Academic Affairs Assessment of Student Learning
Report for Academic Year 2018-2019

Department/Program: Computer Science
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1. **Which learning outcomes did you measure this past year?** The computer science program measured all of the outcomes this year as planned. Outcomes 1, 3 (initial measurement) were measured in one freshman-level course, outcomes 1, 3, 5, 6 (second measurement) were measured in one sophomore-level course. Outcomes 1, 2, 3, 4, 5, 6 (final measurement) were measured in senior seminar.

2. **In which course(s) were assessments conducted?**
   Outcomes were measured in CS 102 (initial measurement), CS 250 (second measurement) and CS 408 (final measurement.

   How did you assess the selected program learning outcomes? Outcomes 1, 3, 5, 6 were measured using standard departmental exams combined with item analysis. Outcomes 2 and 4 were to be measured using student portfolios.

3.

4. **How many students were included in the assessment(s) of each PLO in a course?**
   For the initial measurement of PLOs 1 and 3, 16 students were included. For the second measurement (PLOs 1, 3, 5, 6), nine students were included. For the final measurement of PLOs 1, 3, 5, 6, eight students were included. For PLOs 2 and 4, portfolios were collected from eight students.

5. **How were students selected to participate in the assessment of each outcome?**
   For the first and second measurements, all students who were present the day the test was given were included. For the final measurement, all students in the class were included.

6. **In general, describe how each assessment tool (measure) was constructed** (i.e. in-house, national, adapted).

All instruments were constructed in-house.

7. Who analyzed results and how were they analyzed

The data was run through two computer programs to generate a score for each PLO and an item analysis of the test results. These were then discussed by the department's assessment committee with an eye towards whether PLO scores improve from measurement to measurement. Portfolios were evaluated by the department's assessment committee.

8. **Provide a summary of the results/conclusions from the assessment of each measured Program Learning Outcome.**

Data:

Test 1:

	Inchoate	Emerging	Developed	Mastered
PLO 1	0	4	2	0
PLO 3	0	1	5	0

Test 2:

	Inchoate	Emerging	Developed	Mastered
PLO 1	0	4	5	0
PLO 3	0	4	5	0
PLO 5	0	1	7	1
PLO 6	3	3	3	0

Test 3:

	Inchoate	Emerging	Developed	Mastered
PLO 1	0	3	5	0
PLO 3	0	0	1	7
PLO 5	0	2	3	3
PLO 6	1	0	4	3

Portfolios:

	Inchoate	Emerging	Developed	Mastered
PLO 2	2	7	0	0
PLO 4	0	8	1	0
PLO 6	0	1	0	0

Overall, the data indicates students are progressing satisfactorily towards mastery of the PLOs.

Students do have problems with the most sophisticated PLO (# 5) on program validity, complexity and correctness. To address this, the department decided to make CS 309 (Software Engineering) a core course in the curriculum rather than just an elective.

On Test 1, students have problems with the inverse function question and the recursion question. On Tests 2 and 3, no pattern present on questions missed, but some indication of problems with inclusion/exclusion principle.

9. **What are next steps?** (e.g., will you measure this same learning outcome again? Will you change some feature of the classroom experience and measure its impact? Will you try a new tool? Are you satisfied?)

   As mentioned above, CS 309 was made a required course in the program. The above outcomes will continue to be measured every year. An evaluation rubric for the portfolios will continue to be worked on.

10. **Please attach an example of the assessment tool used to measure your PLO(s).** These can be added as an appendix, a link to the assessment, or sent separately in email with your report.

Assessment Test
(to be given in CS 102)

1. Find the value of x using the following algorithm:

   1. Set $x = 3$
   2. Loop on k from 1 to 4, increasing by 1 each time.
      (i). If $k = 1$ or $k = 3$, then $x = x + k$
      (ii). If $k = 2$, then $x = x + 2k$
      (iii). If $k = 4$, then $x = x + 4k$
   3. Output x

   (a) 3
   (b) 13
   (c) 19
   (d) 27

2. Consider the following program:

```
/* I  */
#include <iostream.h>

int main()
{
    /*  II  */
    float cel;
    float fahr;

    cout << "Please enter the fahrenheit temperature:  "; /* III  */
    cin >> fahr; /* IV  */
    cel = 5.0*(fahr-32)/9.0; /* V  */
    cout << "The celsius temperature is " << cel << endl; /* VI  */
    return 0;
}
```

   Comments:

A. calculate the output value	D. declare the variables
B. a program to convert fahrenheit to celsius	E. prompt for user input
C. output the value	F. get the user input

   The order in which comments A-F go in locations I-VI is

   (a) B,D,F,E,A,C
   (b) B,D,C,F,A,E
   (c) B,D,E,F,A,C
   (d) D,B,C,F,A,E

3. Find the center of the circle whose equation is given by $x^2 + y^2 + 10x - 4y + 28 = 0$.

   (a) $(5, -2)$
   (b) $(5, 2)$
   (c) $(-5, 2)$
   (d) $(10, -4)$

4. Let $C = (5/9)(F - 32)$. Solve for F.

   (a) $(9/5)C - 32$
   (b) $(9/5)C + 32$
   (c) $(9/5)(C + 32)$
   (d) $(5/9)C + 32$

5. Consider the following code fragment.

```
int x, y;
cout << "Please enter an integer: ";
cin >> x;
if(x > 14)
{
    if(x < 57)
    {
        y = -1;
    }
    else
    {
        y=0;
    }
}
else
{
    y=1;
}
```

   Which set of integers used as possible inputs would cause all lines of code to be executed?

   (a) $\{1, 14, 15\}$
   (b) $\{14, 15, 57\}$
   (c) $\{14, 57, -2\}$
   (d) $\{14, 15, 16\}$

6. Solve $\log_2(x + 5) - \log_2(x - 5) = 2$

   (a) $x = 15$
   (b) $x = 25/3$
   (c) $x = -25/3$
   (d) $x = 2$

7. Classify the following system: $\begin{cases} 4x + 5y = 43 \\ 3x - 2y = 11 \end{cases}$

   (a) Consistent and independent

   (b) Inconsistent

   (c) Consistent and dependent

   (d) None of the above

8. Given the following code, how many member variables does class C have?

```
class A{
  int a;
  int go();
};

class B: public A{
  int b;
  int go();
}

class C: public A{
  int c;
  int d;
}
```

   (a) 2

   (b) 3

   (c) 4

   (d) 5

9. Consider the recursively-defined function $f(1) = 2$, $f(n) = n \cdot f(n-1) + 2$. Find $f(4)$.

   (a) 8

   (b) 82

   (c) 6

   (d) 26

10. Given the following overloaded function definitions, which pair are not allowed, if any?

```
I    void test();
II   void test(int a);
III  void test(double b);
IV   void test(int a, int b);
V    int test(int a, double b);
VI   double test(double a, int b);
VII  int test(int a, int b);
```

(a) Function overloading is never allowed

(b) All the above overloaded functions are allowed

(c) V and VII

(d) IV and VII

11. Let $f(x) = \dfrac{3}{4-5x}$. Find its inverse function $f^{-1}(x)$.

(a) $f^{-1}(x) = \dfrac{4-5x}{3}$

(b) $f^{-1}(x) = \dfrac{5x-4}{3}$

(c) $f^{-1}(x) = \dfrac{4x-3}{5x}$

(d) $f^{-1}(x) = \dfrac{3-4x}{5x}$

12. Which feature of Object-Oriented languages helps to provide protection of data from improper access operations?

(a) Inheritance

(b) Polymorphism

(c) Encapsulation

(d) Function overloading