | **20** | **15** | **10** | **5** | **0** |  |
| Analyze Hazards | 6 | 8 | 3 | 5 | 0 | 0 | **18.41** |
| Create a Safety Plan | 6 | 6 | 6 | 4 | 0 | 0 | **18.18** |
| Create Plan for Compliance | 8 | 4 | 7 | 2 | 1 | 0 | **18.63** |
| **Total** | | | | | |  | **76.86** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015\***  **Changes to Rubric** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 12 | 6 | 6 | 0 | 0 | 1 | **4.08** |
| Safety Manager | 9 | 8 | 5 | 1 | 2 | 0 | **3.84** |
| First Aid | 13 | 4 | 3 | 1 | 2 | 2 | **3.76** |
| Emergency Contacts | 12 | 6 | 4 | 1 | 1 | 1 | **3.96** |
| Accident Plan | 11 | 8 | 3 | 1 | 1 | 1 | **3.96** |
| Training | 8 | 10 | 3 | 1 | 2 | 1 | **3.72** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Analyze Hazards | 7 | 7 | 9 | 1 | 1 | 0 | **26.04** |
| Create a Safety Plan for  compliance | 8 | 10 | 5 | 0 | 1 | 1 | **26.88** |
| **Total** | | | | | |  | **76.24** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 16 | 11 | 2 | 0 | 1 | 0 | **4.37** |
| Safety Manager | 19 | 4 | 6 | 0 | 1 | 0 | **4.33** |
| First Aid | 19 | 5 | 4 | 0 | 2 | 0 | **4.30** |
| Emergency Contacts | 13 | 6 | 6 | 4 | 0 | 1 | **3.83** |
| Accident Plan | 17 | 5 | 3 | 1 | 1 | 3 | **3.90** |
| Training | 15 | 7 | 3 | 1 | 0 | 4 | **3.80** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |
| Analyze Hazards | 13 | 11 | 3 | 1 | 1 | 1 | **28.23** |
| Create a Safety Plan for  compliance | 9 | 12 | 7 | 1 | 0 | 1 | **27.07** |
| **Total** | | | | | |  | **79.83** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 12 | 4 | 3 | 0 | 1 | 0 | **4.30** |
| Safety Manager | 9 | 8 | 1 | 2 | 0 | 0 | **4.20** |
| First Aid | 12 | 4 | 3 | 0 | 1 | 0 | **4.30** |
| Emergency Contacts | 14 | 4 | 1 | 0 | 1 | 0 | **4.50** |
| Accident Plan | 12 | 2 | 5 | 1 | 0 | 3 | **4.25** |
| Training | 11 | 6 | 0 | 1 | 2 | 0 | **4.15** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |
| Analyze Hazards | 11 | 6 | 2 | 1 | 0 | 0 | **30.45** |
| Create a Safety Plan for  compliance | 11 | 7 | 1 | 0 | 1 | 0 | **30.45** |
| **Total** | | | | | |  | **86.60** |

|  |  |  |
| --- | --- | --- |
| **Fall 2016 (Revised Rubric)** | **Grading Scale** | **Average** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **5** | **4** | **3** | **2** | **1** | **0** |  |
| Company Safety Policy | 12 | 8 | 4 | 0 | 0 | 0 | **4.33** |
| Site Specific Safety Plan | 7 | 15 | 2 | 0 | 0 | 0 | **4..21** |
| Job Hazard Analysis | 9 | 7 | 6 | 2 | 0 | 0 | **3.96** |
| Hazardous Materials | 9 | 10 | 4 | 1 | 0 | 0 | **4.13** |
| Injury/Accident Plan | 7 | 12 | 5 | 0 | 0 | 3 | **4.108** |
| **Total** | | | | | |  | **81.58** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2014 | 67% | 50% | 39% | 22% |
| Spring 2015 | 85% | 70% | 44% | 11% |
| Summer 2015 | 67% | 52% | 33% | 22% |
| Fall 2015 | 80% | 68% | 32% | 28% |
| Spring 2016 | 87% | 77% | 60% | 30% |
| Summer 2016 | 80% | 80% | 70% | 50% |
| Fall 2016 | 79% | 67% | 42% | 17% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2014 | *Create Plan for Compliance* |
| Spring 2015 | *Create Plan for Compliance* |
| Summer 2015 | *Create a Safety Plan* |
| Fall 2015 | *Analyze Hazards* |
| Spring 2016 | *Emergency Contacts* |
| Summer 2016 | *Safety Manager* |
| Fall 2016 | *Job Hazard Analysis* |

## ACCE SLO #4 Create construction project cost estimates.

* + *Assessed in BSCI 4990 – Thesis. Project Estimate accounts for 15% of Thesis grade. Grading Rubric 1 – Estimate - measures performance over 5 specific criteria.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2014** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 8 | 5 | 4 | 1 | 0 | 0 | **4.11** |
| Calculate Building Quantities | 6 | 7 | 3 | 1 | 1 | 0 | **3.89** |
| Choose Appropriate Technology for Creating Estimate | 7 | 6 | 4 | 0 | 1 | 0 | **4.00** |
| BIM Model | 13 | 3 | 2 | 0 | 0 | 0 | **4.61** |
| Create an Estimate | 6 | 8 | 4 | 0 | 0 | 0 | **4.11** |
| **Total (82.89%)** | | | | | |  | **20.72** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 15 | 9 | 3 | 2 | 2 | 0 | **4.06** |
| Calculate Building Quantities | 9 | 17 | 2 | 0 | 3 | 0 | **3.94** |
| Choose Appropriate Technology for Creating Estimate | 12 | 12 | 4 | 1 | 1 | 1 | **3.97** |
| BIM Model | 19 | 5 | 4 | 0 | 2 | 1 | **4.16** |
| Create an Estimate | 4 | 20 | 4 | 1 | 2 | 0 | **3.74** |
| **Total (79.48%)** | | | | | |  | **19.87** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 10 | 8 | 4 | 0 | 0 | 0 | **4.27** |
| Calculate Building Quantities | 7 | 11 | 4 | 0 | 0 | 0 | **4.14** |
| Choose Appropriate Technology for Creating Estimate | 10 | 11 | 1 | 0 | 0 | 0 | **4.41** |
| BIM Model | 10 | 10 | 1 | 1 | 0 | 0 | **4.32** |
| Create an Estimate | 5 | 16 | 1 | 0 | 0 | 0 | **4.18** |
| **Total (85.27%)** | | | | | |  | **21.32** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 13 | 8 | 3 | 1 | 0 | 0 | **4.32** |
| Calculate Building Quantities | 6 | 13 | 4 | 1 | 0 | 0 | **3.88** |
| Choose Appropriate Technology for Creating Estimate | 10 | 12 | 2 | 1 | 0 | 0 | **4.24** |
| BIM Model | 15 | 8 | 1 | 0 | 1 | 0 | **4.44** |
| Create an Estimate | 4 | 14 | 6 | 0 | 1 | 0 | **3.80** |
| **Total (82.72%)** | | | | | |  | **20.7** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 14 | 7 | 5 | 2 | 1 | 0 | **4.07** |
| Calculate Building Quantities | 11 | 9 | 5 | 3 | 1 | 0 | **3.90** |
| Choose Appropriate Technology for Creating Estimate | 23 | 4 | 2 | 0 | 0 | 0 | **4.72** |
| BIM Model | 15 | 13 | 1 | 0 | 0 | 0 | **4.48** |
| Create an Estimate | 11 | 7 | 4 | 3 | 4 | 0 | **3.62** |
| **Total (83.17%)** | | | | | |  | **20.8** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Classify Materials and Methods  by Trades | 12 | 6 | 1 | 1 | 0 | 0 | **4.45** |
| Calculate Building Quantities | 8 | 6 | 6 | 0 | 0 | 0 | **4.10** |
| Choose Appropriate Technology for Creating Estimate | 12 | 6 | 2 | 0 | 0 | 0 | **4.50** |
| BIM Model | 11 | 6 | 3 | 0 | 0 | 0 | **4.40** |
| Create an Estimate | 6 | 8 | 4 | 0 | 1 | 0 | **3.93** |
| **Total (85.50%)** | | | | | |  | **21.4** |

|  |  |  |
| --- | --- | --- |
| **Fall 2016** | **Grading Scale** | **Average** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **5** | **4** | **3** | **2** | **1** | **0** |  |
| Classify Materials and Methods by Trades | 15 | 16 | 1 | 2 | 2 | 0 | **4.10** |
| Calculate Building Quantities | 9 | 14 | 7 | 4 | 2 | 0 | **3.63** |
| Choose Appropriate Technology for Creating Estimate | 15 | 15 | 6 | 0 | 0 | 0 | **4.24** |
| BIM Model | 18 | 12 | 3 | 3 | 0 | 0 | **4.25** |
| Create an Estimate | 3 | 20 | 7 | 1 | 4 | 0 | **3.44** |
| **Total (78.63%)** | | | | | |  | **19.7** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2014 | 94% | 83% | 56% | 39% |
| Spring 2015 | 81% | 77% | 58% | 23% |
| Summer 2015 | 71% | 68% | 48% | 23% |
| Fall 2015 | 88% | 84% | 64% | 28% |
| Spring 2016 | 90% | 83% | 62% | 45% |
| Summer 2016 | 85% | 80% | 60% | 35% |
| Fall 2016 | 69% | 61% | 36% | 6% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2014 | *Calculate Building Quantities* |
| Spring 2015 | *Create an Estimate* |
| Summer 2015 | *Calculate Building Quantities* |
| Fall 2015 | *Create an Estimate* |
| Spring 2016 | *Create an Estimate* |
| Summer 2016 | *Create an Estimate* |
| Fall 2016 | *Create an Estimate* |

## ACCE SLO # 5 Create construction project schedules.

* + *Assessed in BSCI 4990 – Thesis. Scheduling Assessment accounts for 10% of Thesis grade. Grading Rubric 5 – Scheduling - measures performance over 5 specific criteria*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Develop work breakdown  structure | 11 | 11 | 2 | 0 | 0 | 0 | **4.38** |
| Calculate and apply durations | 10 | 11 | 2 | 1 | 0 | 0 | **4.25** |
| Assign relationships and constraints | 8 | 11 | 4 | 1 | 0 | 0 | **4.08** |
| Leverage the software platform | 12 | 8 | 3 | 1 | 0 | 0 | **4.29** |
| Create a project schedule | 7 | 13 | 3 | 1 | 0 | 0 | **4.08** |
| **Total (84.33%)** | | | | | |  | **21.08** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Develop work breakdown  structure | 12 | 11 | 4 | 3 | 0 | 0 | **4.07** |
| Calculate and apply durations | 18 | 5 | 4 | 3 | 0 | 0 | **4.27** |
| Assign relationships and constraints | 7 | 14 | 8 | 1 | 0 | 0 | **3.90** |
| Leverage the software platform | 14 | 13 | 2 | 1 | 0 | 0 | **4.33** |
| Create a project schedule | 7 | 16 | 2 | 5 | 0 | 0 | **3.83** |
| **Total (81.60%)** | | | | | |  | **20.40** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Develop work breakdown  structure | 12 | 6 | 1 | 1 | 0 | 0 | **4.45** |
| Calculate and apply durations | 10 | 5 | 4 | 1 | 0 | 0 | **4.20** |
| Assign relationships and constraints | 5 | 8 | 5 | 2 | 0 | 0 | **3.80** |
| Leverage the software platform | 9 | 7 | 4 | 0 | 0 | 0 | **4.25** |
| Create a project schedule | 9 | 3 | 7 | 1 | 0 | 0 | **4.00** |

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| --- | --- | --- |
| **Total (82.80%)** |  | **20.70** |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Develop work breakdown  structure | 20 | 11 | 3 | 1 | 0 | 0 | **4.41** |
| Calculate and apply durations | 15 | 11 | 4 | 4 | 1 | 0 | **3.97** |
| Assign relationships and constraints | 13 | 10 | 9 | 2 | 1 | 0 | **3.96** |
| Leverage the software platform | 16 | 13 | 4 | 1 | 1 | 0 | **4.21** |
| Create a project schedule | 12 | 14 | 4 | 4 | 1 | 0 | **3.91** |
| **Total (81.83%)** | | | | | |  | **20.46** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2015 | 96% | 88% | 67% | 38% |
| Spring 2016 | 83% | 73% | 67% | 43% |
| Summer 2016 | 75% | 65% | 50% | 50% |
| Fall 2016 | 71% | 66% | 46% | 31% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2015 | *Assign relationships and constraints/create a project schedule* |
| Spring 2016 | *Create a project schedule* |
| Summer 2016 | *Assign relationships and constraints* |
| Fall 2016 | *Create a project schedule* |

## ACCE SLO #11 Apply basic surveying techniques for construction layout and control.

* + *Assessed in BSCI 3300 – Field Surveying. Final Examination accounts for 10% of final grade. Field Book accounts for 10% of final grade.*

|  |  |  |
| --- | --- | --- |
| **Summer 2016** | **No. of students** | **Average** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Assessment** | **<60** | **60-69** | **70-79** | **80-89** | **90+** |  |
|  |  |  |  |  |  |  |
| Final Examination | 0 | 1 | 8 | 31 | 57 | 90.30 |
| Field Book | 0 | 0 | 3 | 3 | 91 | 97.46 |

## ACCE SLO #18 Understand the basic principles of sustainable construction.

* + *Assessed in BSCI 4990 – Thesis. LEED Assessment accounts for 5% of Thesis grade. Grading Rubric 2 – Sustainability - measures performance over 5 specific criteria.*

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2014** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the appropriate LEED  rating system for your project | 12 | 2 | 2 | 1 | 0 | 0 | **4.47** |
| Identify a material that has recycled content and provide documentation showing source of information | 13 | 2 | 2 | 0 | 0 | 0 | **4.65** |
| Calculate the % of the recycled material based on value. | 8 | 1 | 3 | 5 | 0 | 0 | **3.71** |
| Provide Map of Locally  Resourced Material | 13 | 1 | 3 | 0 | 0 | 0 | **4.59** |
| Provide Table of Locally  Resourced Material | 10 | 3 | 3 | 0 | 1 | 0 | **4.24** |
| Calculate the $ amount that would be required to achieve 2  LEED points | 9 | 1 | 6 | 0 | 0 | 1 | **3.94** |
| Identify recycling service provider and services provided | 9 | 1 | 4 | 3 | 0 | 0 | **3.94** |
| **Total (84.37%)** | | | | | |  | **29.53** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the appropriate LEED  rating system for your project | 20 | 2 | 1 | 0 | 1 | 1 | **4.48** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Identify a material that has recycled content and provide documentation showing source of information | 21 | 1 | 3 | 0 | 0 | 0 | **4.72** |
| Calculate the % of the recycled material based on value. | 20 | 1 | 4 | 0 | 0 | 0 | **4.64** |
| Provide Map of Locally  Resourced Material | 18 | 3 | 1 | 0 | 2 | 1 | **4.28** |
| Provide Table of Locally  Resourced Material | 20 | 3 | 2 | 0 | 0 | 0 | **4.72** |
| Calculate the $ amount that would be required to achieve 2  LEED points | 17 | 6 | 1 | 0 | 0 | 1 | **4.48** |
| Identify recycling service provider and services provided | 17 | 5 | 0 | 0 | 1 | 2 | **4.24** |
| **Total (90.17%)** | | | | | |  | **31.56** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the appropriate LEED  rating system for your project | 16 | 1 | 3 | 1 | 0 | 1 | **4.32** |
| Identify a material that has recycled content and provide documentation showing source of information | 11 | 2 | 4 | 0 | 5 | 0 | **3.64** |
| Calculate the % of the recycled material based on value. | 9 | 9 | 1 | 1 | 1 | 1 | **3.95** |
| Provide Map of Locally  Resourced Material | 5 | 4 | 4 | 0 | 0 | 9 | **2.41** |
| Provide Table of Locally  Resourced Material | 9 | 8 | 3 | 1 | 0 | 1 | **4.00** |
| Calculate the $ amount that  would be required to achieve 2 LEED points | 13 | 3 | 1 | 2 | 0 | 3 | **3.82** |
| Identify recycling service provider and services provided | 8 | 7 | 3 | 2 | 0 | 2 | **3.68** |
| **Total (70.13%)** | | | | | |  | **25.82** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015\***  **Changes to rubric** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Environmental impacts of  construction on site | 13 | 12 | 0 | 0 | 0 | 0 | **4.52** |
| Fundamental commissioning and verification | 9 | 11 | 5 | 0 | 0 | 0 | **4.16** |
| Environmentally preferable products | 11 | 6 | 6 | 2 | 0 | 0 | **4.04** |
| Reduce construction waste | 11 | 11 | 2 | 1 | 0 | 0 | **4.28** |
| IAQ management plan | 9 | 6 | 8 | 2 | 0 | 0 | **3.88** |
| **Total (83.52%)** | | | | | |  | **20.90** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Environmental impacts of  construction on site | 18 | 10 | 1 | 0 | 1 | 0 | **4.47** |
| Fundamental commissioning and verification | 16 | 6 | 7 | 0 | 1 | 0 | **4.20** |
| Environmentally preferable products | 19 | 3 | 5 | 1 | 2 | 0 | **4.20** |
| Reduce construction waste | 18 | 10 | 1 | 0 | 1 | 0 | **4.47** |
| IAQ management plan | 16 | 4 | 8 | 0 | 2 | 0 | **4.07** |
| **Total (85.60%)** | | | | | |  | **21.40** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Environmental impacts of  construction on site | 17 | 1 | 2 | 0 | 1 | 0 | **4.75** |
| Fundamental commissioning and verification | 10 | 8 | 2 | 0 | 1 | 0 | **4.40** |
| Environmentally preferable products | 13 | 4 | 2 | 0 | 0 | 1 | **4.35** |
| Reduce construction waste | 11 | 4 | 3 | 0 | 1 | 1 | **4.05** |
| IAQ management plan | 12 | 4 | 2 | 2 | 0 | 0 | **4.30** |
| **Total (87.40%)** | | | | | |  | **21.90** |

|  |  |  |
| --- | --- | --- |
| **Fall 2016** | **Grading Scale** | **Average** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **5** | **4** | **3** | **2** | **1** | **0** |  |
| Environmental impacts of  construction on site | 23 | 7 | 4 | 0 | 0 | 0 | **4.57** |
| Fundamental commissioning and verification | 14 | 10 | 6 | 2 | 0 | 2 | **3.88** |
| Environmentally preferable products | 18 | 9 | 5 | 0 | 0 | 2 | **4.16** |
| Reduce construction waste | 18 | 9 | 5 | 1 | 1 | 0 | **4.20** |
| IAQ management plan | 15 | 11 | 4 | 3 | 0 | 1 | **4.03** |
| **Total (83.32%)** | | | | | |  | **20.8** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2014 | 94% | 76% | 59% | 47% |
| Spring 2015 | 92% | 88% | 76% | 64% |
| Summer 2015 | 64% | 52% | 36% | 24% |
| Fall 2015 | 88% | 88% | 56% | 28% |
| Spring 2016 | 97% | 83% | 63% | 57% |
| Summer 2016 | 90% | 85% | 65% | 55% |
| Fall 2016 | 71% | 65% | 38% | 24% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2014 | *Calculate the % of the recycled material based on value.* |
| Spring 2015 | *Identify recycling service provider and services provided* |
| Summer 2015 | *Provide Map of Locally Resourced Material* |
| Fall 2015 | *IAQ management plan* |
| Spring 2016 | *IAQ management plan* |
| Summer 2016 | *Reduce construction waste* |
| Fall 2016 | *Fundamental commissioning and verification* |

## ACCE SLO # 19 Understand the basic principles of structural behavior.

o *Assessed in BSCI 4990 – Thesis. Structural Assessment accounts for 5% of Thesis grade. Grading Rubric 3 – Structural - measures performance over 7 specific criteria.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2014** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 8 | 9 | 1 | 0 | 0 | **0** | **4.39** |
| Identify common methods of stabilizing structural frames | 8 | 6 | 4 | 0 | 0 | **0** | **4.22** |
| Classify Loads on Buildings | 9 | 6 | 3 | 0 | 0 | **0** | **4.33** |
| Trace the path of vertical and lateral loads through structural  components of a post and beam building | 10 | 6 | 2 | 0 | 0 | **0** | **4.44** |
| Design and Construct strong, stiff, & stable temporary  structures and formwork | 10 | 4 | 1 | 0 | 3 | **0** | **4.00** |
| Calculate internal member forces  in structural elements of buildings | 10 | 1 | 4 | 1 | 2 | **0** | **3.89** |
| Determine internal stresses on structural bending elements | 10 | 1 | 4 | 1 | 2 | **0** | **3.89** |
| **Total (83.33%)** | | | | | |  | **29.17** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 13 | 12 | 2 | 1 | 0 | 1 | **4.17** |
| Identify common methods of stabilizing structural frames | 14 | 10 | 3 | 1 | 0 | 1 | **4.17** |
| Classify Loads on Buildings | 18 | 7 | 2 | 0 | 2 | 0 | **4.34** |
| Trace the path of vertical and lateral loads through structural components of a post and beam  building | 16 | 10 | 1 | 0 | 2 | 0 | **4.31** |
| Design and Construct strong, stiff, & stable temporary  structures and formwork | 18 | 8 | 4 | 3 | 0 | 0 | **4.14** |
| Calculate internal member forces  in structural elements of buildings | 15 | 3 | 4 | 2 | 4 | 1 | **3.69** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Determine internal stresses on structural bending elements | 16 | 4 | 4 | 1 | 4 | 0 | **3.93** |
| **Total (82.17%)** | | | | | |  | **28.76** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 9 | 9 | 3 | 1 | 0 | 0 | **4.18** |
| Identify common methods of stabilizing structural frames | 8 | 10 | 3 | 0 | 0 | 1 | **4.05** |
| Classify Loads on Buildings | 8 | 13 | 0 | 0 | 1 | 0 | **4.23** |
| Trace the path of vertical and lateral loads through structural components of a post and beam  building | 6 | 12 | 3 | 0 | 0 | 1 | **3.95** |
| Design and Construct strong,  stiff, & stable temporary structures and formwork | 8 | 4 | 3 | 4 | 2 | 1 | **3.41** |
| Calculate internal member forces  in structural elements of buildings | 7 | 2 | 7 | 1 | 4 | 1 | **3.18** |
| Determine internal stresses on structural bending elements | 4 | 5 | 4 | 4 | 4 | 1 | **2.91** |
| **Total (74.03%)** | | | | | |  | **25.91** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 13 | 11 | 1 | 0 | 0 | 0 | **4.48** |
| Identify common methods of stabilizing structural frames | 9 | 12 | 2 | 2 | 0 | 0 | **4.12** |
| Classify Loads on Buildings | 13 | 8 | 3 | 0 | 1 | 0 | **4.28** |
| Trace the path of vertical and lateral loads through structural components of a post and beam  building | 16 | 6 | 3 | 0 | 1 | 1 | **4.52** |
| Design and Construct strong, stiff, & stable temporary structures and formwork | 9 | 9 | 5 | 0 | 1 | 1 | **3.88** |
| Calculate internal member forces | 11 | 8 | 4 | 1 | 0 | 1 | **4.04** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| in structural elements of buildings |  |  |  |  |  |  |  |
| Determine internal stresses on structural bending elements | 13 | 3 | 4 | 1 | 0 | 4 | **3.64** |
| **Total (74.03%)** | | | | | |  | **25.91** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 20 | 8 | 1 | 1 | 0 | 0 | **4.57** |
| Identify common methods of stabilizing structural frames | 17 | 8 | 4 | 1 | 0 | 0 | **4.37** |
| Classify Loads on Buildings | 17 | 11 | 1 | 0 | 1 | 0 | **4.43** |
| Trace the path of vertical and lateral loads through structural components of a post and beam  building | 19 | 7 | 2 | 0 | 2 | 0 | **4.37** |
| Design and Construct strong, stiff, & stable temporary structures and formwork | 21 | 2 | 3 | 3 | 1 | 0 | **4.30** |
| Calculate internal member forces  in structural elements of buildings | 19 | 6 | 2 | 1 | 0 | 0 | **4.30** |
| Determine internal stresses on structural bending elements | 16 | 8 | 3 | 1 | 2 | 4 | **4.17** |
| **Total (87.14%)** | | | | | |  | **30.50** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 17 | 13 | 3 | 1 | 1 | 0 | **4.24** |
| Identify common methods of stabilizing structural frames | 15 | 10 | 5 | 2 | 3 | 0 | **3.89** |
| Classify Loads on Buildings | 21 | 9 | 2 | 0 | 2 | 1 | **4.26** |
| Trace the path of vertical and lateral loads through structural  components of a post and beam building | 19 | 11 | 3 | 1 | 1 | 0 | **4.31** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Design and Construct strong, stiff, & stable temporary structures and formwork | 18 | 7 | 5 | 2 | 2 | 1 | **3.94** |
| Calculate internal member forces  in structural elements of buildings | 20 | 8 | 2 | 1 | 3 | 1 | **4.31** |
| Determine internal stresses on structural bending elements | 20 | 6 | 4 | 1 | 3 | 1 | **3.94** |
| **Total (82.55%)** | | | | | |  | **28.89** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Identify the structural  components of a building | 15 | 3 | 1 | 1 | 0 | 0 | **4.60** |
| Identify common methods of stabilizing structural frames | 8 | 8 | 2 | 0 | 2 | 0 | **4.00** |
| Classify Loads on Buildings | 17 | 11 | 1 | 0 | 1 | 0 | **4.43** |
| Trace the path of vertical and lateral loads through structural components of a post and beam  building | 12 | 5 | 2 | 0 | 1 | 0 | **4.35** |
| Design and Construct strong, stiff, & stable temporary structures and formwork | 8 | 6 | 2 | 3 | 1 | 0 | **3.85** |
| Calculate internal member forces  in structural elements of buildings | 11 | 2 | 4 | 0 | 3 | 0 | **3.90** |
| Determine internal stresses on structural bending elements | 12 | 1 | 5 | 0 | 2 | 0 | **4.05** |
| **Total (83.57%)** | | | | | |  | **29.25** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Fall 2014 | 89% | 83% | 56% | 39% |
| Spring 2015 | 79% | 72% | 59% | 38% |
| Summer 2015 | 55% | 52% | 31% | 17% |
| Fall 2015 | 84% | 80% | 64% | 48% |
| Spring 2016 | 93% | 90% | 77% | 53% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Summer 2016 | 80% | 65% | 50% | 45% |
| Fall 2016 | 69% | 60% | 43% | 31% |

|  |  |
| --- | --- |
| **Semester** | **Lowest ranked criteria** |
| Fall 2014 | *Calculate internal member forces in structural elements of buildings.*  *Determine internal stresses on structural bending elements.* |
| Spring 2015 | *Calculate internal member forces in structural elements of buildings.* |
| Summer 2015 | *Determine internal stresses on structural bending elements.* |
| Fall 2015 | *Determine internal stresses on structural bending elements.* |
| Spring 2016 | *Determine internal stresses on structural bending elements* |
| Summer 2016 | *Design and Construct strong, stiff, & stable temporary structures and formwork* |
| Fall 2016 | *Design and Construct strong, stiff, & stable temporary structures and formwork* |

## ACCE SLO #20 Understand the basic principles of mechanical, electrical and piping systems.

o Assessed in examinations in BSCI 4700 Mechanical Systems in Buildings & BSCI 4750 Electrical Systems in Buildings:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016** | **No. of students** | | | | | **Average** |
| **Assessment** | **<60** | **60-69** | **70-79** | **80-89** | **90+** |
|  |  |  |  |  |  |  |
| Final Examination BSCI 4700 (Mechanical portion) | 0 | 1 | 14 | 30 | 14 | 85% |
| Mid Term Examination BSCI 4700 (Plumbing portion) | 1 | 1 | 14 | 32 | 12 | 84% |
| 3 Examination in BSCI 4750  (Electrical) | 3 | 1 | 9 | 40 | 67 | 88% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Percentage of students scoring above** | **60%** | **70%** | **80%** | **90%** |
| Mechanical Fall 2016 | 100% | 98% | 75% | 23% |
| Electrical Fall 2016 | 100% | 98% | 75% | 20% |
| Plumbing Fall 2016 | 99% | 97% | 89% | 56% |

## 8a. Indirect Measure

Indirectly measure the students’ perception of their ability to meet the 20 ACCE Student Learning Outcomes using an exit survey that assesses how strongly they agree they have met the 20 outcomes.

*Our accreditation agency, The American Council for Construction Education, has established learning outcomes that set out what you should be able to do upon graduation. On a scale of 1 to 5, rate how strongly you agree or disagree that you have achieved the following outcomes:*

## Individual responses and average response

* 1. Create written communications appropriate to the construction discipline

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 4 | 4 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 0 | 0 | 9 | 19 | 4.68 |
| Summer 2015 (21 Reporting) | 0 | 0 | 0 | 4 | 17 | 4.81 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 9 | 7 | 4.15 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 7 | 13 | 4.57 |
| Summer 2016 (21 Reporting) | 0 | 0 | 2 | 11 | 11 | 4.38 |
| Fall 2016 (27 Reporting) | 0 | 0 | 0 | 12 | 15 | 4.56 |

* 1. Create oral presentations appropriate to the construction discipline

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 3 | 4 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 8 | 19 | 4.64 |
| Summer 2015 (21 Reporting) | 0 | 0 | 1 | 11 | 9 | 4.38 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 10 | 6 | 4.10 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 8 | 12 | 4.52 |
| Summer 2016 (24 Reporting) | 0 | 1 | 1 | 13 | 9 | 4.25 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 10 | 16 | 4.56 |

* 1. Create a construction project safety plan.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 5 | 3 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 11 | 16 | 4.54 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 9 | 10 | 4.38 |
| Fall 2015 (20 Reporting) | 0 | 1 | 3 | 8 | 8 | 4.15 |
| Spring 2016 (21 Reporting) | 0 | 0 | 0 | 7 | 14 | 4.67 |
| Summer 2016 (24 Reporting) | 0 | 1 | 3 | 10 | 10 | 4.21 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 13 | 13 | 4.44 |

* 1. Create construction project cost estimates.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 3 | 5 | 4.63 |
| Spring 2015 (28 Reporting) | 0 | 0 | 0 | 3 | 25 | 4.89 |
| Summer 2015 (21 Reporting) | 0 | 0 | 1 | 5 | 15 | 4.67 |
| Fall 2015 (20 Reporting) | 1 | 0 | 2 | 6 | 11 | 4..30 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 4 | 16 | 4.71 |
| Summer 2016 (24 Reporting) | 0 | 0 | 1 | 9 | 14 | 4.54 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 8 | 18 | 4.63 |

* 1. Create construction project schedules

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 2 | 6 | 4.75 |
| Spring 2015 (28 Reporting) | 0 | 0 | 0 | 5 | 23 | 4.82 |
| Summer 2015 (21 Reporting) | 0 | 0 | 0 | 11 | 10 | 4.48 |
| Fall 2015 (20 Reporting) | 0 | 1 | 2 | 6 | 11 | 4.35 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 7 | 13 | 4.57 |
| Summer 2016 (24 Reporting) | 0 | 0 | 2 | 9 | 13 | 4.56 |
| Fall 2016 (27 Reporting) | 0 | 0 | 0 | 8 | 19 | 4.70 |

* 1. Analyze professional decisions based on ethical principles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 2 | 5 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 0 | 2 | 11 | 15 | 4.46 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 9 | 10 | 4.38 |
| Fall 2015 (20 Reporting) | 0 | 0 | 2 | 11 | 7 | 4.25 |
| Spring 2016 (21 Reporting) | 0 | 0 | 4 | 4 | 14 | 4.48 |
| Summer 2016 (24 Reporting) | 0 | 0 | 3 | 9 | 12 | 4.38 |
| Fall 2016 (27 Reporting) | 0 | 1 | 1 | 7 | 18 | 4.56 |

* 1. Analyze construction documents for planning and management of construction processes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 2 | 5 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 7 | 20 | 4.68 |
| Summer 2015 (21 Reporting) | 0 | 0 | 1 | 8 | 12 | 4.52 |
| Fall 2015 (20 Reporting) | 0 | 0 | 3 | 8 | 9 | 4..30 |
| Spring 2016 (21 Reporting) | 0 | 1 | 0 | 5 | 15 | 4.62 |
| Summer 2016 (24 Reporting) | 0 | 0 | 4 | 8 | 12 | 4.33 |
| Fall 2016 (27 Reporting) | 0 | 0 | 0 | 10 | 17 | 4.63 |

* 1. Analyze methods, materials, and equipment used to construct projects.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 4 | 4 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 11 | 16 | 4.54 |
| Summer 2015 (21 Reporting) | 0 | 0 | 1 | 9 | 11 | 4.48 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 8 | 8 | 4.20 |
| Spring 2016 (21 Reporting) | 0 | 0 | 2 | 6 | 13 | 4.52 |
| Summer 2016 (24 Reporting) | 0 | 2 | 2 | 10 | 10 | 4.17 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 12 | 14 | 4.48 |

* 1. Apply construction management skills as a member of a multidisciplinary team.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 4 | 4 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 1 | 1 | 6 | 20 | 4.61 |
| Summer 2015 (21 Reporting) | 0 | 0 | 1 | 6 | 14 | 4.62 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 8 | 8 | 4.20 |
| Spring 2016 (21 Reporting) | 0 | 0 | 0 | 6 | 15 | 4.71 |
| Summer 2016 (24 Reporting) | 0 | 2 | 3 | 8 | 11 | 4.17 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 13 | 13 | 4.44 |

* 1. Apply electronic-based technology to manage the construction process.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 3 | 4 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 0 | 11 | 17 | 4.61 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 8 | 11 | 4.43 |
| Fall 2015 (20 Reporting) | 0 | 0 | 3 | 10 | 7 | 4.20 |
| Spring 2016 (21 Reporting) | 0 | 0 | 0 | 6 | 15 | 4.71 |
| Summer 2016 (24 Reporting) | 0 | 2 | 0 | 10 | 12 | 4.33 |
| Fall 2016 (27 Reporting) | 0 | 0 | 1 | 13 | 13 | 4.44 |

* 1. Apply basic surveying techniques for construction layout and control.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 5 | 3 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 10 | 17 | 4.57 |
| Summer 2015 (21 Reporting) | 0 | 2 | 2 | 7 | 10 | 4.19 |
| Fall 2015 (20 Reporting) | 1 | 0 | 4 | 8 | 7 | 4.00 |
| Spring 2016 (21 Reporting) | 0 | 0 | 2 | 5 | 14 | 4.57 |
| Summer 2016 (24 Reporting) | 0 | 1 | 0 | 15 | 8 | 4.25 |
| Fall 2016 (27 Reporting) | 0 | 1 | 3 | 11 | 12 | 4.26 |

* 1. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 3 | 5 | 4.63 |
| Spring 2015 (28 Reporting) | 0 | 0 | 0 | 13 | 15 | 4.54 |
| Summer 2015 (21 Reporting) | 0 | 0 | 0 | 12 | 9 | 4.43 |
| Fall 2015 (20 Reporting) | 0 | 0 | 5 | 4 | 11 | 4.30 |
| Spring 2016 (21 Reporting) | 0 | 0 | 2 | 5 | 14 | 4.57 |
| Summer 2016 (24 Reporting) | 0 | 1 | 1 | 10 | 12 | 4.38 |
| Fall 2016 (27 Reporting) | 0 | 0 | 2 | 10 | 15 | 4.48 |

* 1. Understand construction risk management.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 5 | 3 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 15 | 12 | 4.39 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 10 | 9 | 4.33 |
| Fall 2015 (20 Reporting) | 0 | 0 | 2 | 9 | 9 | 4.35 |
| Spring 2016 (21 Reporting) | 0 | 0 | 3 | 6 | 12 | 4.43 |
| Summer 2016 (24 Reporting) | 0 | 0 | 2 | 11 | 11 | 4.38 |
| Fall 2016 (27 Reporting) | 0 | 0 | 2 | 17 | 8 | 4.22 |

* 1. Understand construction accounting and cost control.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 4 | 3 | 4.25 |
| Spring 2015 (28 Reporting) | 0 | 0 | 3 | 12 | 13 | 4.36 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 11 | 8 | 4.29 |
| Fall 2015 (20 Reporting) | 0 | 1 | 3 | 9 | 7 | 4.10 |
| Spring 2016 (21 Reporting) | 0 | 2 | 1 | 5 | 13 | 4.38 |
| Summer 2016 (24 Reporting) | 0 | 2 | 4 | 11 | 7 | 3.96 |
| Fall 2016 (27 Reporting) | 0 | 2 | 3 | 16 | 6 | 3.96 |

* 1. Understand construction quality assurance and control.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 4 | 3 | 4.25 |
| Spring 2015 (28 Reporting) | 0 | 0 | 2 | 10 | 16 | 4.50 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 12 | 7 | 4.24 |
| Fall 2015 (20 Reporting) | 0 | 0 | 5 | 9 | 6 | 4.05 |
| Spring 2016 (21 Reporting) | 0 | 1 | 3 | 5 | 12 | 4.33 |
| Summer 2016 (24 Reporting) | 0 | 3 | 5 | 7 | 9 | 3.92 |
| Fall 2016 (27 Reporting) | 0 | 1 | 4 | 10 | 12 | 4.22 |

* 1. Understand construction project control processes.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 3 | 5 | 4.63 |
| Spring 2015 (28 Reporting) | 0 | 0 | 2 | 10 | 16 | 4.50 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 8 | 11 | 4.43 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 9 | 7 | 4.15 |
| Spring 2016 (21 Reporting) | 0 | 0 | 2 | 6 | 13 | 4.52 |
| Summer 2016 (24 Reporting) | 0 | 2 | 3 | 10 | 9 | 4.08 |
| Fall 2016 (27 Reporting) | 0 | 0 | 2 | 10 | 15 | 4.48 |

* 1. Understand the legal implications of contract, common, and regulatory law to manage a construction project.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 4 | 4 | 4.50 |
| Spring 2015 (28 Reporting) | 0 | 0 | 2 | 11 | 15 | 4.46 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 12 | 7 | 4.24 |
| Fall 2015 (20 Reporting) | 0 | 0 | 6 | 8 | 6 | 4.00 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 7 | 13 | 4.57 |
| Summer 2016 (24 Reporting) | 0 | 1 | 5 | 8 | 10 | 4.13 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fall 2016 (27 Reporting) | 0 | 1 | 1 | 12 | 13 | 4.37 |

* 1. Understand the basic principles of sustainable construction.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 2 | 2 | 4 | 4.25 |
| Spring 2015 (28 Reporting) | 0 | 1 | 2 | 13 | 12 | 4.29 |
| Summer 2015 (21 Reporting) | 0 | 0 | 4 | 12 | 4 | 4.00 |
| Fall 2015 (20 Reporting) | 1 | 1 | 5 | 8 | 5 | 3.75 |
| Spring 2016 (21 Reporting) | 1 | 0 | 2 | 8 | 10 | 4.24 |
| Summer 2016 (24 Reporting) | 1 | 0 | 8 | 6 | 9 | 3.92 |
| Fall 2016 (27 Reporting) | 0 | 0 | 3 | 16 | 8 | 4.19 |

* 1. Understand the basic principles of structural behavior.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 0 | 5 | 3 | 4.38 |
| Spring 2015 (28 Reporting) | 0 | 0 | 1 | 8 | 19 | 4.64 |
| Summer 2015 (21 Reporting) | 0 | 0 | 2 | 13 | 6 | 4.19 |
| Fall 2015 (20 Reporting) | 0 | 0 | 4 | 10 | 6 | 4.10 |
| Spring 2016 (21 Reporting) | 0 | 0 | 1 | 7 | 13 | 4.57 |
| Summer 2016 (24 Reporting) | 0 | 1 | 2 | 11 | 10 | 4.25 |
| Fall 2016 (27 Reporting) | 0 | 1 | 2 | 13 | 11 | 4.26 |

* 1. Understand the basic principles of mechanical, electrical and piping systems.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** | **Average** |
| Fall 2014 (8 Reporting) | 0 | 0 | 1 | 4 | 3 | 4.25 |
| Spring 2015 (28 Reporting) | 0 | 0 | 5 | 11 | 12 | 4.25 |
| Summer 2015 (21 Reporting) | 0 | 0 | 4 | 13 | 4 | 4.00 |
| Fall 2015 (20 Reporting) | 1 | 1 | 4 | 8 | 5 | 3.79 |
| Spring 2016 (21 Reporting) | 0 | 1 | 4 | 6 | 10 | 4.19 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Summer 2016 (24 Reporting) | 3 | 0 | 1 | 13 | 7 | 3.88 |
| Fall 2016 (27 Reporting) | 0 | 1 | 3 | 11 | 12 | 4.26 |

1. **Percentage of graduating students that agree they have met the learning outcome (responded either “agree” or “strongly agree”)**
   1. Create written communications appropriate to the construction discipline.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 100% |
| Summer 2015 (21 Reporting) | 0% | 100% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 0% | 92% |
| Fall 2016 (27 Reporting) | 0% | 100% |

* 1. Create oral presentations appropriate to the construction discipline.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 0% | 95% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 4% | 92% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Create a construction project safety plan.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning**  **outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 96% |

|  |  |  |
| --- | --- | --- |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 5% | 80% |
| Spring 2016 (21 Reporting) | 0% | 100% |
| Summer 2016 (24 Reporting) | 4% | 83% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Create construction project cost estimates.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 100% |
| Summer 2015 (21 Reporting) | 0% | 95% |
| Fall 2015 (20 Reporting) | 5% | 85% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 0% | 96% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Create construction project schedules.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that**  **agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 100% |
| Summer 2015 (21 Reporting) | 0% | 100% |
| Fall 2015 (20 Reporting) | 5% | 85% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 0% | 92% |
| Fall 2016 (27 Reporting) | 0% | 100% |

* 1. Analyze professional decisions based on ethical principles.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 93% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 90% |
| Spring 2016 (21 Reporting) | 0% | 81% |

|  |  |  |
| --- | --- | --- |
| Summer 2016 (24 Reporting) | 0% | 88% |
| Fall 2016 (27 Reporting) | 4% | 93% |

* 1. Analyze construction documents for planning and management of construction processes.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 0% | 95% |
| Fall 2015 (20 Reporting) | 0% | 85% |
| Spring 2016 (21 Reporting) | 5% | 95% |
| Summer 2016 (24 Reporting) | 0% | 83% |
| Fall 2016 (27 Reporting) | 0% | 100% |

* 1. Analyze methods, materials, and equipment used to construct projects.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that**  **agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 0% | 95% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 90% |
| Summer 2016 (24 Reporting) | 8% | 83% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Apply construction management skills as a member of a multidisciplinary team.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 4% | 93% |
| Summer 2015 (21 Reporting) | 0% | 95% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 100% |
| Summer 2016 (24 Reporting) | 8% | 79% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Apply electronic-based technology to manage the construction process.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning**  **outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 100% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 85% |
| Spring 2016 (21 Reporting) | 0% | 100% |
| Summer 2016 (24 Reporting) | 8% | 92% |
| Fall 2016 (27 Reporting) | 0% | 96% |

* 1. Apply basic surveying techniques for construction layout and control.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 10% | 81% |
| Fall 2015 (20 Reporting) | 5% | 75% |
| Spring 2016 (21 Reporting) | 0% | 90% |
| Summer 2016 (24 Reporting) | 4% | 96% |
| Fall 2016 (27 Reporting) | 4% | 85% |

* 1. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 100% |
| Summer 2015 (21 Reporting) | 0% | 100% |
| Fall 2015 (20 Reporting) | 0% | 75% |
| Spring 2016 (21 Reporting) | 0% | 90% |
| Summer 2016 (24 Reporting) | 4% | 92% |
| Fall 2016 (27 Reporting) | 0% | 93% |

* 1. Understand construction risk management.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning**  **outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 90% |
| Spring 2016 (21 Reporting) | 0% | 86% |
| Summer 2016 (24 Reporting) | 0% | 92% |
| Fall 2016 (27 Reporting) | 0% | 93% |

* 1. Understand construction accounting and cost control.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 89% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 5% | 80% |
| Spring 2016 (21 Reporting) | 10% | 86% |
| Summer 2016 (24 Reporting) | 8% | 75% |
| Fall 2016 (27 Reporting) | 7% | 81% |

* 1. Understand construction quality assurance and control.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 93% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 75% |
| Spring 2016 (21 Reporting) | 5% | 81% |
| Summer 2016 (24 Reporting) | 13% | 67% |
| Fall 2016 (27 Reporting) | 4% | 81% |

* 1. Understand construction project control processes.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 93% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 90% |
| Summer 2016 (24 Reporting) | 8% | 79% |
| Fall 2016 (27 Reporting) | 0% | 93% |

* 1. Understand the legal implications of contract, common, and regulatory law to manage a construction project.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 93% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 70% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 4% | 75% |
| Fall 2016 (27 Reporting) | 4% | 93% |

* 1. Understand the basic principles of sustainable construction.

|  |  |
| --- | --- |
| **Semester** | **Percentage of graduating students that agree they have met the learning** |

|  |  |  |
| --- | --- | --- |
|  | **outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 75% |
| Spring 2015 (28 Reporting) | 4% | 89% |
| Summer 2015 (21 Reporting) | 0% | 76% |
| Fall 2015 (20 Reporting) | 10% | 65% |
| Spring 2016 (21 Reporting) | 5% | 86% |
| Summer 2016 (24 Reporting) | 4% | 63% |
| Fall 2016 (27 Reporting) | 0% | 89% |

* 1. Understand the basic principles of structural behavior.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that**  **agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 100% |
| Spring 2015 (28 Reporting) | 0% | 96% |
| Summer 2015 (21 Reporting) | 0% | 90% |
| Fall 2015 (20 Reporting) | 0% | 80% |
| Spring 2016 (21 Reporting) | 0% | 95% |
| Summer 2016 (24 Reporting) | 4% | 83% |
| Fall 2016 (27 Reporting) | 4% | 89% |

* 1. Understand the basic principles of mechanical, electrical and piping systems.

|  |  |  |
| --- | --- | --- |
| **Semester** | **Percentage of graduating students that**  **agree they have met the learning outcome** | |
| **Disagree** | **Agree** |
| Fall 2014 (8 Reporting) | 0% | 88% |
| Spring 2015 (28 Reporting) | 0% | 82% |
| Summer 2015 (21 Reporting) | 0% | 81% |
| Fall 2015 (20 Reporting) | 10% | 70% |
| Spring 2016 (21 Reporting) | 5% | 76% |
| Summer 2016 (24 Reporting) | 13% | 83% |
| Fall 2016 (27 Reporting) | 4% | 85% |

## Interpreting Results

Please provide an interpretation of the results aligned with the student learning outcomes. The interpretation should reflect consideration of factors (e.g., capabilities

of a particular cohort, innovative curricular change) that may have affected the results.

The discussion and resulting actions are set out in the Minutes of Annual Quality Improvement Meeting – see Appendix C.

## Communicating Results

Please provide a very brief narrative describing with whom the results are shared (e.g., all program faculty).

A copy of the draft BSCI Degree Program Assessment Plan and Report for 2016 and copies of the summary of student exit interviews for calendar year 2016 were provided to all program faculty in electronic format several days before the annual quality improvement meeting held on May 9, 2017. These documents were used to stimulate discussion and encourage recommendations for quality improvement. All program faculty received an electronic copy of the minutes of the quality improvement meeting and were given the opportunity to make changes prior to them being included in this document as Appendix C.

# Use of Results

## Purposeful Reflection and Action Plan

Please provide a narrative describing the process in which faculty engage to discuss assessment results and create actionable plans in an effort to improve student learning.

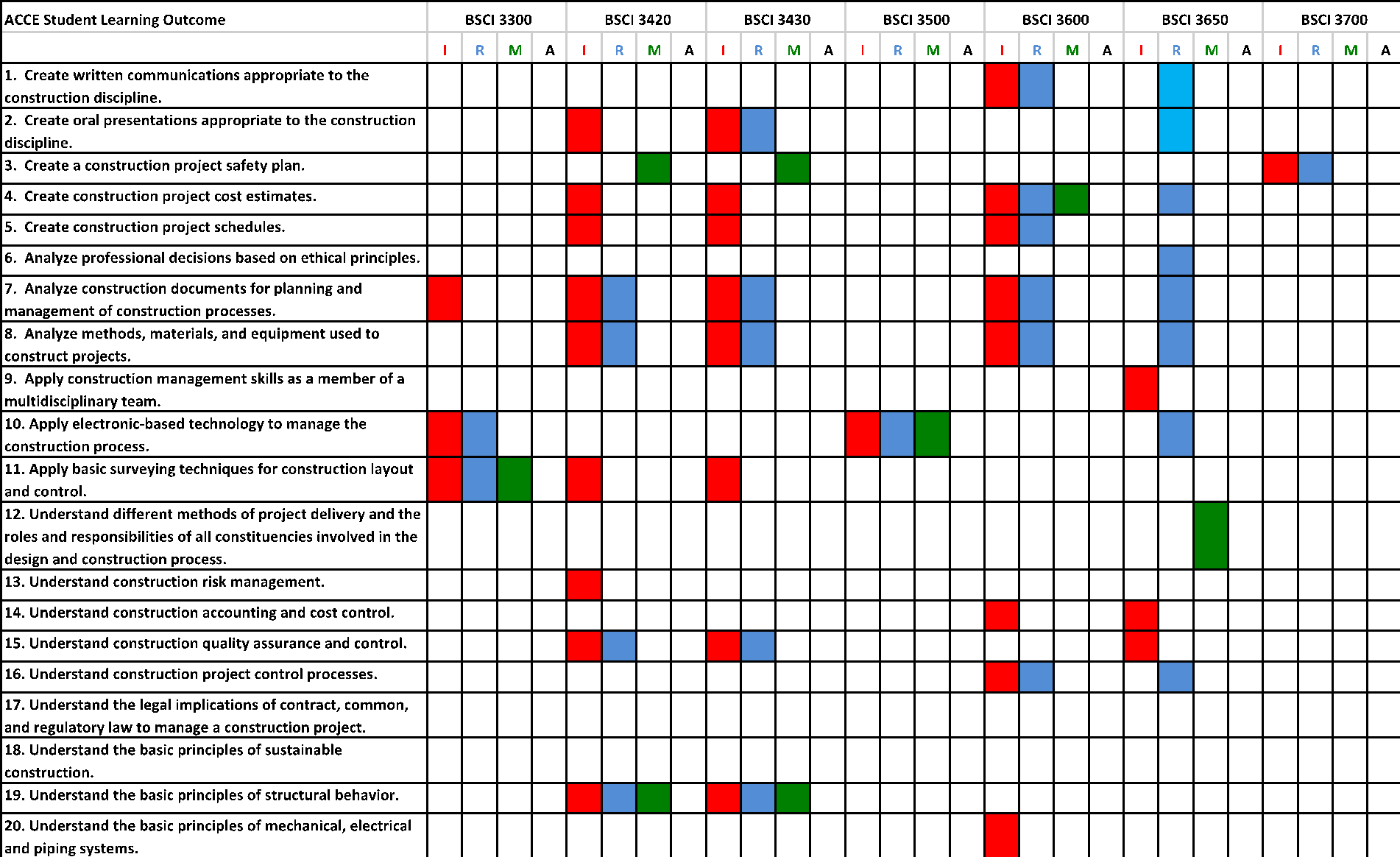
The discussion and resulting actions are set out in the Minutes of Annual Quality Improvement Meeting – see Appendix C.

## Appendix B – Curriculum Mapping

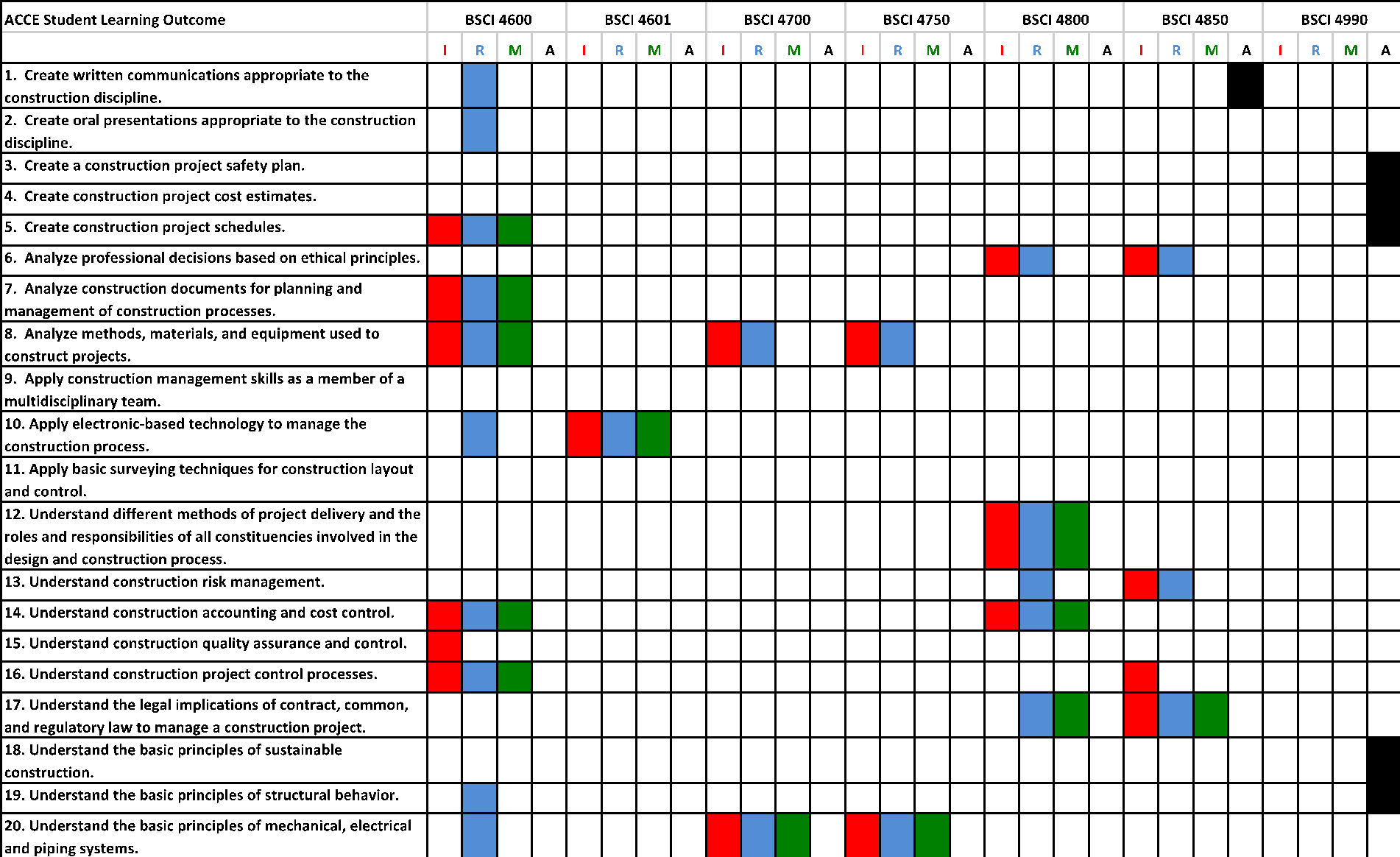
**Pre-Building Science (PBSCI) Curriculum Mapping**

# Pre-Building Science (PBSCI) Curriculum Mapping

**Building Science (BSCI) 3000 Level Classes Curriculum Mapping**



**Building Science (BSCI) 4000 Level Classes Curriculum Mapping**



**Appendix C – McWhorter School of Building Science - Minutes of BSCI Quality Improvement Meeting – May 9, 2017**

**McWhorter School of Building Science**

**Minutes of BSCI Quality Improvement Meeting – May 9, 2017**

**Faculty Present:** Alan Bugg, Les Carter, Wesley Collins, Ben Farrow, Mike Hosey, Jeff Kim, Scott Kramer, Junshan Liu, Darren Olsen, Keith Rahn, Lauren Redden, Mark Tatum, Eric Wetzel

1. AU & ACCE Assessment Requirements – Richard Burt

*Dr. Burt outlined the annual requirements for assessment for Auburn University. Annual Assessment reports will be due July 1, 2017 and the BSCI Degree Program Assessment Plan & Report 2016 will cover the spring, summer and fall semesters of 2016. Following the July 1 submission, faculty raters from across the university will evaluate assessment reports. The feedback generated during this experience will be compiled into Assessment Feedback Reports that are disseminated to each academic degree program in the Fall semester.*

*Assessment reports for the American Council for Construction Education (ACCE) are reviewed as part of the evaluation of the self study and the accompanying site visit in spring 2020. At the moment we are evaluating only 8 of the 20 ACCE Student Learning Outcomes, with a plan to assess between 3-5 additional outcomes each year, so that all 20 outcomes are evaluated by the fall of 2019. The intent is to use the “Data for Assessment of Student Learning Outcomes Reported to Auburn University Director of Academic Assessment” as an appendix to the “BSCI Degree Program Assessment Plan” which is required under standard 9.2.3. This will hopefully reduce the need to develop two separate assessment reports.*

1. Actions Taken to address previous quality improvement issues:
   1. Mapping Changes of Student Evaluation of BSCI 1100 – Introduction to Construction (Appendix D

- Mapping Changes of Student Evaluation of BSCI 1100 – Introduction to Construction)

*Faculty were provided with copies of the results of data collected from student exit surveys set out in Appendix*

1. *Students began taking the revised BSCI 1100 class during fall 2013 and would have graduated from the program from approximately Spring 2015 onwards. Results for the past seven semesters have been consistently above those recorded before the implementation of improvements suggesting a significant improvement in the perceived value of this class.*
   1. Mapping Changes of Student Evaluation of SLO - *Organize LEED Green Building activities/ Understand the basic principles of sustainable construction.* (Appendix E - Mapping Changes of Student Evaluation of SLO - *Organize LEED Green Building activities/ Understand the basic principles of sustainable construction.*)

*Faculty were provided with copies of the results of data collected from student exit surveys set out in Appendix*

1. *Students began taking BSCI 2100 - Introduction to Sustainable Construction class during fall 2013 and would have graduated from the program from approximately Spring 2015 onwards. Results suggest a significant improvement in the perception that students have met the student learning outcome “Understand the basic principles of sustainable construction” during the last 7 semesters evaluated. Changes introduced in the most recent curriculum review have resulted in the elimination of BSCI 2100 from the curriculum. The content previously covered in BSCI 2100 will be taught across several PBSCI & BSCI classes. The faculty were concerned about the content being included in these classes. The school head agreed to review syllabi prior to the start of each semester to make sure subject matter is covered.* ***Action – Richard Burt.***
   1. Improvement to teaching and assessment of ACCE Learning Outcome Create a construction project safety plan (Spring 2015 Quality Improvement Meeting)

(Appendix F - Mapping Changes of Assessment of SLO - *Create a construction project safety plan*)

*Faculty were provided with copies of the results of data collected from grading rubrics from BSCI 4990 for the last 4 semesters. The results are set out in Appendix F. Further changes to improve the grading rubric were*

*incorporated during the fall 2016 semester. Results suggest a marginal improvement in performance during the past two semesters.*

1. Actions taken from Spring 2016 Quality Improvement Meeting (Quality\_Improvement\_Spring\_2016\_Minutes.doc)
   1. Response to student request during exit interviews for common drawings between classes.

*It was decided that a trial would be instigated during the 2016/17 academic year to have a common set of drawings between BSCI 3600 – Project Controls I and BSCI 3650 – Project Controls II & possibly the MEP & Electrical classes. A set of plans would be found over the summer break and reviewed by the faculty at the August retreat.* ***ACTION – Darren Olsen, Wes Collins & Eric Wetzel.***

*Common Plans were used for assignments in both BSCI 3650 Project Controls II & BSCI 4700 Mechanical Systems in Buildings. After introduction of the new curriculum model in Fall 2017 it is anticipated that common plans will be used for BSCI 3660 Preconstruction & Project Management, BSCI 4700 Mechanical Systems in Buildings and BSCI 4750 Electrical Systems in Buildings which will all be taught in the same semester.*

* 1. Consistent positive perception of value of ‘hands-on” learning and use of BSCI Field Laboratory during classes.

*It was decided that as part of the ongoing curriculum review we would seek to maintain the “hands-on” learning experience. In the short term it was decided that we would integrate field lab activities into the following classes during the 2016/17 academic year:*

* + 1. *BSCI 3600 – Wall Form Activity –* ***ACTION – Wes Collins & Lauren Redden***

*This activity was incorporated into the class during summer 2016. The experience of implementing this activity into a project controls class was written up into a scholarly paper that what presented at the Associated Schools of Construction Annual International Conference in April 2017.*

* + 1. *BSCI 3650 – Construction Waste Management Plan –* ***ACTION – Darren Olsen***

*The incorporation of a construction waste management plan into BSCI 3650 was not completed. While developing the new curriculum model, it was decided the development of construction waste management plans would be incorporated into a new class - BSCI 4350 Construction Project Analysis*

* + 1. *BSCI 4600 – Site Logistics –* ***ACTION – Eric Wetzel***

*Students in the Advanced CIT class during the Fall 2016 semester conducted a laser scan of the BSCI Construction Field Lab and produced a 3D Sketchup model to study site logistics.*

* + 1. *BSCI 4860 – Advanced CIT – Site Survey/High Bay Building @ Field Lab –* ***ACTION – Darren Olsen***

*Students in the Advanced CIT class during the Fall 2016 semester conducted a laser scan of the BSCI Construction Field Lab and produced a 3D Sketchup model of the site and a proposed high bay building.*

* 1. Improvements to takeoff and estimate forms used in BSCI 3600/3650/4600/4990

*Professors Collins & Redden made a presentation on an excel spreadsheet for use in the project controls classes and thesis. The forms were used for the first time in BSCI 3600 during the spring 2016 semester and it was decided that these will continue to be used for project controls classes, competition teams and BSCI 4990 starting fall 2017.* ***ACTION – Wes Collins & Lauren Redden.***

*The takeoff and estimating forms were used in all of the project controls classes and will be used for the first time in BSCI 4990 during the summer 2017 semester.*

* 1. Making students in BSCI 4990 aware of instructional videos housed in the McWhorter Academy.

*Professor Olsen proposed resurrecting the McWhorter Academy as a resource for thesis students. It was decided to review the current state of the McWhorter Academy, with a view to making it more accessible to thesis students*. ***ACTION - Darren Olsen & David Royer.***

*Videos previously housed in the McWhorter academy were moved to the Auburn University You Tube channel. New videos are currently being produced to instruct students on the use of the new robotic total station and the Faro laser scanner.*

1. Review of Data for 2016 Calendar Year - BSCI Degree Program Assessment Plan and Report May 2017 & Exit Interview Notes
   1. Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI
   2. Goal 2: The McWhorter School of Building Science will provide an enriching educational experience consistent with the needs of its stakeholders.
   3. Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry.

*A copy of the draft BSCI Degree Program Assessment Plan and Report and copies of the summary of student exit interviews were provided to the faculty in electronic format several days before the meeting and were used to stimulate discussion and encourage recommendations for quality improvement. Prior to discussion of any proposed recommendations, the faculty discussed any factors they thought might have contributed to student performance. The recommendations following this discussion are set out in section 6 below.*

1. Set Performance Criteria for 2017/18 (ACCE Accreditation Requirement)
2. Goal 1: Enhance the quantity & quality of incoming students to PBSCI & BSCI

* *The faculty discussed performance criteria for this outcome and set performance criteria for the five objectives used to evaluate this goal. These performance criteria are set out in section 6.1 of the McWhorter School of Building Science – BSCI Degree Program Assessment & Implementation Plan & Report 2016.*

1. Goal 2: The McWhorter School of Building Science will provide an enriching educational experience consistent with the needs of its stakeholders.

* *The faculty discussed performance criteria for this outcome and set performance criteria for the two objectives used to evaluate this goal. These performance criteria are set out in section 6.2 of the McWhorter School of Building Science – BSCI Degree Program Assessment & Implementation Plan & Report 2016.*

1. Goal 3: The McWhorter School of Building Science will advise, prepare and provide assistance for all students to obtain entry-level positions across diverse sectors of the construction industry.

* *The faculty discussed performance criteria for this outcome and set performance criteria for the three objectives used to evaluate this goal. These performance criteria are set out in section 6.3 of the McWhorter School of Building Science – BSCI Degree Program Assessment & Implementation Plan & Report 2016.*

1. Recommendations for quality improvements 2017/18
   1. From Review of Data for 2016 Calendar Year:
2. Response to student comments about BSCI 4750 Electrical Systems in Buildings

*It was decided that faculty will meet with small groups of recent graduates to review content of current course.*

**ACTION – Mark Tatum**

1. Consistent positive perception of value of ‘hands-on” learning and use of technology expressed in exit interviews.

*It was decided that as part of the new BSCI 3660 Preconstruction & Project Management class that Procore mobile technology project management software would be incorporated.* ***ACTION – Project Controls Team***

* 1. Faculty/Student suggestions:

i. Incorporation of sustainability topics into Mechanical & Plumbing Classes

*It was agreed that additional sustainability topics would be introduced into BSCI 4700 Mechanical Systems starting in Fall 2017 in preparation of transitioning to the new curriculum. Dedicated Examination questions will be developed that address sustainability topics****. ACTION – Keith Rahn***

## Appendix D - Mapping Changes of Student Evaluation of BSCI 1100 – Introduction to Construction

**McWhorter School of Building Science – Mapping Changes of Student Evaluation of BSCI 1100 – Introduction to Construction**

**Quality Improvement Meeting – May 3, 2012**

Students’ comments about content of material included in BSCI 1100 History & Intro. to Construction (exit interviews and surveys)

This class has consistently received the lowest evaluations of any BSCI class when students complete their exit surveys. The course was partially revised last academic year when Professor Zabel taught the class. During the 2012/13 academic year the class will be taught by Darren Olsen who has revised the content further. We will submit a proposal to the AU curriculum committee for course revision and renaming to Introduction to Construction during the fall semester.

**March 8, 2013 – Name change to “Introduction to Construction” and changes to course content approved by University Curriculum Committee.**

**Fall 2013 – Revised class offered for first time.**

**Responses to Exit Survey Question on Value of BSCI 1100**

Below are specific and general subject areas that you took while enrolled in the BSCI program, please rate the value of each area to your educational experience:

1 Not Valuable at all 2 Seldom Valuable

1. Somewhat Valuable
2. Valuable
3. Highly Valuable N/A

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2009 | | | 2010 | | | 2011 | | | 2012 | | |
| Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall |
| Mean  Response | 2.74 |  | 2.56 | 2.85 | 2.91 | 2.46 | 2.23 | 2.36 | 2.47 | 2.64 | 2.68 | 2.60 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2013 | | | 2014 | | | 2015 | | | 2016 | | |
| Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall |
| Mean  Response | 2.17 | 2.57 | 2.76 | 2.83 | 2.73 | 3.63 | 3.50 | 3.62 | 3.70 | 3.71 | 3.25 | 3.52 |

**Appendix E - Mapping Changes of Student Evaluation of SLO - *Organize LEED Green Building activities/ Understand the basic principles of sustainable construction.***

**McWhorter School of Building Science – Mapping Changes of Student Evaluation of SLO - *Organize LEED Green Building activities/ Understand the basic principles of sustainable construction.***

## Assessment Report for Building Science, BS, 2010

The learning outcome “Organize LEED Green Building activities” had a mean response of 2.54. Resolved during curriculum review by identifying a series of sustainable construction topics taught throughout the revised curriculum and a dedicated introduction to sustainable construction class.

**March 8, 2013 – BSCI 2100 Introduction to Sustainable Construction course approved by AU Undergraduate Curriculum Committee**

**Fall 2013 – – BSCI 2100 Introduction to Sustainable Construction offered for first time**

**Responses to Exit Survey Question on meeting SLO 1.17 *Organize LEED Green Building activities.***

BSCI has an approved set of learning outcomes that set out what you should be able to do upon graduation. On a scale of 1 to 5, rate how strongly you agree or disagree that you are able to do the following:

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree N/A

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2009 | | | 2010 | | | 2011 | | | 2012 | | |
| Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall |
| Mean  Response |  |  | 2.54 | 3.23 | 2.98 | 2.89 | 2.58 | 3.03 | 2.79 | 3.08 | 3.54 | 4.00 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2013 | | | 2014 | | |
| Spring | Summer | Fall | Spring | Summer | Fall |
| Mean  Response | 3.00 | 3.43 | 3.69 | 3.57 | 3.20 |  |

**From Fall 2014 Responses to Exit Survey Question on meeting ACCE SLO 18. *Understand the basic principles of sustainable construction.***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2014 | | | 2015 | | | 2016 | | | 2017 | | |
| Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall | Spring | Summer | Fall |
| Mean  Response |  |  | 4.25 | 4.29 | 4.00 | 3.75 | 4.24 | 3.92 | 4.19 |  |  |  |

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**Appendix F - Mapping Changes of Assessment of SLO - *Create a construction project safety plan.***

**McWhorter School of Building Science – Mapping Changes of Assessment of SLO *Create a construction project safety plan.***

## Quality Improvement Meeting Report May 6, 2015

1. Recommendations for quality improvements 2015/16
   1. From Review of Data for 2014-15 Academic Year – Improvement to teaching and assessment of ACCE Learning Outcome *Create a construction project safety plan.*
      1. Since Fall 2014 there has been a requirement to develop project specific safety plans for all field labs and service learning projects in BSCI 3420 & 3430.
      2. Re-write Thesis Guidelines and grading rubric for Safety for Fall 2015. **– Action – Mike Hosey & Richard Burt.**

Fall 2015 New Thesis Guidelines for Site Specific Safety Plan introduced. Existing grading rubric retained. Fall 2016 new grading rubric introduced.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2015\*** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 12 | 6 | 6 | 0 | 0 | 1 | **4.08** |
| Safety Manager | 9 | 8 | 5 | 1 | 2 | 0 | **3.84** |
| First Aid | 13 | 4 | 3 | 1 | 2 | 2 | **3.76** |
| Emergency Contacts | 12 | 6 | 4 | 1 | 1 | 1 | **3.96** |
| Accident Plan | 11 | 8 | 3 | 1 | 1 | 1 | **3.96** |
| Training | 8 | 10 | 3 | 1 | 2 | 1 | **3.72** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |
| Analyze Hazards | 7 | 7 | 9 | 1 | 1 | 0 | **26.04** |
| Create a Safety Plan for  compliance | 8 | 10 | 5 | 0 | 1 | 1 | **26.88** |
| **Total** | | | | | |  | **76.24** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Spring 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 16 | 11 | 2 | 0 | 1 | 0 | **4.37** |
| Safety Manager | 19 | 4 | 6 | 0 | 1 | 0 | **4.33** |
| First Aid | 19 | 5 | 4 | 0 | 2 | 0 | **4.30** |
| Emergency Contacts | 13 | 6 | 6 | 4 | 0 | 1 | **3.83** |
| Accident Plan | 17 | 5 | 3 | 1 | 1 | 3 | **3.90** |
| Training | 15 | 7 | 3 | 1 | 0 | 4 | **3.80** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |
| Analyze Hazards | 13 | 11 | 3 | 1 | 1 | 1 | **28.23** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Create a Safety Plan for  compliance | 9 | 12 | 7 | 1 | 0 | 1 | **27.07** |
| **Total** | | | | | |  | **79.83** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summer 2016** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Specifics of the Project | 12 | 4 | 3 | 0 | 1 | 0 | **4.30** |
| Safety Manager | 9 | 8 | 1 | 2 | 0 | 0 | **4.20** |
| First Aid | 12 | 4 | 3 | 0 | 1 | 0 | **4.30** |
| Emergency Contacts | 14 | 4 | 1 | 0 | 1 | 0 | **4.50** |
| Accident Plan | 12 | 2 | 5 | 1 | 0 | 3 | **4.25** |
| Training | 11 | 6 | 0 | 1 | 2 | 0 | **4.15** |
|  | **35** | **28** | **21** | **14** | **7** | **0** |  |
| Analyze Hazards | 11 | 6 | 2 | 1 | 0 | 0 | **30.45** |
| Create a Safety Plan for  compliance | 11 | 7 | 1 | 0 | 1 | 0 | **30.45** |
| **Total** | | | | | |  | **86.60** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fall 2016 (Revised Rubric)** | **Grading Scale** | | | | | | **Average** |
| **5** | **4** | **3** | **2** | **1** | **0** |
| Company Safety Policy | 12 | 8 | 4 | 0 | 0 | 0 | **4.33** |
| Site Specific Safety Plan | 7 | 15 | 2 | 0 | 0 | 0 | **4..21** |
| Job Hazard Analysis | 9 | 7 | 6 | 2 | 0 | 0 | **3.96** |
| Hazardous Materials | 9 | 10 | 4 | 1 | 0 | 0 | **4.13** |
| Injury/Accident Plan | 7 | 12 | 5 | 0 | 0 | 3 | **4.11** |
| **Total** | | | | | |  | **81.58** |

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**BSCI-4990 THESIS RULES & REGULATIONS**

Effective for: Summer Semester - 2016

All thesis students are responsible for compliance with the requirements in this document. Specific requirements contained within this handout may not be omitted. Your thesis advisor must approve changes in the physical scope of the project in writing.

## PRELIMINARY REQUIREMENTS

**Project Approval**

Prerequisites specified in the Auburn University Bulletin will be enforced. No course can be taken during the final term that conflicts with the scheduled Thesis course time: 12:00 a.m. to 3:50 a.m. MTWRF. The Thesis student is responsible for completing a “Graduation Check” and verifying that all of the required course work has been satisfactorily completed.

The student must submit Project Plans with a Thesis Approval Form to the School of BSCI Office **no later than the last class day of the preceding academic term. No Project Plans will be approved during semester break.** A copy of the Approval form is located in Appendix

1. Written approval is required prior to starting any thesis work. The approval form must be included in the thesis submittal as noted in the Thesis Assembly section of this document. Any project scope changes must be approved and noted on the approval form by the thesis reviewer at time of submission. Only one set of plans will be approved for each student. A student may apply for approval of a project up to two academic terms before graduation.

## GENERAL REQUIREMENTS

**Course Administration**

Thesis Lab is in session during scheduled class time; a*ttendance will be taken during that time period.* A series of one-hour lectures relative to thesis will be conducted periodically by BSCI faculty and will be announced by e-mail. Attendance is mandatory for all thesis lectures. The lectures may cover the following topics: Estimating, Recap Sheets and Bid Forms, Scheduling, Contract Documents, Structural Assessments, Materials, Erosion Control and other related thesis topics as requested by the class. In addition, desk critiques with faculty and group meetings with faculty will occur on an ongoing basis. Attendance for all of these events is mandatory.

Three unexcused absences will be allowed without penalty. More than three will be reported to your thesis jury and will affect your final thesis grade. Absences will be excused at the discretion of your thesis advisor only as stated in the Syllabus.

The BSCI Thesis Laboratory is a space set aside for the use of the thesis students. The School of BSCI acknowledges the effort it takes to complete an exceptional thesis project. Thesis students will have access to the Thesis Laboratory 24 hours per day, seven days per week unless the University schedules otherwise. A library atmosphere shall be maintained in the BSCI Thesis Laboratory. **Eating, drinking, smoking and spit cups are not permitted in Gorrie Center.** Radios without headsets are not permitted in the BSCI Thesis Laboratory.

For most Thesis class sizes, each student is entitled to one desk to work on. Desks and computer equipment are to remain as arranged by the thesis faculty so that the rooms can be used for an occasional class or exam. The computers in the Thesis Laboratory are protected by a fiber optic security system. This system does not allow for rearrangement of furniture or computers.

## Computing Support

The computer is a valuable tool in the preparation of the thesis. The McWhorter School of BSCI recognizes that the students rely on computing to complete their thesis. Computers, printers, and plotters are available in Gorrie Center. The McWhorter School of BSCI maintains this equipment and will respond as quickly as possible to any problems. ***However, it is the student’s responsibility to complete the project in a timely manner.*** Any failure of computer equipment is not an acceptable excuse for a late or incomplete thesis project. ***Students must make periodic backups to protect their respective progress. Students are completely responsible for their backup strategies***.

The School will provide all printing and plotter supplies. Each student should exercise caution and print only when necessary. **The printer is not a copy machine.** The more it is used, the more likely it will crash. **Do not open the printer for any reason! The printers are monitored 24/7. The cost of repairs due to student damage will be charged to the student and will have to be paid to be cleared for graduation.**

## Job Placement Assistance

The industry recognition and appreciation of Auburn University Building Science is what attracts top construction firms to recruit. Your participation in the process is important to all of us. Companies will be making presentations and conducting interviews in Gorrie Center. Cassandra Calloway will make a presentation to the Thesis class to explain the interviewing process. Honor your job interview commitments or cancel well in advance. Broken commitments can result in problems with the contractors returning to campus in the future. For more information, see Cassandra Calloway on the first floor of Gorrie Center.

BSCI maintains an electronic job board cataloging jobs those firms that have job openings are available. Your communication with these firms should be professional and open. We also have current AGC and ABC national directories for your use. Contact Cassandra Calloway for further information regarding job placement and opportunities.

## BSCI Graduate Exit Interview

All students are **REQUIRED** to complete the graduate survey and participate in the exit interview process. The purpose is to continue to improve our program in all aspects; the input of our "most recent alumni" is to ascertain their perspective on their experience in Building Science and to solicit their input and comments on the program and its future. A copy of the **graduate survey** must be completed online.

## THESIS SUBMITTAL REQUIREMENTS

**General Requirements**

**Thesis projects will be accepted until 2:00 p.m. on Wednesday, July 20, 2016.** The thesis will be turned in to the thesis instructor in the Faculty Conference Room, where a drawing will be held to determine thesis juries. Thesis jury hearings will be completed on or before dead day of that academic term (Time & Location, TBA). Submit your approved drawings and specifications with your completed thesis for grading. Drawings and specifications will be returned after jury hearings. **Your name should be clearly marked and easily found on the outside of all your submitted documents.** Theses receiving a passing grade will be made available for pick-up on graduation day in the School of Building Science. All remaining theses will become property of the School of Building Science. The School reserves the right to retain copies of Theses for quality control and accreditation requirements. The jury is a formal presentation and defense of the student’s work. The student should be dressed as if making a formal presentation to a major prospective client. **The student should take the Means BCCD used for pricing to the jury meeting.**

The Thesis presentation should be of professional quality, as if you were presenting your company to a prospective client. **Your thesis document shall be in 8½” x 11” page format submitted in a “D” ring binder.** Your work should be neat, thorough and original. Improper grammar and misspelled words will lower your grade. Although all thesis work is to be your own, you may exchange ideas and discuss problems with other students. The faculty is available to answer questions appropriate to the courses they teach. Add something here about Thesis

Seminars???? The faculty will not, however, take the time to re-teach course materials. Nor will the faculty “pre-grade” portions of your thesis to “check if it has been done correctly.” Refer to your class notes for any necessary review. You may also ask questions of contractors, architects, suppliers, and building industry officials, preferably those associated with your project.

## THESIS ASSEMBLY

Assemble the thesis in logical order (i.e., chronological). Number all pages, **in ink**, including assumptions, worksheets and summary sheets, documents, and other information. A complete Table of Contents is required listing the sections, titles and page numbers. It should show all divisions of work contained in the worksheets and summary sheets. Worksheets and summary sheets will have a dual numbering system; one number system for the estimate itself and one for the thesis document. The typical work sheet and summary sheet heading areas should be complete.

Carefully plan sequencing and dating of all documents; i.e., Bid, Agreement, Bonds, Billing, etc., so that they are reasonable and consistent. You may assume any dates required to complete the thesis such as the bid date, project start date and company start date. A project time line is required.

Include your full name, as registered with the university, and thesis semester on both cover and title page. Anticipate binding room on each sheet of paper when copying or printing. Do not submit a machine copy of your thesis. **All documents must have original hand written signatures.**

## Minimum Requirements / Thesis Assembly Model

The minimum requirements and recommended assembly for a complete thesis are as follows (do

**NOT** use Appendix B – Thesis Evaluation & Grading Criteria as your Thesis Assembly outline):

**Preliminary** Title Page

A Complete Table of Contents w/ page numbers Thesis Proposal Approval Form

Project Brief Assumptions

Detailed Project Time Line of Events

List of Student Selected Work w/ page numbers

**Company** Company History, Philosophy and Goals Organizational Chart

Duties of Key Personnel Contractor’s Licenses

Business Licenses (state and local)

**Financial** Contractor's Qualification Statement Balance Sheet

Income Statement - current and projected

Financial Narrative including business position and strategies consistent with financial statements

Financial Ratios and a thorough analysis of each: Net and Gross Margins, ROI, Current Ratio, Fixed Asset Newness, and Average Ages of Receivables and Payables

Labor Burden Determination (home office and field) General Overhead Determination

**Project Estimate** Specification Take-off / Drawing Notes Issues

BIM Model of Structure

QTO Worksheets (***including Site Utilities)***

Document earthwork quantities using "Earthworks" or other suitable program. Include printout of software including graphic image of cut/fill.

Pricing Sheets ***including Site Utilities and unit prices (if required)***

Job Site Overhead Recap Sheet

Bid Calculation Worksheets (base bid, alternates and unit prices) Explanation/Analysis of MEP systems

Subcontract Scope Statement for MEP systems

**Project Documents** Master Surety Agreement

Proposal Form with at least one alternate bid item Bid Bond

Power of Attorney for Bond Agent

Agreement Form (per your specs.) w/acceptance of one alternate Bond Application Form

Performance and Payment Bonds Certificate of Insurance

Project Specific Safety Plan LEED Assessment

Subcontract Agreement Short Form (AGC) w/ detailed scope of Work and listing of project documents as attachments.

Building Permit (not the application) Project Cash Flow Projection Submittal/shop Drawing Control Document CPM Activity Worksheets

Schedule of Values Reports showing Period Costs for first three months, from which the pay applications are generated

Change Order prompting, i.e. RFI, Architect’s directive, etc.

Change Order QTO, Pricing, Recap sheets, and cover correspondence to Architect

Change Order (executed in first 3 months) Payment Requests (for first 3 consecutive months) Substantial Completion Documentation

Consent of Surety to Release of Retainage (when appropriate) Affidavit of Release of Liens

Affidavit of Payment of Debts & Claims Consent of Surety to Final Payment Certificate of Occupancy

List of all required Warranties and at least two actual Warranties

**Structural** Structural Analysis

**Project Schedule** Color plot of original Bar Chart (with logic arrows), cost loaded,

clearly indicating a timeline, all appropriate activities, their durations, total float, and ALL logic/lag ties [front and end] for each activity.

Inclusion of Schedule Draft; to be returned to student upon submission of final project

***Appendix*** Site Utilization Plan (graphic and written narrative)

**References** Reference all sources used in Thesis

Attach a complete copy of the Thesis Instructions

## Grading

Completing all the minimum requirements listed in the preceding section does not mean an automatic grade of “A”. If all items are included and most of the items are reasonably correct, then the student can expect a grade of “C”. Significant omissions and/or errors will result in a grade in the “D” range or an “F”. Additional copies of the items listed in minimum requirements will not be considered “Student Selected Work”. Per the University’s definition, an “A” is for superior work.

Thesis projects will be presented to and defended before a faculty jury. The jury will evaluate the projects for:

* 1. Meeting the minimum requirements listed in the Thesis Instructions in a manner appropriate to the student’s thesis project.
  2. The accuracy and applicability of student selected work.
  3. The integration of the minimum requirements and the student selected work into a cohesive whole.
  4. The professional quality of the thesis document.
  5. The professional quality of the student’s presentation and defense.
  6. The student’s ability to explain the reason and meaning of each part of the thesis. **(If you don’t know what it is, how it was developed, why it’s there, and what it means, it lowers your grade!)**

The jury will assign a letter grade based on this evaluation. Possible grades are A+, A, A-, B+, B, B-, C+, C, C-, D+, D, D- and F.

If the thesis is graded as an "F" (failure), the thesis will be retained. The School Head will determine whether the student is allowed to retake the course using another approved set of drawings and specifications. An "IN" (incomplete) will be assigned only if extenuating circumstances warrant and requires the School Head's approval and per University mandated criteria.

A thesis that is submitted on time but that is not complete, will be evaluated and given a grade appropriate to the degree of completion and the quality of the work submitted. A thesis that is submitted after the designated time, but prior to 11:00 am on the due date, will be penalized by a letter grade reduction. Theses will not be accepted for grading after 11:00 am on the date due and an "F" will be assigned.

## Project Brief

A brief overview of the project should be done prior to beginning your project. The brief should address the following items:

* Identification of the 2 or 3 major risks on the job for your construction firm
* Identification of the work you plan to self-perform and what you plan to subcontract (you are encouraged to self-perform one trade)
* Identification of key dates-Bid, start, finish, etc…
* Identification of major site issues including earthwork requirements and site logistic issues if any exists
* Consideration for how quality will be measured
* Identification of 3 or 4 largest safety risks specific to this project
* Construction of a schedule of the key 10-15 items on the job (may be drawn by hand)
* Specification Take-off

### \*Refer to the Course Syllabus for the due date of the Project Brief.

**Company and Project Documents**

All documents are to be fully executed as if real, and dated, signed and notarized where appropriate. The student is required to comply with all requirements contained within the contract documents by:

* + 1. Compliance with the requirements, or
    2. Written assumption concerning the requirement approved by the Thesis Professor.

The student may have to provide additional documents to meet the minimum requirements depending on their project.

The student is required to set up an organization that is capable of constructing their project. Be realistic in relating organization and overhead to annual construction volume, and use good management principles in staffing your organization.

An analysis and determination of the unique annual overhead, fee objectives, and labor burden for field and office employees must be clearly demonstrated and explained for the most recent complete year as well as the projected values for the duration of the thesis project.

The faculty strongly requests that multiple copies of forms or reports such as subcontracts and state licenses should be omitted. All information included should have a purpose and only one example of an executed document is required. However, pay requests are required for three months. Any additional pay requests are not considered extras and should not be included.

Students are encouraged to be creative and original in the development of forms, letterheads and other documentation. However, the creation of these items can have a negative impact if they cause excessive paper use or do not add to the overall appearance of the document. Remember, "Fluff is not a substitute for substance."

**COST ESTIMATE - All scope changes must be approved by the Thesis Instructor and noted on the plans. Verbal approvals are not acceptable.**

Each thesis will include a comprehensive, detailed cost estimate for the selected thesis project. Generally, the project will be taken-off manually and priced manually using the “productivity” pricing method (the normal Pricing Sheet pricing method).

## Takeoff

The quantity survey can be accomplished using both manual and electronic tools. Tabulation of quantity takeoff into worksheets should be organized in such a manner as to allow intuitive review. Quantity takeoff sheets should be organized by trades, each sheet should be limited to a single trade. Students need to utilize a consistent methodology and an easy to follow audit trail. The audit trail should seamlessly blend both manual and electronic takeoff. With manual takeoff the audit trail should include a plan reference and further dimensional and location and orientation information to allow reviewers to retrace your steps and verify quantities. If electronic means are used for quantity takeoff the audit trail should include an explicit reference to an appended document (Onscreen Takeoff sheets w/image legend) which clearly demonstrates how the quantities were derived and where they came from. You will be required to justify your methodology for your calculated quantities. Waste and overages need to be considered on your quantity takeoff sheets. **Quantities for Divisions 3, 4 and 5, must be extracted from the BIM Model, and Division 7 which may be taken off and priced using square foot assembly pricing.**

You may design your own worksheets, summary sheets, and recap sheets as long as they are similar to those used in Project Controls. **Site work is a required item** and must be estimated and priced in a detailed manner. In addition, it should be noted that site utilities and erosion control are to be taken off and priced as Site Work “subcontract” work. Proper analysis of the site work requirements is critical to the successful completion of a project. The student should understand the grading operations and the effects of shrinkage and swell. Using a cut/fill program is acceptable. However, the appropriate reports showing existing layers and volumes, proposed layers and volumes, structures, total cut and fill, existing elevation data and proposed

elevation data must be included and incorporated in the thesis in an organized manner. It is required that the thesis student prepare a narrative in order to defend their understanding of earthmoving operations.

Do not take off demolition work, trees and shrubs in landscaping, lawn sprinkler systems, fire alarm and/or sprinkler systems, or any low voltage wiring. Include these items in the bid amount by estimating a lump sum price for each item. The thesis faculty will provide limited guidance in this area. Do not assume this work will not be accomplished. Be prepared to explain your approach to these lump sum prices.

Worksheets, Summary Sheets, Job Overhead Sheets and Recap Sheets may be completed in pencil, but must be neat and legible. All estimating work should be self-explanatory to a reviewer and demonstrate an **easy-to-follow audit trail** throughout the estimate. Be sure to highlight totals on worksheets which are carried forward to summary sheets and totals on summary and job overhead sheets which are carried to the recap sheet indicating the page number of the destination in the appropriate manner. You will be required to justify your methodology, waste and conversion factors, and all computation in your estimate.

## Pricing

You may use spreadsheet software to price all items in a format similar to the pricing sheets. Provide the pricing guide page number and line number after each item priced on the summary sheet. The reference column is for the work sheet number and should be provided for all items on the pricing sheets.

Pricing sheets should reference quantity takeoff sheets from which the quantities were derived. Pricing sheets should also be limited to a single trade per sheet. In no event should more than one trade be included on a pricing sheet, but often a single trade will require more than one sheet. It is appropriate to summarize cost information for each trade at the end of its last pricing sheet and then for that information to be forwarded to the recap sheet.

On-Screen Take-off, or other estimating software may be used to take-off and price all sections. All computer estimate reports should be produced in a manner to easily review the information. It will be the student’s responsibility to clearly present the information in a format that shows the audit trail, crew designations and makeup, systems/work groups procedures, the pricing according to the current Means being used, and proper calculation of unit prices and subcontractor mark-ups.

**Develop "raw" (raw means no general contractor markup) prices for all work done at the project site including subcontracted work other than roofing.** You may estimate each subcontractor's total markup at 22% to 32% if the work is totally subcontracted; the mark-up is 40% and 45% if only labor and equipment are subcontracted. ***While these markup rates are somewhat arbitrary for this exercise, you have to show in some form (and be prepared to defend) what factors are included in the markup.*** Show subcontractor markup on the final pricing sheet for each trade. Highlight the subcontractor quote (including markup) and carry to Recap sheet.

The bid must include **at least two** alternates with the estimate and on the proposal form. If no alternates are listed in the specifications, the student is required to submit an addendum to the bid documents that creates the alternates. **One (1) alternate must be accepted in the agreement with the owner**.

## Use the proposal form and the Bid Bond form from the project specifications, if provided.

As in industry, the alternate is accepted after bid day and before the contract is written. The student must prepare the prices for these items separately for the owner to select. The student can select which will be accepted.

**You are required to show the calculations of any unit prices required on your bid for additive or deductive work.** These unit prices should include markup. Also, show the calculations for contract change orders and alternate bid items including markup.

## Special Pricing Considerations

Price all concrete by the cubic yard, brick by thousands, block by each, and rebar and structural steel by the ton. The only exception is that the square foot/square yard pricing can be used for sidewalks and paving.

Connections for steel, wood, etc., may be estimated on the summary sheet as an adjustment to the quantity (additional materials). Use proper judgment by interpolating or adjusting Means line items.

Determine the quantity and type of all wood and light gage metal roof trusses. Use the Means pricing data for your truss pricing or an actual truss manufacturer quote. The contractor/subcontractor will still need additional material for bracing and labor to erect the trusses.

If it is necessary to adjust pricing in Means, use proper judgment when interpolating between line items. Add price adjustments to your list of assumptions and be prepared to defend your methodology.

## Recap

The recap sheet is “part and parcel” to the pricing sheet and in addition to summarizing the project’s cost. It also provides a document that an estimator could use for bid day evaluation. Therefore, each line item on the recap sheet should be organized by trade. The recap sheet should reflect if the estimator plans to self-perform or subcontract the work. Recap sheets are used to add indirect cost and markups to the estimate. Recap sheets need to be produced for alternates, change orders and unit prices.

## BIM GUIDELINES:

All thesis students MUST create a BIM model for the structure in their projects, as described below. Any BIM software available in the McWhorter School labs may be used.

|  |  |  |
| --- | --- | --- |
| **Frame** | **Required** | **Not Required** |
| Steel | Foundations, columns, beams, braces trusses, load bearing walls, retaining walls, rebar (foundation & walls), elevated slab on deck, ground floor  slab, OWSJ and joist girders | Connections, base plates, anchor bolts, partitions and other miscellaneous steel |
| Concrete Frame | Foundations, columns, beams, load bearing walls, retaining walls, rebar, elevated slabs, ground floor slab  (foundation, beams, columns & walls) | Formwork, slab on grade outside the foot print of the building. |
| Wood Frame | All load bearing components of the building, foundations, rebar, trusses,  braces | Partitions |

Students MUST use quantities from the models above in their estimates (See thesis folder for formatting and quantity extraction instructions).

## PROJECT SCHEDULE

The work plan and project schedule must correspond to the project's cost estimate. You must include CPM Activity Worksheets to justify activity costs. A single page schedule with 6-10 activities is recommended (but not required) to be complete prior to beginning your estimate.

**A *draft project schedule* shall be completed no later than the end of class on June 8, 2016.** It should contain a calendar timeline, and milestone activities with durations for the complete project including construction. The schedule should be represented in a clear, legible, organized manner, and it should follow standard CPM drawing conventions, contain a title block, date and legend, and not exceed a sheet size of 36"x 48". It will be submitted in a 9” x 12” manila envelope with the student’s name, project name, and thesis semester neatly and legibly written on the cover. This schedule will be inserted into the thesis when the thesis is submitted. **While this submission should be complete, it should be a draft that demonstrates your understanding of how the building will be assembled, and its relativity to your pricing of equipment, crews, and overhead. The draft should be in bar-chart form, should include a time scale plus all activities and logic ties. Obviously, your final schedule may (and likely should) reflect refinements to this draft. Make sure you retain or make a copy of the draft, as you will not be allowed to reference it after it has been submitted.** Time-based items in the estimate must agree with the scheduled time frame of the project. The pay requests are derived from the cost loaded CPM schedule and are representative of the planned progress of the work.

Each category of work must be planned and scheduled. The schedule should contain a sufficient

number of activities (100 activities +/-, excluding procurement activities) for the Project Manager to coordinate the work on a weekly basis. The sequence of activities should represent the Project Manager's plan and follow standard construction practices. In addition, the schedule should show procurement activities including fabrication and delivery of critical and other time- sensitive materials to the jobsite in time not to delay the project.

Each activity must be assigned an earned value in order to produce an anticipated "Early Start Earned Value Curve." The student must include on this diagram an anticipated "Income Curve" based on the Early Start Earned Value Curve, as well as an anticipated “Actual Costs Curve”. The student will then produce and include a report showing the cash flow projection of the project based on the plotted curves.

The student will assign a "Schedule of Value" code to each activity and produce a SOV report. The codes in this report will correspond with the G703 pay request cost items and agree with the pay request amounts. Therefore, if the schedule is updated, the earned value should equal the pay request amount without the stored material.

The student is required to update the schedule for the first three months of the project and produce a SOV report that verifies the pay request amounts based on “costs this period” as well as “costs to date.”

For scheduling-related reports, the student shall include **only** the following: 1.) a Classic Schedule Report and a Detailed SOV Report for the initial, as-planned schedule, 2.) an updated Detailed SOV Report for each of the three updates.

Schedule Activity Worksheets should be sorted by activity and include totals for each activity as well as an overall total. A list of items not assigned to activities and included in the markup must be included as part of the schedule activity worksheets. The individual and total $ value of these items must be shown on the list.

## PROJECT MANAGEMENT

**Use the forms (Proposal, Bond, Contract, Pay Request, etc.) furnished with your specifications.** If none are provided, use the latest version of AIA forms.

It is required to complete the pay request documents for the first three months of the project. Show stored materials on each request. It is not realistic for a job not to have stored materials in the early months.

The "Schedule of Values" for the pay request is a breakdown of the work for the owner to approve payments. The breakdown should identify the major subcontractors and/or work areas. SOVs limited to the 16 CSI Divisions are not acceptable.

Execute all documents (fill in all blank spaces including correct signature, stamps and seals). Clearly identify the drawings and specifications in the contract agreement. Do not include any documents that are not required by your project. Use the AGC subcontract agreement form

rather than the AIA document for your required subcontract.

The thesis is to include a list of submittals and shop drawings for the project with identification of the vendor/party responsible for originating each and the scheduled/required delivery date for each submittal. This list is to be developed from the submittal requirements given in the project specifications. Major procurement items (+/- 10 each) should be included in the schedule.

The student is required to execute a change order during the first three months of the project. This change order will be reflected in the pay request(s) as is appropriate. The change order amount and scope of work will be at the student’s discretion. The actual work required in the change order does not have to be accomplished during the first three months. The scope of the change order must be such that the contract duration and/or the contract sum is/are changed. Worksheets and Summary Sheets showing the changes are required.

## SITE SPECIFIC SAFETY PLAN

Company Safety Policy (10%):

Briefly state the importance of the health and safety of your employees to your company? What is your company’s Experience Modification Rate (EMR)? A new EMR is issued to companies each year by the National Council on Compensation Insurance (NCCI) based on the number and value of claims over the last three years. How does your present EMR effect your company? (Insurance premiums, OSHA fines, lost time, morale, litigation, job opportunities, etc.)

Safety Manager (10%):

How do you plan to access the hazards and regulate the safety program for this project? Who is your safety manager?

Who does he report to?

How is safety information from this project communicated to upper management? What is the role of each level of management in safety for this project?

What are the rules for non-compliance for the workers? Supervisors? Planning (40%):

Initial Review - Job Hazard Analysis (JHA)

Perform an initial review of the project and select at least one hazard that is inherent with the project based on its location, topography, weather conditions, active campus, etc. Describe and give visual illustrations for the hazard and your method(s) of hazard mitigation. Include a risk assessment of the hazard.

|  |  |
| --- | --- |
| **Hazard** | **A condition, set of circumstances, or inherent property that can cause injury, illness or death** |
| **Risk** | **An estimate of the combination of the likelihood of an occurrence of a hazardous event or exposure, and the severity of injury or illness that may be caused by the event or exposure** |

Ongoing Review – Job Safety Analysis (JSA)

Perform a review of at least two hazards that will be encountered during the construction phase of the project due to nature of the work, construction procedures, hazards inherent with this type of construction, etc. Perform a Job Safety Analysis providing a step by step process of the work activity with hazards encountered at each step and mitigation measures to be enacted. Describe the OSHA standards that apply. Include visual illustrations. Explain why these two hazards are considered high risk on this project. Describe the specific training procedures required for your employees prior to engaging in these specific work processes and/or prior to their exposure to these specific hazards.

Hazardous Communication Program (20%):

How are you going to communicate information concerning the hazardous materials that will be encountered by your employees during the course of this project?

What is your plan for providing, maintaining, and updating the MSDS sheets as materials are brought onsite?

What is your policy on container labeling of materials?

What provisions have you made for the storage of hazardous materials during the construction phase?

Provide at least one example of how your hazardous communication process will work to inform and protect your employees from a specific hazardous material that will be used on your project during the course of construction. (Lead, silica, acetylene, gasoline, etc.)

Develop a Safety Data Sheet for the above substance and two additional hazardous materials on the project in accordance with the specified 16-section format that went into effect in June 2015 and with the Globally Harmonized System (GHS) pictograms.

Injury/Accident Plan (20%):

What is your plan to provide care for your employees if they are injured while working on this project?

Who are you going to contact when an accident occurs?

Where is the nearest hospital or source for emergency responders? Provide a map showing route and the distance/time to the facility.

What are you provisions for first aid? (First Aid Kits, Eyewash stations, trained personnel) Does the proximity of your jobsite require that a person trained in first aid be present to meet the OSHA requirements?

What are your procedures for accident investigation and reporting? (OSHA 301 form, accident recreation, interviews with witnesses, determination and elimination of the root causes of the accident)

Describe your accident prevention/rescue plan for one activity/hazard that will be encountered on this project (suspension trauma during steel/precast erection, confined space rescue plan, excavation cave-in, etc.) Tell how you have made preparations in advance so that you will be ready if an accident occurs.

## STRUCTURAL ASSESSMENT

**Structural System:**

Include a conceptual assessment of the structural systems of the building. The assessment must provide a detailed explanation and identify the following:

1. The basic structural system for carrying vertical loads. Include diagrams that trace the path of vertical loads in the structure from roof to ground. A section view through a major axis of your building would be used for this. Make use of gravity force vectors of differing weights to indicate accumulation of load from roof to ground. A detailed verbal description must accompany the graphic one.
2. The basic structural system for carrying lateral loads (wind). Include diagrams that trace the path of lateral loads applied to the structure. A plan view of your building indicating the reacting structural elements for wind load striking each of the major building axes is required. You should use different colors or separate diagrams for each wind direction. Show section views with wind load vectors for clear demonstration of how wind loads travel to the ground. A detailed verbal description must accompany the graphic one.

Special Structures (for students with wood/metal pre-fab trusses or pre-engineered metal buildings)

* 1. For students with pre-engineered metal buildings, substitute traditional steel members for prefabricated members and complete the following:
     1. Develop a paragraph indicating the substitutions you plan to make (bar joists for typical purlins, wide flange members for girders, etc.)
     2. Determine the required size of members noted in a.
     3. Develop a price for the structure sized in (b).
     4. Develop a paragraph indicating the difference in the cost of the structure between your approach in the estimate and your answer in (c). Reflect on the differences.
  2. For students with wood/metal pre-fab trusses, complete the following:
     1. Select a typical truss and sketch an elevation of that truss. Select a possible layout of web members. Show all dead and live loads applied to the truss on a plf basis along the top and bottom chord or as a point load at truss joints. Essentially, indicate the vertical load on a horizontal projection of the truss.
     2. Produce a plan(s) of trusses showing all required temporary bracing. You may use any accepted national standard for bracing such as Alpine’s “Builders Guide for Trusses”.
     3. Design and provide a sketch for the diagonal brace at the end of the truss that takes the force to the ground. (This item may also be used for the temporary bracing design requirement of the thesis.)

## Temporary Structure:

Students must provide one detailed structural analysis of a temporary structure such as that identified below, such as the concrete formwork for one of the major building components, elevated slab, wall, beam or slab. The analysis must include detailed load determination, selection of appropriate materials, and structural analysis, including strength, stiffness and stability considerations. A virtual model of the temporary structure should be provided. The work should also include a temporary compression ground brace for wall or truss system: size

and spacing of braces must be determined considering lateral (wind) loads, slenderness ratio, strength analysis, connectors and anchorages, etc.

* Example 1: Trench shoring: determine soil lateral loads, design sheeting, wales and shores considering slenderness, strength, and deformations.
* Example 2: Elevated slab formwork design: determine all sources of gravity loads to design sheathing, joists, stringers, and shores, considering strength and stiffness. Stability must be considered in slenderness of shores and system stability in lateral bracing of overall shoring system.
* Example 3: Wall or column form: determine all loads to calculate lateral form pressures, and design sheathing, studs, wales and ties considering strength and stiffness. . Determine lateral stability.

## MECHANICAL, ELECTRICAL AND PLUMBING

Provide a complete ***scope of work*** for HVAC, Plumbing, and Electrical contracts.

Provide descriptions of the HVAC, Plumbing, and Electrical systems shown in your project. Include the following as a minimum:

HVAC System:

1. Describe the components of the system or systems (AH, VAV, RTU, Chiller, cooling tower, piping, pumps, type of duct, etc.).
   1. The purpose of each component.
   2. How the component works.
   3. How the components work together.
2. Discuss the controls of the system and who installs the controls.
3. Discuss the process of the cooling cycle through the system.
4. Discuss the process of the heating cycle through the system.
5. Discuss the energy conservation measures, if any, for the building.
6. Why was this system used as compared to another?
7. Discuss the impact of the HVAC system on the schedule.

PLUMBING System:

1. Potable water supply source, waste discharge point for sanitary and storm.
2. Type and location of water pipes.
3. Type and location of sanitary sewer pipes.
4. Discuss the pumps in the systems.
5. Discuss any controls in the system.
6. Discuss the hot water source and distribution (re-circulation or non-re-circulation)
7. Discuss the impact of the plumbing system on the schedule.

ELECTRICAL System:

1. List service amperages and voltage to the MDP.
2. List operating voltage(s).
3. Describe the control systems.
4. Describe the electrical from the entrance, meter, and/or MDP through the sub-panels.
5. Describe the building equipment needs other than lights and receptacles (pumps, AH, Chiller, RTU, elevators, etc.).
6. Describe the types and locations of conduit.
7. Describe the emergency power system.
8. Discuss the impact of the electrical system on the schedule.

The estimate for the MEP portion of the project may be completed with a cost per square foot price (from Means) for the MEP subcontracts.

## SUSTAINABLE CONSTRUCTION ASSESSMENT

You are to conduct an assessment of your project building to demonstrate that you understand how the design and construction of your building reflects the basic principles of sustainable construction. Set out below are specific tasks to complete that relate to principles of sustainable construction. You are to answer these as they relate specifically to your building.

1. The USGBC through its LEED certification program has different certification programs for different construction projects.
   1. Select the current certification program that would be applicable to your construction project and locate and reference at least two resources or tools from the USGBC website that set out the requirements of the specific certification program.
2. During construction a contractor should consider the environmental impacts of construction activities on the site and its surroundings. A LEED Pre-requisite on any LEED certified project is *to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust*.
   1. Review you project documents to identify any national, state or local requirements that control site erosion and sedimentation.
   2. Identify 6 specific measures incorporated into your project that reduce pollution from construction activities. Describe how each measure helps to reduce pollution using illustrations obtained from project documentation or other sources.
3. Sustainable construction projects seek to minimize non-renewable energy consumption, protect water resources and conserve water consumption. This is accomplished through good design and operating the building using sound environmental practices. A LEED Pre-requisite on any LEED certified project is to provide fundamental commissioning and verification to *support the design, construction, and eventual operation of a project that meets the owner’s project requirements for energy, water, indoor environmental quality, and durability.*
   1. Review you project documents to identify and summarize any specific requirements related to commissioning and verification.
   2. Review the document *New Construction Building Commissioning Best Practice*

by the *Building Commissioning Association*. Identify and describe the contractor’s

commissioning responsibilities during the construction phase for a project such as yours.

* 1. Identify 6 pieces of commissioned equipment from your project that might be included in the construction checklist and describe the specific commissioning process for at least one piece of equipment.

1. Sustainable construction projects seek to use environmentally preferable products in the construction process. The LEED certification process seeks to minimize *the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials* and gives credit for using construction products that provide *building product disclosure and optimization.*
   1. Choose 3 construction products used in your project that you believe are environmentally preferable.
   2. Locate the product manufacturers website and use the information available to explain how these products seeks to minimize *the embodied energy and other impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials*
2. Another sustainable construction principle is to reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.
   1. Identify 3 material streams used in your project where waste materials could be diverted from landfill or incineration.
   2. Describe with specific reference to your project how the 3 waste materials streams will be collected during the construction phase and processed locally after they leave the site. Your description should include a site utilization plan highlighting key features specific to waste management (i.e. dumpsters, salvage material lay down)
3. The quality of the indoor environmental is essential in sustainable construction projects. LEED certification seeks to *promote the well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation.* This is achieved by developing and implementing an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building.
   1. Identify the requirements and procedures and describe how you would protect the air distribution system (for example ductwork) during construction.
   2. Give an example specific to your project and describe how you would protect absorptive materials stored on-site and from moisture damage.

## Related References:

1. <http://www.usgbc.org/cert-guide>
2. [http://www.bcxa.org/wp-content/pdf/BCA-Best-Practices-Commissioning-New- Construction.pdf](http://www.bcxa.org/wp-content/pdf/BCA-Best-Practices-Commissioning-New-Construction.pdf)
3. <http://apps.necanet.org/files/NECA090_2004.pdf>
4. <http://your.kingcounty.gov/solidwaste/greenbuilding/construction-demolition.asp>
5. <http://www.mcaa.org/green/Construction_IAQ_Final.pdf>
6. <http://cbcs-ky.com/doc/IAQPlan2-9-2011.pdf>

## SPECIFICATION TAKE-OFF / DRAWING NOTES ISSUES

The student shall provide an analysis of all items that impact time, money, or other risks that are associated with, but not be limited to, supplemental conditions, general notes on drawings, and all specifications. The analysis shall be presented in the form of an internal memorandum directed toward company employees affiliated with this project.

## STUDENT SELECTED WORK

Students are required to add relevant information into their thesis document. The information should be insightful and provide the faculty with additional understanding concerning the project or the construction process as seen by the student. You may enhance your thesis by taking photos, including work on related items that interests you, and adding originality where it enhances your total project. The Student Selected Work submitted should involve **approximately 40 hours of work** completed by the student. Examples of “Student Selected Work” are listed below:

## E-Portfolio:

**Students are strongly encouraged to engage the e-portfolio as their student selected work. See specific directions in Canvas.**

**Cost Analysis:**

The student can identify a component of the building and do a value analysis to determine which system may be better to use. The analysis needs to address the cost of the item, its effect on the schedule and the life cycle cost. The important thing to remember is to identify and analyze various systems. The project can remain the same.

## Temporary Structures:

In addition to the information required in the Building Stability section, the student could do in-depth investigations of several areas. Trenching, bracing wood trusses, bracing masonry walls, structural steel bracing and shoring could all be studied as they relate to your specific project. The complete design could include sketches, citations from applicable codes or OSHA sections, connection details, construction sequencing and other relevant information.

## Scheduling:

Project planning is an area that the student could explore. Creating a detailed Work Breakdown Structure which represents the organization of the project is acceptable. This plan should be reflected in the actual schedule that is required.

Creating a detailed Two-week Schedule that deals with a specific operation or area of the project could also enhance the thesis. This schedule could be used by the superintendent to direct field personnel or coordinate subcontractors. This could also represent a project meeting schedule where the actions of the last week and the next two weeks would be discussed. This schedule would be more detailed that the overall project schedule, but represent the activities that need to be completed during the time period.

**APPENDIX A: BSCI 4990 – THESIS PROPOSAL APPROVAL FORM (version 1-7-13)**

This form is to be submitted **directly to the BSCI Office**, along with drawings and separately bound specifications. The student is encouraged to submit the drawings and specs. on a USB drive in PDF format. The Thesis Instructor will make notations on this sheet as to their approval and any special requirements. After the project has been approved, the BSCI Office will return a copy of this form and the plans/specs/cd to you and retain a copy of this form for filing. If disapproved, the plans/specs/cd and form will be returned to you. The Building Science Office phone number is **(334) 844-4518**.

Today’s Date: \_ Semester & Year you will take Thesis: \_

Full Name of Student (as in AU Banner): \_ \_ \_ AU e-mail: \_ \_ Exact Title of Project on Plans/Specs: \_ \_ \_

Name of Architect: \_ \_ \_ \_ Date of Plans: \_

Architect’s Project #: Location of Building, City: \_ State: \_ \_

Cost of Project: \_ \_ (Should be between $1,000,000 and $3,000,000) Use actual bid figures or A/E's or G.C.’s estimate/budget.

Building Floor Area (should be approximately 9,000 - 12,000**\*** s.f.) No less that 7,000 s.f. of the area must have finished floors, partitions, walls and ceilings. **\*** BIM Thesis is a minimum of 15,000 s.f.

Types of buildings that do not lend themselves to be good Thesis projects and will not be approved:

|  |  |
| --- | --- |
| * Pre-engineered roof trusses and wall systems | * Wal-Mart or supermarket type buildings |
| * Pre-engineered metal buildings or pre-cast walls | * Drug Store projects (CVS, Walgreens, etc.) |
| * Branch banks | * Houses or Apartments |

Select **Yes** or **No** to the following questions.

**Required Items for Thesis Proposal Approval:**

**Yes No**

Do you have a complete set of bound Specifications, Division 0 thru Mechanical/Electrical/Plumbing?

Do you have the following forms in the General Conditions: Bid Proposal, Agreement?

Do you have complete Civil drawings (u.g. utilities, grading, parking, elevations, erosion control, etc.)?

Do you have complete Architectural drawings (doors & windows, interiors, ceiling, elevations, etc.)?

Do you have complete Structural drawings (foundations, floor & roof framing, wall sections, etc.)?

Do you have complete Mechanical drawings (HVAC, ductwork, equipment schedules, piping, etc.)?

Do you have complete Electrical drawings (lighting fixture schedule, power, panel board schedule, etc.)?

Do you have complete Plumbing drawings (non-pressure & pressure piping, fire protection, etc.)?

**Required Items for *Thesis Class* (strongly recommend inclusion in Thesis Proposal):**

Do you have a *Geotechnical Report*?

Do you have any *Formwork* required such as retaining wall, elevated slab, columns, etc.?

Do you have a *Finish Hardware* schedule in the specifications or listed on the drawings?

Do you have any *Alternates* in the Bid Proposal and/or specifications?

For BIM Thesis only: Do you have *CAD drawings* and *digital specifications*?

Student Comments Regarding Proposal: \_ \_

\_ \_ \_ \_

**BSCI Office Approval:** \_ \_ Date:

**BIM Thesis Faculty Approval:** Date: \_

**Thesis Instructor Approval:** \_ \_ Date:

Thesis Instructor Comments & Special Requirements for approval \_ \_

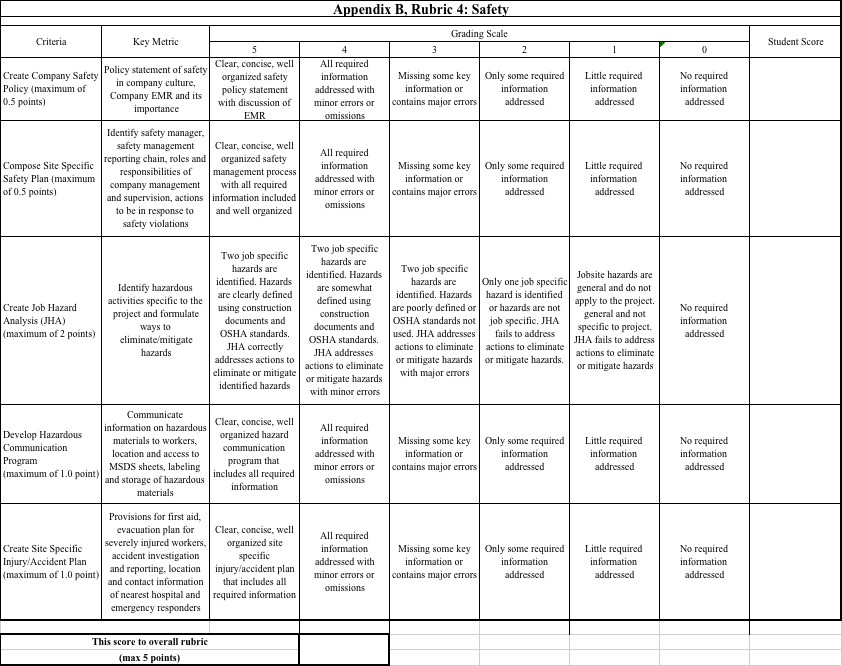
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| --- | --- | --- | --- | --- |
| **Appendix B - Thesis Evaluation & Grading Criteria (updated 8/15/15)** | | | | |
| **Student Name:** | |  | **5%** | **LEED Assessment** |
| **Each Subpart (In Blue) will be graded as a unit with the weight of** | |  |  | LEED Certification Selection |
| **Subpart shown in 1st column** | |  |  | Environmental impacts of construction activities on the site |
|  | **A 10-point scale will be used with this grading criteria** |  |  | Commissioning |
|  | **Completing all the minimum requirements does not mean an**  **automatic grade of “A”.** |  |  | Environmentally preferable products |
|  | **If ALL items are included and most of the items are reasonably**  **correct, then the student can expect a grade of “C”.** |  |  | Construction waste management |
|  | **Significant omissions and/or errors will result in a grade in the “D”**  **range or an “F”.** |  |  | Indoor environmental quality |
| **15%** | **General Overview** |  |  |  |
|  | Understanding the Plans |  | **15%** | **Project Administration** |
|  | Understanding the Specifications |  |  |  |
|  | Understanding Materials |  |  | Proposal Form with at least one alternate bid item |
|  | Understanding Methods |  |  | Change Order (executed in first 3 months) |
|  | Organization of the Book |  |  | Change Order prompting, i.e. RFI, Architect’s directive, etc. |
|  | Appearance of the Book |  |  | Change Order QTO, Pricing, Recap sheets, and cover  correspondence to Architect |
|  | Misc. Factors |  |  | Agreement Form (per your specs.) w/acceptance of one alternate |
|  |  |  |  | Schedule of Values Reports showing Period Costs for first three  months, from which the pay applications are generated |
| **5%** | **The Thesis & Company Items** |  |  | Payment Requests (for first 3 consecutive months) |
|  | Title Page |  |  | List of all required Warranties and at least two actual Warranties |
|  | Thesis Proposal Approval Form |  |  | Subcontract Agreement Short Form (AGC) w/ detailed scope of Work  and listing of project documents as attachments. |
|  | Table of Contents with page numbers |  |  | Explanation/Analysis of MEP systems |
|  | Assumptions |  |  | Subcontract Scope Statement for MEP systems |
|  | Spec Takeoff - Division 1 & Plan Notes Issues |  |  | Project Cash Flow Projection & Analysis |
|  | Detailed Project Time Line |  |  |  |
|  | List of Student Selected Work w/page numbers |  | **5%** | **Project Documents** |
|  | Company History, Philosophy, and Goals |  |  | Master Surety Agreement |
|  | Organizational Chart |  |  | Bid Bond |
|  | Duties of Key Personnel |  |  | Power of Attorney for Bond Agent |
|  | Contractor's Licenses (State and Local) |  |  | Bond Application Form |
|  | Reference all sources used in Thesis |  |  | Performance and Payment Bonds |
|  | Project Brief |  |  | Certificate of Insurance |
|  |  |  |  | Building Permit (not the application) |
| **10%** | **Financial** |  |  | Submittal/shop Drawing Control Document |
|  | Contractor's Qualification Statement |  |  | Substantial Completion Documentation |
|  | Income Statement - current and projected |  |  | Consent of Surety to Release of Retainage (when appropriate) |
|  | Financial Narrative including business position and strategies  consistent with financial statements |  |  | Affidavit of Release of Liens |
|  | Financial Ratios and a thorough analysis of each: Net and Gross Margins, ROI, Current Ratio, Fixed Asset Newness, and Average Ages  of Receivables and Payables |  |  | Affidavit of Payment of Debts & Claims |
|  | Labor Burden Determination (home office and field) |  |  | Consent of Surety to Final Payment |
|  | General Overhead Determination |  |  | Certificate of Occupancy |
|  |  |  |  |  |
| **15%** | **Project Estimate** |  | **10%** | **Project Schedule** |
|  | Document earthwork quantities using "Earthworks" or other  suitable program. Include printout of software including graphic image of cut/fill. |  |  | CPM Activity Worksheets (activities derived from cost estimate, cost loading the schedule, SOV #s, etc.) |
|  | Classify Materials and Methods by Trades |  |  | Full Plotted Schedule, (critical path, procurement activities, etc.) |
|  | Calculate Building Quantities |  |  | Site Utilization Plan (Graphic & Written Narrative) |
|  | Choose appropriate Technology for Creating Estimate |  |  |  |
|  | BIM Model |  | **5%** | **Structural** |
|  | Create an Estimate |  |  | Identify the structural components of a building |
|  |  |  |  | Identify common methods of stabilizing structural frames |
| **5%** | **Safety Plan** |  |  | Classify Loads on Buildings |
|  |  |  |  | Trace the path of vertical and lateral loads through structural |
|  | Specifics on the Project |  |  | Design and Construct strong, stiff & stable temporary structures  and formwork |
|  | Emergency Contacts |  |  | Calculate Internal member forces in structural elements of |
|  | Safety manager |  |  | Determine internal stresses on structural bending elements |
|  | First Aide |  |  |  |
|  | Emergency Plan |  | **10%** | **Student Selected Work** |
|  | Regulations |  |  | Requires 40 hours of work for full credit. |
|  | Create a Safety Plan |  |  | (i.e., LEED, BIM, pictures with narrative, etc) |
|  | Create a Plan for Compliance |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Appendix B, Rubric 1: Estimate** | | | | | | | |
| **Name:** | | | | | | | |
| Criteria | Key Metric | Grading Scale | | | | | Student  Score |
| 5 | 4 | 3 | 2 | 1 |
| Classify Materials and Methods by Trades | Recapped and organized estimate according to appropriate trades | All items organized well and assigned to appropriate trade | Minor errors in organzation and classification only | One key item with significant organization or classification  issues | 2-3 key items with significant organization or classification  issues | More than 3 key items that wer organized or classified poorly |  |
| Calcuate Building Quantities | Is it complete? | All items were addressed correctly | All items addressed, but some minor errors were made in the  QTO | One major omission or error in the QTO (may also include minor  errors) | 2-3 key omissions or errors in the QTO (may also include minor errors) | More than 3 key omissions or errors in  the QTO (may also include minor errors) |  |
| Choose Appropriate Technology for Creating Estimate | There is a consistent level of detail through the estimate, and the  audit trail is obvious | Solid choices were made for creating the estimate. A consistent level of detail and audit trail are clear and well developed. | Generally good choices were made to create the estimate. Some minor errors in level of detail or audit trail may be  present. | One major issue associated with choice of technology for the esitmate.  Inconsistencies in level of detail or the audit trail  occur. | 2-3 inconsitencies in level of detail or the audit trail. | Significant issues with level of detail or audit trail throughout the estimate. |  |
| BIM Model | Are required items included in the model? | Model is complete and readily accessible | Model is generally complete and/or accessibility of model is not  clear | Model lacks one key item and/or accesibility of model is difficult | Model lacks 2-3 key items that  should be included or model cannot be  accessed. | Model lacks 3-4 key items that should be included or model cannot be accessed. |  |
| Create an Estimate | QTO, Pricing, Recap, Alternates, Bid Proposals, Documents | All required items are included, and no errors or  omissions are  evident | Only minor errors or ommissons noted | One key item with significant errors or omissions | 2-3 key items with significant errors or omissions | More than 3 key items that were omitted or entered with errors |  |
|  |  |  |  |  |  | Estimate Score: |  |
|  |  |  |  |  |  |  |  |
| Total Score | (Sum of all points  above) |  | **This score to overall rubric** |  |  |  |  |
| % of total Points | (Total Score/25) |  |  |  |  |
| Score to Overall  Rubric | (% of total Points \*  15%) |  |  |  |  |

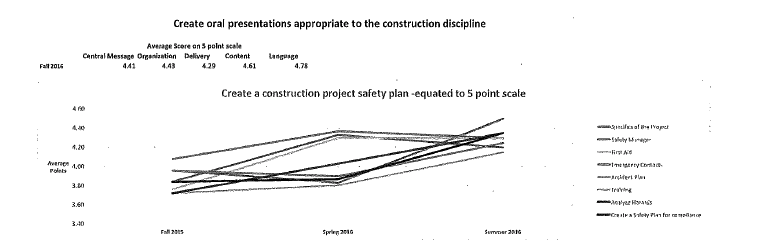
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| **Appendix B, Rubric 2: Sustainability** | | | | | | |  | |
| **Name:** | | | | | | |  |  |
| Criteria | Key Metric | Grading Scale | | | | | | Student Score |
| 5 | 4 | 3 | 2 | 1 |  |
|  |  |  |  |  |  |  |  |  |
| LEED Certification Program Selection | Correct Program  Selected |  |  |  |  |  |  |  |
| Environmental impacts of construction activities on the site | Identify requirements that control site  erosion and  sedimentation. | All project specific reqs identified | Most project specific reqs identified | Some project specific reqs identified | Reqs identified are not project specific | Some generic non project  specific | No reqs identified |  |
| reqs identifie d |
| (5 Points) | Identify and  describe 6 specific measures | 6 project specific measures  identified and fully described and illustrated | Less than 6 project specific measures identified and/or descriptions lacking detail | Less than 4 project specific measures identified and/or descriptions lacking detail | Measures identified and described but are not project specific | Measur es identifie d but little attempt to  describ  e them | No measures identified |
| Fundamental commissioning and | Identify and  summarize project | Documents  reviewed and all |  | | | | No evidence  of project |  |
| (5 Points) |
|  | Identify and describe contractors  responsibilities | Identification and description consistent with  best practice | All  responsibilities identified and  some description | All  responsibilities identified | Some responsibilities identified but little description | Some respons ibilities  listed | No  responsibiliti es identified |
|  | Identify 6 pieces of equipment and describe one process in detail | 6 pieces of equipment identified and process well described | 6 pieces of equipment identified and process  somewhat described | 6 pieces of equipment identified | 4 pieces of equipment identified | 2 pieces of equipm ent identifie d | No equipment identified |
| Environmentally preferable products (5 Points) | Choose 3 environmentally preferable  products | 3 products correctly identified |  | | | | No products identified |  |
|  | Explain how products are environmentally preferable | Website information  used to explain all ways the 3 products reduce environmental impact | Website information used to explain some of the ways ways the 3 products reduce environmental impact | Website information used to explain some of the ways 2 products reduce environmental impact | Non-product information used to explain some of the ways 3 products reduce environmental impact | Non- product informa tion  used to explain some of the ways 2 product s reduce environ mental impact | No explanation |
| Reduce construction waste (5 Points) | Identify 3 material streams | 3 material streams  identified |  | | | | No material streams  identified |  |
|  | Describe how materials collected and processed | Collection & processing of material streams for all 3 are  described & are project specific | Collection & processing of material streams for all 3 are  described but are not project  specific | Collection & processing of material streams for 2 are described & are project  specific | Collection&  processing of material streams for 2 are  described but are not project specific | Only 1 Collecti on & process ing of material stream describ  ed | Collection and  processing not  described |
|  | Site utilization plan for CWM | Site utilization plan shows project specific locations of dumpsters,  salvage material  lay down etc. for all 3 streams | Site utilization plan shows project specific locations of dumpsters,  salvage material  lay down etc. for 2 streams | Site utilization plan shows project specific locations of dumpsters,  salvage material  lay down etc. for 1 stream | General information about locations of dumpsters,  salvage material lay down etc. given but not project specific | | No site utilization plan |
| Indoor air quality (IAQ) management plan (5 Points) | Identify requirements and procedures and describe protecting the air distribution  system | Requirements, and procedures are project specific and description is consistent with industry best practice | | Requirements, and procedures are not project specific and description is not consistent with industry best practice | | | No Requirement s, and  procedures identified |  |
|  | Example of | Example is |  | Example is not |  | | No example |
| **Total Score (Max 25)** | | | | | | | |  |
| **Transfer to Grading Rubric – Total Score/25 (Max 5)** | | | | | | | |  |

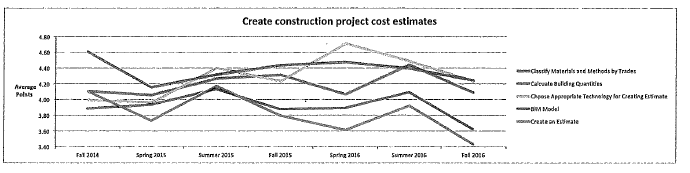
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| **Appendix B, Rubric 3: Structure** | | | | | | | |
| **Name :** | | | | | | | |
| Criteria | Key Metric | Grading Scale | | | | | Student  Score |
| 5 | 4 | 3 | 2 | 1 |
| Identify the structural  components of a building | Verbal description of structural  system that includes graphic depiction in either 2D or 3D | All key structural elements are identified along with their function. A clear understanding of structure is  presented. | Description covers almost all structural components of the structure with most member functions  addressed. The student has an understanding of items  presented. | Approximately half of the members are identified with function shown. The student lacks some  understanding of the structure. | Key elements of the structure are not included in the description and a lack of understanding of components is evident. | Key structural elements are not identified. Student lacks an  understanding of components of the building. |  |
| Identify common methods of  stabilizing  structural frames | Verbal description of lateral system that includes graphic depiction in either 2D or 3D | Lateral load resisiting system  is clearly identified.  Student illustrates how load is transmitted to lateral system. | Lateral load resisting system  is clearly identified. A lack of clarity is present in how the load is transmitted to the system. | Lateral system is address but is not complete.  Student does not have clear connection with how lateral load is transmitted to the foundation. | Lacks sufficient detail in the lateral load system of the buidling. A lock of understanding is present. | Fails to identify correct lateral system and does not attemp to identify lateral load flow. |  |
| Classify Loads on Buildings | Verbal and graphical depiction of building loads | All dead loads, live loads, and wind loads are corectly shown on the building. | Loads shown on building are generally correct but lack  sufficient detail  for full credit. | Either dead loads, live loads, or wind loads are incorrect. | Two of three key loads are incorrect or not suffiiciently addressed. | Loads on the buidling are not clear or are not adddressed. |  |
| Trace the path of vertical and lateral loads through  structural components of a post and beam building | Verbal and graphical depiction of building loads | All loads are shown clearly  transmitting to the ground. | Load paths shown are  generally correct but lack  sufficient detail to confirm all are resolved to the  ground. | Load paths  shown have minor errors or lack clarity. | One load case is not resolved to the ground.  Others are generally correct. | Neither gravity or wind loads are resolved to the foundation. |  |
| Design and  Construct strong, stiff, & stable temporary  structures and  formwork | Temporary  structure analysis | Temporary  structure design is complete and accurate | Temporary  structure design lacks minor details or has minor errors | Temporary  structure design lacks at least one major componetn or has one major flaw | Temporary  structural design is not complete or multiple errors are present | Lack of understanding of temporary structure  design and construction |  |
| Calculate internal member forces in  structural elements of buildings | Temporary  structure analysis | Forces for all elements were determined and sufficiently  resolved. | Forces for all elements were determined, but some were not resolved. | Most member forces were determined and resolved. | Major errors are present in the  structure analysis of forces in temporary  members. | Little or no effort was made to determine internal member forces within temporary structural  members. |  |
| Determine internal stresses on  structural bending elements | Temporary  structure analysis | All members for temporary  structure have internal stresses identified and  sufficiently resolved. | All members for temporary  structure have internal stresses identified but may not be  sufficiently resolved. | Most members in the temporary  structure have internal stresses identified and resolved. | Major errors are present in the  structure analysis of stresses in temporary members. | Little or no effort was made to determine internal member  stresses within temporary structural members. |  |
|  |  |  |  |  |  | Structure Score: |  |
|  |  |  |  |  |  |  |  |
| Total Score | (Sum of all points  above) |  | **This score to overall rubric** |  |  |  |  |
| % of total Points | (Total Score/35) |  |  |  |  |
| Score to Overall  Rubric | (% of total Points \*  5%) |  |  |  |  |

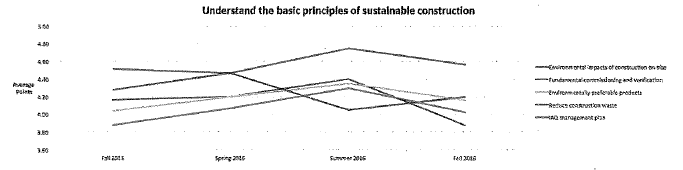


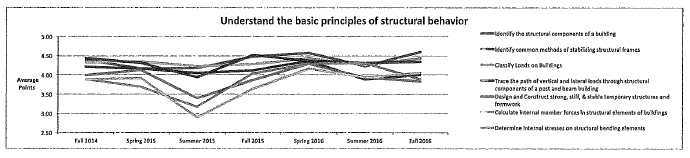
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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Appendix B, Rubric 5: Schedule** | | | | | | | |
| **Name:** | | | | | | | |
| Criteria | Key Metric | Grading Scale | | | | | Student  Score |
| 5 | 4 | 3 | 2 | 1 |
| Develop Work Breakdown Structure at Consistent and  Appropriate Level of Detail, minimum  # of activities as described in the Thesis Instructions | Thoughtful and Consistent Listing of Activities, Grouped Appropriately | All Project Components Broken Down at Sufficient Detail by which to Direct the Trades, and at a Consistent level of Detail, minimum  # of activities as described in the Thesis  Instructions | Minor errors or omissions in breaking down components into activities | 1 to 2 key ommissions or  errors in breaking down or organizing the project components | 3 - 5 ommissions or inconsistencies in key components into activities | More than 3 key components that were broken down poorly or at an inconsistent level of detail |  |
| Calculate and Apply Reasonable and Appropriate Durations | Are Durations Reasonable Relevant to Crew Sizes, and to the Overall Project Duration? | All activities assigned a reasonable  duration based on logical crew sizes and overall project duration | 1 - 2 minor errors in the  assignment of reasonable duration, causing minor problems with  sequence and/or the critical path | 1 or 2 problematic errors with key activity durations, causing issues with overall  sequence and the critical path | 3 - 5 problematic errors with key activity durations, causing issues with overall  sequence and the critical path | More than 5  significant errors in assignment of durations, causing  significant problems with overall sequence and the critical path |  |
| Assign  Relationships and Constraints Demonstrating Understanding of the Building and Site's Sequence | Major Phases of the Project (Site, Structure, Skin, Rough-In, and Finishes) have Relativity in Sequence | Solid choices were made for creating the estimate. A consistent level of detail and audit trail are clear and well developed. | Generally good choices were made to create the estimate. Some minor errors in level of detail or audit trail may be  present. | One major issue associated with choice of technology for the esitmate.  Inconsistencies in level of detail or the audit trail  occur. | 2-3 inconsitencies in level of detail or the audit trail. | Significant issues with level of detail or audit trail throughout the estimate. |  |
| Leverage the Software Platform to Appropriately Reflect the Information, Sequence, Critical Path | Critical Path Illuminated, Relationships Shown, Numerical Data Shown (duration, Start Date, Float), and Sequence  Understood Easily | Model is complete and readily accessible | Model is generally complete and/or accessibility of model is not clear | Model lacks one key item and/or accesibility of model is difficult | Model lacks 2-3 key items that  should be included or model cannot be  accessed. | Model lacks 3-4 key items that should be included or model cannot be accessed. |  |
| Create a Comprehensive Project Schedule | Submission Shows a Comprehensive Understanding of the Building and Site Components, Their Sequence and  Constructability, and Represented Properly in the Software Platform | All required items are included, and no errors or  omissions are evident | Only minor errors or ommissons noted | One key item with significant errors or omissions | 2-3 key items with significant errors or omissions | More than 3 key items that were omitted or entered with errors |  |
|  |  |  |  |  |  | Estimate Score: |  |
|  |  |  |  |  |  |  |  |
| Total Score | (Sum of all points  above) | 25 | **This score to overall rubric** | 10.00% |  |  |  |
| % of total Points | (Total Score/25) | 100.00% |  |  |  |
| Score to Overall  Rubric | (% of total Points \*  10%) | 10.00% |  |  |  |

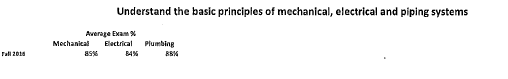
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| --- | --- | --- | --- | --- | --- |
| **Oral Communication Rubric (to be completed by Professor, Presenter, and 3 peers)** | | | | | |
|  | 5 | 4 | 3 | 2 | 1 |
| **Central Message** | Central message is compelling (precisely stated, appropriately repeated, memorable, and  strongly supported.) | Central message is clear and consistent with the supporting materials. | Central message is basically understandable but is not often repeated and is not  memorable. | Central message can be deduced, but is not explicitly stated in the presentation. | Central message is unclear and cannot be deduced. |
| **Organization** | Organization pattern (specific introduction and conclusion, sequenced material within the body, and trasitions) is clearly and consistently observable. It makes the content of the  presentation cohesive. | Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation. | Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation. | Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the parameters. | Presentation lacks any organized pattern. |
| **Delivery** | Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) makes the presentation compelling.  Speaker appears polished and  confident. | Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting.  Speaker appears comfortable. | Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable.  Speaker appears tentative. | Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation. Speaker appears  uncomfortable. | Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) are not present. Speaker lacks confidence to deliver material. |
| **Content and Supporting Material** | Content and supporting materials (explanations, examples, illustrations, logical analysis, statistics, analogies, quotations, information and data from relevant authories) are well developed and significantly supports the presentation and establishment of the presenter's credibility/authority on the topic. Content is clear, concise, complete and correct | Content and supporting materials (explanations, examples, illustrations, logical analysis, statistics, analogies; and quotations, information and data from relevant authories) that generally supports the presentation and establishment of the presenter's credibility/authority on the topic. Content is needs improvement in being clear, concise, complete and/or  correct | Content and supporting materials (explanations, examples, illustrations, logical analysis, statistics, analogies; and quotations, information and data from relevant authories) that partially supports the presentation and establishment of the presenter's credibility/authority on the topic. Content needs significant improvement in being clear, concise, complete and/or  correct | Insufficient Content and supporting materials (explanations, examples, illustrations, logical analysis, statistics, analogies; and quotations, information and data from relevant authories) that minimally supports the presentation and establishment of the presenter's credibility/authority on the topic. Content is not clear, concise, complete and/or  correct | Presentation provides little or no supporting material (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) |
| **Language** | Language choices are appropriate for the audience. The language is memorable and compelling and enhances the effectiveness of the  presentation. | Language in presentation is appropriate to the audience.  Language choices are thoughtful and generally support the effectiveness of the  presentation. | Language in presentation is appropriate to audience. The language may be mundane or colloquial and partially support the effectiveness of the  presentation. | Language in presentation is not appropriate to the audience. Language choices are unclear, irrelevant, or minimially support the effectiveness of the  presentation. | Language in presentation is offensive to the audience. Language may not support the items within the presentation. |

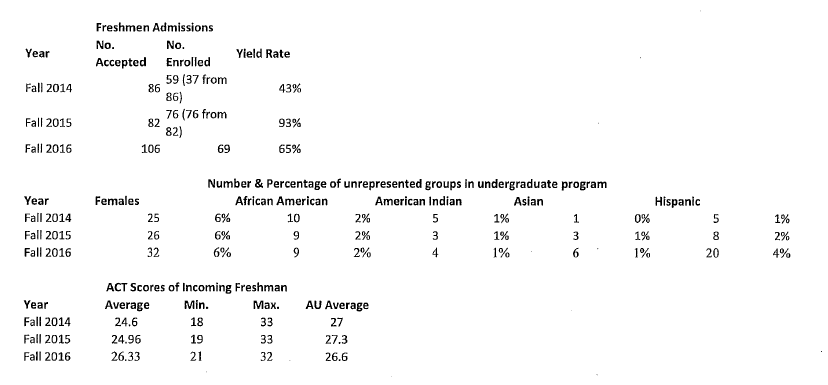






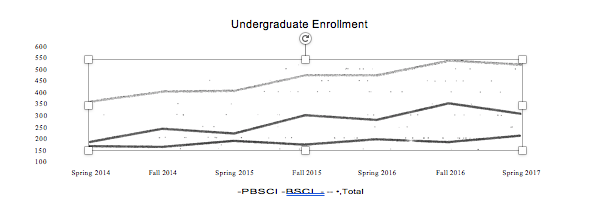




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**Formula GPA for incoming BSCI students Student Enrollment**

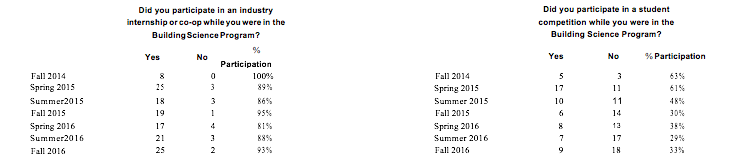
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Average** | **Min.** | **Max.** | **Semester** | **PBSCI** | **BSCI** |  | **Total** |
| Spring 2014 | 2.92 | 2.31 | 3.82 | Spring 2014 | 183 |  | 164 | 357 |
| Summer  2014 | 3.08 | 2.22 | 3.76 | Summer  2014 | 60 | 133 | | 193 |
| Fall 2014 | 3.38 | 3.06 | 4.00 | Fall 2014 | 239 | 161 | | 400 |
| Spring 2015 | 2.98 | 2.3 | 3.94 | Spring 2015 | 219 | 188 | | 407 |
| Summer  2015  F<!ll 2015 | 2.97  3.36 | 2.2  2.5 | 3.72  3.94 | Summer  2015  Fall 2015 | 45  300 | 144  173 | | 199  473 |
| Spring 2016 | 3.13 | 2.38 | 4.00 | Spring 2016 | 279 | 196 | | 475 |
| Summer  2016  Fall 2016 | 3.11  3.53 | 2.22  3.12 | 4.00  3.94 | Summer  2016  Fall 2016 | 60  353 | 146  186 | | 206  539 |
| Spring 2017 | 3.35 | 2.94 | 4.00 | Spring 2017 | 309 | 213 | | 522 |

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BSCI Summary Assessment Data Enrichment

**What is your overall satisfaction with the education you received in the Did you participate in a service learning Building Science program? experience as part of a BSCI class?**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester Not at all**  **satisfied** | | **Slightly**  **satisfied** | | **Moderately**  **satisfied** | | **Very**  **satisfied** | **Extremely**  **satisfied** | **Average Yes No** % **Participation** | | | | |
| Fall 2014 | 0 | | 0 | | 0 | 5 | 3 | 4.38 | Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 0 | | 0 | | 0 | 10 | 18 | 4.64 | Spring 2015 | 25 | 3 | 89% · |
| Summer 2015 | 0 | | 0 | | 2 | 8 | 11 | 4.43 | Summer 2015 | 20 | 1 | 95% |
| Fall 2015 | 0 | | 1 | | 2 | 8 | 9 | 4.25 | Fall 2015 | 20 | 0 | 100% |
| Spring 2016 | 0 | | 0 | | 2 | 12 | 7 | **4.24** | Spring 2016 | 19 | 2 | 90% |
| Summer2016 | 0 | | 2 | | 2 | 11 | 9 | 4.13 | Summer2016 | 23 | 1 | 96% |
| Fall 2016 | 0 | | 0 | | 0 | 12 | 14 | 4.48 | Fall 2016 | 26 | 1 | 96% |
| **Semester** | **Not at** all | **A little** | | **Somewhat** | | **Quite a** bit | **Very much** | **Average** | **Did you participate** In a **study abroad** | | | |
|  | **prepared** | **prepared** | | **prepared** | | **prepared** | **prepared** |  | **program or another international experience** | | | |
|  |  |  | |  | |  |  |  | **as part of** the **Building Science Program?** | | | |
| Fall 2014 | 0 | | 0 | | 1 | 2 | 5 | 4.50 |  | **Yes** | **No** % **Pa** | **rticipation** |
| Spring 2015 | 0 | | 0 | | 1 | 8 | 19 | 4.64 | Fall 2014 | 3 | 5 | 38% |
| Summer 2015 | 0 | | 0 | | 1 | 6 | 14 | 4.62 | Spring 2015 | 3 | 25 | 11% |
| Fall 2015 | 0 | | 1 | | 3 | 8 | 8 | 4.15 | Summer 2015 | 7 | 14 | 33% |
| Spring 2016 | 0 | | 2 | | 1 | 9 | 9 | 4.19 | Fall 2015 | 3 | 17 | 15% |
| Summer2016 | 0 | | 1 | | 4 | 12 | 7 | 4.04 | Spring 2016 | 6 | 15 | 29% |
| Fall 2016 | 0 | | 0 | | 3 | 9 | 15 | 4.44 | Summer 2016 | 7 | 17 | 29% |
|  |  | |  | |  |  |  |  | Fall 2016 | 5 | 22 | 19% |

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**Did you create an ePortfolio while you were in the Building Science Program?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Yes** |  | **No** |  | % **Participation** |
| Fall 2014 |  | 8 |  | 0 | 100% |
| Spring 2015 |  | 28 |  | 0 | 100% |
| Summer2015 |  | 17 |  | **4** | 81% |
| Fall 2015 |  | 20 |  | 0 | 100% |
| Spring 2016 |  | 21 |  | 0 | 100% |
| Summer2016 |  | 18 |  | 6 | 75% |
| Fall 2016 |  | 24 |  | 3 | 89% |

BSCI Summary Assessment Data Employment Preparation

**Did you seek advisement through BSCI Career Office?**

**Semester**

**No. of students advised per. semester**

**Semester**

**Yes No** % **PBSCI**

BSCI GRAD OTHER

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | **Participation** |  | | | | | |
| Fall 2014 | 7 | 1 | 88% |
| Spring 2015 | 20 | 8 | 71% | Spring 2015 | 13 | 11 | | 4 | 0 |
| Summer2015 | 13 | 8 | 62% | Summer2015 | 0 | 1 | | 1 | 0 |
| Fall 2015 | 10 | 10 | 50% | Fall 2015 | 34 | 19 | | 7 | 4 |
| Spring 2016 | 15 | 6 | 71% | Spring 2016 | 15 | 16 | | 1 | 4 |
| Summer 2016 | 6 | 18 | 25% | Summer 2016 | 2 | 0 | | 2 | 1 |
| **Did you submit** a **Resume to AU Career** | | | |  | **Number of Company** | | | | |
| **Development Center?** | | | |  | **Presentations per semester** | | | | |
| **Semester Yes No** % | | | | **Semester** | **Companies Students** | | | | |
| **Participation** | | | |  | **presenting attending** | | | | |
| Fall 2014 | 5 | 3 | 63% | Fall 2014 | 14 | | 144 | | |
| Spring 2015 | 14 | 14 | 50% | Spring 2015 | 11 | | 133 | | |
| Summer2015 | 12 | 9 | 57% | Summer 2015 | 0 | | 0 | | |
| Fall 2015 | 13 | 7 | 65% | Fall 2015 | 8 | | 64 | | |
| Spring 2016 | 13 | 8 | 62% | Spring 2016 | 7 | | 92 | | |
| Summer 2016 | 12 | 12 | 50% | Summer2016 | 0 | | 0 | | |
| **Did you attend a company presentation** | | | | **Semester** | **Number of companies** | | | **Number of companies** | |
| **in Gorrie prior to attending an on** | | | |  | **attending campus interviews** | | | **attending BSCI Career Expo** | |
| **campus interview?** | | | |  | **(not inc. expo)** | | |  | |
| **Semester Yes No** % | | | |  |  | | |  | |
|  |  |  | **Participation** |  |  | |  | | |
| Fall 2014 | 8 | 0 | 100% | Fall 2014 | 14 | | 62 | | |
| Spring 2015 | 24 | 4 | 86% | Spring 2015 | 11 | | 60 | | |
| Summer 2015 | 14 | 7 | 67% | Summer 2015 | 1 | | 22 | | |
| Fall 2015 | 18 | 2 | 90% | Fall 2015 | 7 | | 77 | | |
| Spring 2016 | 17 | 4 | 81% | Spring 2016 | 6 | | 72 | | |
| Summer2016 | 17 | 7 | 71% | Summer2016 | 0 | | 21 | | |

**Did you attend a company interview in Semester Number of students attending BSCI Career Expo Gorrie?**

**Semester Yes No** % **PBSCI**

**BSCI**

**MBC/MIDC**

**Other Total**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | **Participation** |  | | | | | |
| Fall 2014 | 8 | 0 | 100% | Fall 2014 | 147 | 103 | 17 | 57 | 324 |
| Spring 2015 | 24 | 4 | 86% | Spring 2015 | 47 | 78 | 17 | 68 | 210 |
| Summer 2015 | 12 | 9 | 57% | Summ.er 2015 |  | 64 |  | 2 | 66 |
| Fall 2015 | 15 | 5 | 75% | Fall 2015 | 171 | 101 | 17 | 61 | 350 |
| Spring 2016 | 17 | 7 | 67% | Spring 2016 | 94 | 104 | 7 | 65 | 270 |
| Summer2016 | 14 | 10 | 58% | Summer 2016 |  | 37 |  |  | 37 |

**Did you attend a BSCI Career Expo? Sector of industry-recruiting on campus**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Yes** | **No** |  | % **Semester**  **Participation** | **Commercial** | **Residential** |  | **Infrastructure Industrial** | **Other** |  |
| Fall 2014 | 7 |  | 0 | 100% Fall 2014 | 66% |  | 3% | 6% | 9% | 16% |
| Spring 2015 | 27 |  | 1 | 96% Spring 2015 | 66% |  | 2% | 11% | 9% | 12% |
| Summer 2015 | 20 |  | 1 | 95% Summer 2015 | 83% |  | 4% | 4% | 0% | 9% |
| Fall 2015 | 20 |  | 0 | 100% Fall 2015 | 72% |  | 9% | 6% | 3% | 10% |
| Spring 2016 | 21 |  | 0 | 100% Spring 2016 | 69% |  | 8% | 3% | 3% | 17% |
| Summer2016 | 24 |  | 0 | 100% Summer 2016 | 80% |  | 10% | 0% | 0% | 10% |

BSCI Summary Assessment Data Employment

|  |  |  |  |
| --- | --- | --- | --- |
| Student Exit Surveys |  |  |  |
| Have you formally accepted a job offer? | Yes | No | Placement % |
| Fall 2014 | 8 | 0 | 100% |
| Spring 2015 | 27 |  | 96% |
| Summer 2015 | 19 | 2 | 90% |
| Fall 2015 | 18 | 2 | 90% |
| Spring 2016 (3 grad school) | 17 | 4 | 81% |
| Summer 2016 (1 grad school) | 20 | 4 | 83% |

|  |  |  |  |
| --- | --- | --- | --- |
| BSCI Career Office Tracking |  |  |  |
| Semester | Students Interviewed | Job offer or grad school | Percentage |
| Fall 2014 | 19 | 19 | 100% |
| Spring 2015 | 29 | 29 | 100% |
| Summer 2015 | 24 | 24 | 100% |
| Fall 2015 | 26 | 26 | 100% |
| Spring 2016 (3 grad school) | 30 | 30 | 100% |
| Summer 2016 (1 grad school) | 29 | 29 | 100% |

