Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to write correct and robust software.

Outcome Measure: Annual: CSC254 Signature Assignment

Criteria for Success: 80% of the students should have an average score of at least 2 in each of the major areas.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 2 or Higher								
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019***
Compilation	100%	100%	92%	75%	100%	94%	90%	75%	
Runtime Correctness	86%	58%	85%	100%	62%	72%	95%	60%	45%
Problem Solving	100%	100%	100%	75%	92%	83%	80%	85%	70%

*Note that the instrument was changed in 2019.

Conclusions Drawn from Data:
The students find the run-time correctness the most challenging. This is because this is the area of programming that is the most detailed oriented. The instrument was changed in 2019, the "compilation" test was removed because the rest of the work can not be evaluated if the program does not compile.

Changes to be Made Based on Data:
Continue to emphasize the need to carefully de-bug computer code during development. The rubric was modified to clarify the definition of run-time correctness which has made scoring simpler (Fall 2017). We continuing to work with students the detailed work needed for accurate computer programs.

CSC 254 Signature assignment

	Unsatisfactory (1)	Satisfactory (2)	Good (3)	Excellent (4)
Runtime correctness	• Less than 60% correct	• Between 60% – 79% correctness	• 80% - 89%	• 90% – 100%
Problem solving	• Analysis of program source code indicates that program is NOT close to working, and could NOT easily be modified to work given additional time.	• Analysis of program source code indicates that the student partially understands the problem solution or understands the solution but could not efficiently translate the solution to C++ code	• Analysis of program source code indicates that program is close to working, and could be modified to work given additional time.	• All tasks execute correctly indicating that the code is both correct and robust (can catch user input errors)

Criterion: 80% of students will average 2 in Runtime, correctness and Problem solving.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will analyze the interaction between hardware and software.

Outcome Measure:
Annual (CS and IS): CSC314 Signature Assignment

Annual (CS): ETS CS Exam Computer Organization, Architecture and Operating Systems Subscore.

Criteria for Success:
CSC314 Assignment: 80% of the students should have an average score of at least 7.

ETS: The department subscore will be at the 65th percentile or higher.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 7 or Higher								
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Hardware/software interaction understanding	85%	89%	82%	92%	88%	75%	69%	100%	92%

ETS Subscore:
Here are the most recent 10 years of data:

Year	Percentile
2009-10	90
2010-11	65
2011-12	89
2012-13	*
2013-14	82
2014-15	94
2015-16	86
2016-17	61
2017-18	53
2018-19	74
2019-20	No Score

* Sample size too small to be given indicator scores.
ETS changed the CS exam in 2011-12.

Conclusions Drawn from Data:
Students have been able to successfully master the material in the CSC314 assessment. The variations appear to be related to sample size.

This data from the ETS subscore is a challenge to interpret for several reasons: some years our sample size is too small for ETS to provide the subscore and in all years our sample size is sufficiently small that the standard deviation is relatively large. The last few years we have not had as much success. This could be changes in the exam, the particular problems selected or variations in the students.

Changes to be Made Based on Data:
Continue to require operating systems (CSC314) of all CS and IS students.

We need to evaluate the ETS test questions to determine if this remains a valid measurement tool that is aligned with our curriculum. We have noticed that there may be a correlation between this data and our curricular cycle. We teach several key classes in alternating years and it appears that students are more successful in an alternating year cycle. We need to investigate this further as part of our upcoming program review. We will be also be evaluating whether or not the ETS MFT is the best way to measure this learning objective.

The department has decided to discontinue using the ETS MFT. We are in the process of aligning this learning outcome with a signature assignment in a class.

Rubric Used (CSC314)
The scoring for this assignment is purely points based.

	Unsatisfactory (1)	**Satisfactory (2)**	**Good (3)**	**Excellent (4)**
Points gained by showing understanding of software/hardware interaction in answering question	6 and below	7	8	9-10

Rubric Used (ETS)
Scoring done by ETS on the Major Field Test.

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to apply their technical knowledge and critical thinking to solve problems.

Outcome Measure:
Alternating Year**:** ISS414 Signature Assignment using data bases.

ETS Proficiency Profile: Critical Thinking/Reading Portion

Criteria for Success:

80% of the students should have an average score of at least 2.5 in each of the major areas.

ETS PP: 85% of the students will be marginal or proficient at Level 2 Reading/Critical Thinking.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Class at 2.5 or Higher				
	2011-12	**2013-14**	**2015-16**	**17-18**	**19-20**
Relevant Information Chosen	100%	100%	88%	89%	88%
Query Correctness	25%	100%	48%	41%	83%

	Percentage of Students Marginal or Proficient							
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
ETS Proficiency Profile Level 2 Critical Thinking	80%	92%	100%	84%	92%	76%	79%	80%

*ETS is for the full department.

Conclusions Drawn from Data:
ISS414 Assignment: The 2012 class was relatively small and that led to a fairly large standard deviation. 75% of the class would have passed query correctness if the benchmark had been 2.3. We once again saw some problems with query correctness in 2015-16 and in 17-18. In both cases, had the threshold for success be lowered slightly (2 vs 2.5), many more students

would have succeeded. In 2019-20 we saw an improvement in query correctness. The assignment was modified a bit to be clearer for students.

ETS: The students are generally hitting our benchmark in this area, with small sample sizes hitting or missing the benchmark can be a matter of a single person's score.

Changes to be Made Based on Data:
Spend more time in class emphasizing queries. This class is being revised in light of some new curricular changes. In 2015-16 the class was changed significantly. It focused on both data bases and website construction. Less time is being spend on data bases. In 2017-18 the course content was adjusted again. We need to continue to review this signature assignment in light of the changed course content. The signature was updated in 2019-20 based on the review of content.

Rubric Used

	Unsatisfactory (1)	**Satisfactory (2)**	**Good (3)**	**Excellent (4)**
Recognition of relevant information	3 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	2 errors (an error is defined as missing a relevant database field or listing an irrelevant field)	1 error (an error is defined as missing a relevant database field or listing an irrelevant field)	All relevant database fields are listed and no irrelevant fields are listed for both queries
Query correctness	3 mistakes in the 2 queries	2 mistakes in the 2 queries	1 mistake in the 2 queries	No mistakes in the two queries

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats (Quantitative Reasoning).

Outcome Measure: Annual: Each student will participate in the ETS Proficiency Profile exam.

Criteria for Success: 90% of the students will be Marginal or Proficient at Level 2. Note that we dropped the criteria of success so that it is possible for the department to pass even if a single student misses the criteria.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	Percentage of Students Marginal or Proficient							
ETS Proficiency Profile	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
ETS Proficiency Profile Level 2 Mathematics	100%	100%	100%	100%	92%	82%	95%	93%

Conclusions Drawn from Data:
Students are in general meeting our criteria. The variation often comes down to a single student because of small sample sizes.

Changes to be Made Based on Data:
None at this time. We will continue to monitor the results.

Rubrics
ETS Proficiency Profile (no rubric involved)

Assessment Data Mathematical, Information and Computer Sciences

Learning Outcome: Information Systems graduates will be adequately prepared for entry into graduate school or jobs in the computing profession.

Outcome Measure:
Annual: Require students to take the ETS Major Field Test in Computer Science as the mid-term exam for the capstone course, Information Systems 481, Senior Seminar in Information Systems. Note that we are in the process of changing this to the Peregrin Test and in 2017-18 piloted a collection of questions.

Annual: Internship supervisor evaluations

Every 5 Years: Alumni will be surveyed every five years. They will be asked at least the following questions:

1. If you have a job in Computer Science: On a scale of 1 to 5, 1 being outstanding and 5 being poor, how well do you think that the undergraduate Computer Science curriculum at PLNU prepared you for your work in the field?
2. If you are going to graduate school or went to graduate school: On a scale of 1 to 5, 1 being outstanding and 5 being poor, how well do you think that the undergraduate Computer Science curriculum at PLNU prepared you for graduate school?

Criteria for Success:
ETS MFT: 50% of our students achieve above the 25th percentile on the exam.

Peregrine Test: 70% of students will score a 70% or higher on the exam (when there are national norms, this will be adjusted).

Internship Supervisor Evaluation: 80% of the students will score an average score of 4 or more in the following areas:

- Ability to learn
- Ability to problem solve
- Quality of work
- Initiative
- Responsibility
- Ability to work with others
- Relations with others
- Ability to use computing to solve problems

Alumni Survey: 75% of the respondents say they were well prepared or higher.

Aligned with DQP Learning Areas (circle one or more):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

ETS Major Field Test:
Most recent 10 years of data.

Year	Overall Benchmark
2007-08	N
2008-09	Y
2009-10	N
2010-11	Y
2011-12	N
2012-13	N
2013-14	Y
2014-15	N/A
2015-16	N
2016-17	Y

* Sample size too small to be given indicator scores.
ETS changed the CS exam in 2011-12.

Peregrine Exam:

	2017-18	2018-19	2019-20
Percentage of students scoring 70% or higher	100%	N/A	N/A

Note that there were no Information Systems majors in Senior Seminar in 2018-19.
COVID-19 made it extremely difficult to hold our second pilot in the senior seminar (it would have been March 2020)

Internship Supervisor Evaluation:

	2016-17	2017-18	2018-19	2019-20
Percentage of students with an average of 4 or more	100%	N/A*	100%	N/A**

* Supervisors for small sample of students (2) didn't return reports
** COVID-19 year, it was a challenge to get supervisors to respond to the survey.

Alumni Data:
In the spring of 2017, the department surveyed alumni who had graduated in the last 15 years. The survey is data used to inform the department's program review. Below are the components of the survey relevant to our assessment plan for information systems.

How well did the undergraduate curriculum prepare you for:

	Well or higher	OK	Poorly
Work in the field (if went into the field)	61.5%	23.1%	15.4%
Graduate school	100%	0%	0%

Conclusions Drawn from Data:

ETS Results:

We continue to evaluate if the ETS exam in computer science is the best measure or ability for computer information systems/information systems students. We are considering moving to the Peregrine exam in Business for these students since our newly adopted IS curriculum has a larger business component and Peregrine will work with us to design IS questions.

Peregrine Results:

The students met the benchmark in 2018, the year that we tested the first round of questions that were designed. There were no information systems students in senior seminar in 2019 so we have not revalidated the questions. Because of COVID-19 it was not possible to run the second pilot test of the questions in March/April 2020. We hope to do that in Spring 2021.

Internship Supervisor Survey:

We have just begun using this survey, but the preliminary results indicate that that the supervisors believe that our student interns are well prepared. We have had some challenges getting supervisors to respond to the survey, we need to look at the instrument and see if we can simplify it.

Alumni Survey:

The program met the benchmark for those who went to graduate schools but missed the benchmark for those who went into industry. The majority of these students earned their degree before the Information Systems curriculum was significantly changed to include a more cohesive set of business coursework. It is expected that those changes will be reflected in an improvement in the next round of survey data.

Changes to be Made Based on Data:

ETS Results:

We have made curricular changes in the last few years to update our department coursework to align with new standards from the Association of Computing Machinery as well as to respond to assessment data. As part of this process we did a compute overhaul in the curriculum in this area. Starting in 2015-16 we will be launching a newer IS curriculum in partnership with the School of Business. This will increase the amount of business course work completed by these majors. We will need to evaluate if the CS MFT test is reasonable to use or our IS majors, or if the MFT in business is more suitable, or if we should use a different measure. See our APC proposals for the specific descriptions of curricular changes made.

Survey:

We expect to see changes in alumni survey results due to the significant changes made in the Information Systems curriculum. We need to modify this survey so that it is quicker and easier for internship supervisors to give us feedback.

Rubric:

ETS: The ETS provides the data.

Peregrine: We are currently developing questions for Peregrine so scoring the exam by hand.

Internship Supervisor Evaluation:

This is a survey instrument so there is no rubric.

Alumni Survey:
This is not rubric scored, but the data is tabulated.