MARYMOUNT
U N I V E R S I T Y

STUDENT LEARNING ASSESSMENT REPORT

PROGRAM: BS Information Technology
SUBMITTED BY: Diane Murphy
DATE: September 30, 2020

Executive Summary: Description of Assessment Process

List *all* of the program's learning outcomes, as of the assessment year's catalog: *(regardless of whether or not they are being assessed this year)*

Learning Outcome	Year of Last Assessment	Assessed This Year *(Y=Yes)*	Year of Next Planned Assessment
Analyze problems in business and society, and identify and define the digital technology appropriate to the solution	2016-2017	Y	2020-2021
Design, implement, and evaluate a digital solution as a system, process, component, or program to meet the defined needs	2016-2017	Y	2020-2021
Select and use appropriate current techniques, skills, and tools necessary for today's digital age	2018-2019		2020-2021
Demonstrate knowledge of programming principles and proficiency in at least one programming language	2016-2017	Y	2020-2021
Work successfully in a team environment both as a team leader and as a participant of a team	2017-2018		2020-2021
Communicate effectively with a wide range of audiences, non-technical and technical	2018-2019		2020-2021
Demonstrate an awareness of professional, ethical, legal, security, social issues, and responsibilities and be able to determine the most ethical response to common dilemmas in the digital age	2017-2018		2020-2021
Recognize the need for and an ability to engage in continuing professional development to adapt to an ever-changing global technological and business environment	2017-2018		2020-2021
Conduct evidence-based research on contemporary information technology issues in today's digital world	2018-2019		2020-2021

Provide a brief description of the assessment process used including how results are shared and discussed and strengths, challenges, and planned improvements to the process, providing evidence of a culture of continuous improvement based on assessment. If there is something that is impeding your ability to implement improvements, please comment on those issues

The IT program faculty discusses assessment in its monthly faculty team meetings. In the October meeting, we began looking at the impact of AACSB on the program and identified the need to streamline the learning outcomes for each program. A small group worked on changes for each program and these were approved in January 2020.

Last year's assessment results, particularly the action plan, we discussed in the December department meeting. The data was used to plan improvements and new approaches within courses and across the curriculum.

The BS, IT program will participate in the College of Business, Ideation, Leadership and Technology (BILT)'s expanded assessment process to be launched in AY 20-21. The BILT will establish an Assessment Committee to support the continuous improvement of student learning outcomes. The Assessment Committee will assist directors and program champions in refining learning outcomes and will focus on documenting progress on the improvement measures established by the faculty. This approach will strengthen further the College's mission and vision.

Closing the Loop: Progress on Planned Improvements from Prior Year

Describe how the program implemented its planned improvements from last year:

Outcome	Planned Improvement	Update
Select and use appropriate current techniques, skills, and tools necessary for today's digital age	Added a short introduction of the new DevOps methodology into IT210, Software Engineering, course in Spring 2019; coverage will be extended in the 2019-20 courses. We also recognize new specialties and coordinate them with NOVA as many of our students are transfer students. One of these examples is Cloud Computing which will be introduced as a specialty in 2019-20. We will introduce some new technology segments in the IT junior and senior seminars.	DevOps is now the fastest growing area of expertise for software development. It is now fully covered in IT210, Software Development courses each semester. The Program Director has worked closely with NOVA (Dr. Chad Knights, NOVA Provost of Information and Engineering Technologies, and Paula Ford, Dean, Information and Engineering Technologies) on program specific pathways including cybersecurity and cloud computing. This relationship is ongoing. New technology sessions are included in the seminars including, including segments on cloud, data science, and artificial intelligence.
Communicate effectively with a wide range of audiences, non-technical and technical	Students who take IT210 in their sophomore year, or first year as a transfer student, have taken EN102 or its equivalent at community college. Some are better writers than others and we will promote the use of the CTL tutors after the first assignment if skills are not up to standard to get a good grade.	Writing has improved for most of the class. We now critically review the first written assignment (a 2-page memo) and recommend the CTL center (now the Academic Hub) for student support.
Conduct evidence-based research on contemporary information technology issues in today's digital world	We will discuss the Graduating Student Survey questions as part of IT423, IT Senior Seminar, to ensure students understand the relationship of the questions to the program content.	The Graduating Student Survey is now included in a session towards the end of the course..

Provide a response to last year's University Assessment Committee review of the program's learning assessment report:
Comment:

The assessment is one of the elements in the department's continuous improvement program. It is a look back at student performance against the defined learning outcomes. Much of our program for improvement is looking forward as the field is under constant change. We spend time interfacing with the companies who hire our students in all aspects of this large field and implementing upgrades to our curriculum. Last year we did some 50 major and minor revisions including converting specialties into minors and allowing students a wider selection of options to embed in their BS in Information Technology program.

Outcomes Assessment 2019-2020

Learning Outcome 1: Analyze problems in business and society, and identify and define the digital technology appropriate to the solution

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	Performance Standard *Define the acceptable level of student performance.*	Data Collection *Discuss the process for collecting this data: who conducted the assessment, when, and how?*	Result *Did you meet your target? What was the result?*
Direct: Analyze a scenario and accurately and completely document the problem in the form of user stories or use cases in IT210, Software Engineering	85% of all students must achieve a grad of 10 out of 12 on the assignment (see rubric one)	The instructor uses the rubric to grade the assignment. The data is collected at the end of the semester from Canvas	The data is taken from the section of IT210 taught by Dr. Mbaziira in Fall 2019 (20 students) and Spring 2020 (17 students). Of the 37 students, 32 students received a score of 10 or more (86.5%). The standard was met.
Indirect: Performance on the job, including ability to solve problems in the field, including the appropriate use of technology	85% of students were confident of their ability to apply knowledge and skills to new situations. This is important given the fast-changing field of IT.	One question was selected from the 2019-20 Graduating Student Survey: "Solve problems in your field using your knowledge and skills".	85.7% of the 21 alums responding answered good or excellent. Solving the problem is interpreted to include the implementation of the technology appropriate to the solution. The standard was met.

Interpretation of Results
Analysis and Implications:

The existing students and the graduating students were able to meet the standard for analyzing and document a problem such that it could be developed using today's technology in an early course in the curriculum and on graduation.

Discuss planned curricular or program improvements <u>for this year based on assessment of outcome:</u>

The focus in the program has to be on change and to the need to stay current in the technology field. We have recently added new and emerging technology discussions into IT423, the IT Senior Seminar, which should help students understand the need to be aware of changes in the field. We will add content also to IT423 to reinforce problem solving regardless of the technology solution to be used.

Learning Outcome 2: Design, implement, and evaluate a digital solution as a system, process, component, or program to meet the defined needs

Outcome Measures	Performance Standard	Data Collection	Result
Direct: Ability of students to successfully complete a project, and defend it as part of an oral defense, in either networking, database development, or cybersecurity as part of IT489, the IT Capstone Project.	85% of students who decided to do networking, databases, or cybersecurity for their capstone projects successfully completed the assignment as evidenced by their project report and their oral defense of it.	The data was collected from the evaluation reports submitted by the 3 faculty members who evaluated the report and oral defense sessions. See Rubric 2	Of the 82 students who took IT489, IT Capstone Couse, Fall 2019 (28) Spring 2020 (36) Summer 2020 (18) only 37 (45%) did a project that involved implementing either a database, a network, or a cybersecurity control. 32 of the 37 of these students (86%) successfully defended their project. The other 5 had difficulties in articulating one or more part of their project activities or results or did not complete the assignment as specified in their proposal. The standard was met.
Indirect: Performance on the job, including ability to use technology effectively in the workplace	85% of students were confident of their ability to make effective use of technology in their workplace	One question was selected from the 2019-20 Graduating Student Survey 1, Use technology effectively in a workplace environment	90.5% of the 21 alums who responded answered good or excellent. The standard was met.

Interpretation of Results
Analysis and Implications:

The IT489 course is the culminating course in the BS Information Technology curriculum and students met the standard for completion of a self-directed project to implement a solution to a problem of their choosing in databases, networks, or cybersecurity, common aspects of information technology in business and government today. The standard was met and faculty were confident of student's ability to design, develop, and implement an effective technology solution on graduation. The graduating students also agreed with this conclusion.

Alums. However, some alums did not feel as confident in their ability to design, implement, and evaluate a digital solution once they are in the workplace. Only 80% gave a confident answer to the same question in the 2019 Alumni survey. This may have, however, being influenced by the many changes in the industry that have occurred since graduation.

Discuss planned curricular or program improvements <u>for this year based on assessment of outcome</u>:

A more complex case study will be added as an assignment to IT423 to help students understand the complexity of problems and solutions in the workplace of tomorrow.

Learning Outcome 3: Demonstrate knowledge of programming principles and proficiency in at least one programming language

Outcome Measures	Performance Standard	Data Collection	Result
Direct: Ability of student to develop a complete a solid program in the final project in IT230, Advanced JAVA Programming.	At least 70% of the students must be able to compile a program of moderate complexity that is free of compiler errors, includes comments, and is able to run and meet the requirements, without errors.	Code was submitted by each student for their final assignment in IT230, Advanced Programming in JAVA. The object and source code, together with written documentation, for each student, was submitted to an independent faculty member for review. The rubric is attached as Rubric 3. The independent faculty member first reviewed the documentation to independently examine the capabilities of the software developed and evaluated it and the coed as shown in Rubric 3	Of the 34 students in IT230 (Fall 2019 17; Spring 2020 15; Summer 2020 2), 27 met the standards required by the rubric, (73%). Most of the deficiencies were in understanding the requirements and in the ancillary items such as comments and warning errors. Object-oriented programming (such as JAVA) remains one of the more difficult components of the IT major. The principles developed, however, are key components of learning any of the newer programming and scripting languages. The outcomes assessment standard was met.
Direct: Ability of students to complete the assignments in 3 different programming (scripting) languages in IT227, Mobile App Development	85% of students should effectively meet the requirements in each of the 3 coding techniques.	In IT227, students are required to produce three assignments, three of which involve different mobile app programming techniques. There were 21 students in 20/SP, the only occurrence of the class in the school year. The assignments were reviewed by a second faculty member for usability, functionality, and documentation, with the rubric shown in Rubric 4. The instructor first assessed how well the student understood the mobile app platform and implemented the	IT227, Mobile App Development, focuses on ensuring that students have the necessary coding skills to enter the workforce as an entry-level mobile app developer In the evaluation, 18 of the 21 students (86%) met the rubric requirements to be able to effectively develop a mobile app. The outcomes assessment standard was met.

Outcome Measures	Performance Standard	Data Collection	Result
		coding to meet those requirements Each mobile app was run and the functionality requested was tested. The code was reviewed for clarity its effectiveness. The assignments were evaluated using the Rubric4	

Interpretation of Results
Analysis and Implications:

The prior programming experience of the students who failed to meet the standard was examined. 5 of the 7 students were found to have had the prerequisite IT130 transferred in from NOVA. Our assumption that the courses coverage was the same was obviously wrong.

Similarly, the 3 students who did not meet the standard for coding in IT227 had taken IT125 as their first programming course. This course focuses more on the coding side of Web sites (HTML and CSS0 and not on logical programming such as JavaScript. Although, JavaScript is covered towards the end of the course, it is not in depth enough to be adequate for the use of JavaScript in IT227 mobile App class.

Discuss planned curricular or program improvements <u>for this year based on assessment of outcome:</u>

The discrepancies in the performance of the transfer students, mainly in error handling, will lead us to examine the difference between IT130 and the NOVA course and make sure that any omissions necessary to be successful in IT230 are covered in the start of IT230.

The prerequisites for IT227 will be modified to ensure that the students have taken either IT129 (a new course) or IT130, Java. If they have taken IT125, they will be asked to demonstrate proficiency in JavaScript, before admission. There are many free courses online to learn JavaScript if they want to do mobile app development.

Appendices

1. *Rubric for IT210, Software Engineering*

Attribute	Measure	Scoring	Student Score
Review the user stories to ensure they cover all aspects of the problem	Grade it as complete (3), largely complete (2), several functions not included (1), and no correct submission (0)	Factor a, values 0, 1, 2 or 3	
Review the user story/use case for their ability to accurate describe the desired functionality, including one or more test criteria	Mark as fully functional (3), mostly functional (2), only partly functional (1), or non-functional (0)	Factor b, values 0, 1, 2, or 3	
Review the user stories/use cases for language construction and ability to convey the functionality to a non-functional user	Mark as well written (3), good enough to communicate functionality to intended audience (2), has some communication or writing issues (1), or unable to communicate (0).	Factor c, values 0, 1, 2, or 3	
Check the format of the user story/ use case for compliance with industry requirements	Mark as fully compliant (3), mainly compliant (2), minimally compliant (1), or not compliance (0)	Factor d, values 0, 1, 2, or 3	
Total score	Calculate score	a + b + c + d with students receiving a score of 0 through 12.	

3. Rubric for Report/Oral Defense in IT489

Criterion	Substantially Developed (4)	Moderately Developed (3)	Minimally Developed (2)	Inadequate (1)	Not submitted (0)
1. Quality of problem/question	Has a clearly stated problem to solve	Has defined the problem somewhat but not complete	Has identified a broad area but no clear focus for a semester length project	Topic identified is too broad to provide a basis for the project	No submission or untimely submission
2. Likely Outcome	Defines the likely outcome of the project in detail	Defines the likely outcome of the project in some detail	Defines some the likely outcome of the project but not in any detail	Does not defines the likely outcome of the project in any detail	No submission or untimely submission
3. Knowledge being applied	Defines the knowledge gained in the program and used in the project in detail	Defines the knowledge gained in the program but incomplete	Defines some of the knowledge gained in the program in some detail	Project plan does not define the knowledge gained in the program that is used	No submission or untimely submission
4. Writing Style	Very well written and well organized	Reasonably well written and well organized	A few issues in the writing and/or the organization	Poorly written and organized	No submission or untimely submission
4. Oral Defense	Very well presented and all questions answered	Good presentation but struggled with	Presentation marginal and show poor understanding of	Inadequate or no presentation	

Criterion	Substantially Developed (4)	Moderately Developed (3)	Minimally Developed (2)	Inadequate (1)	Not submitted (0)
		one or more questions	the techniques used		

TOTAL: _____/_____

2. *Rubric for IT230, Advanced JAVA Programming*

Attribute	Measure	Scoring	Student Score
Review the documentation to examine the capabilities of the software developed and	Grade it as complex, medium, or simple	Factor x, values 1, 2 or 3	
Execute the object code and review it for the functionality described in the documentation	Mark as fully functional, partly functional, or non-functional	Factor y, values 0, 1, or 2	
Review the source code for language construction and comments and results from compilation with a current JAVA compiler	Mark as compilable with adequate comments, compilable with comments lacking, or non-compilable	Factor z, values 0, 1, or 2	
Total score	Calculate score	$x(y + z)$ with students receiving a score of 0 through 12.	

4. *Rubric for IT227, Mobile App Development*

Criteria	Incomplete 0	Does Not Meet Expectations 1	Proficient 2	Very Good 3	Outstanding 4
Understanding of requirements	The student did not submit a working mobile app	Student did not understand the requirements, and did not develop an adequate mobile application	Student seemed to understand the requirements, but the mobile application did not fully meet all the requirements fully.	Student understood the requirements, and developed a mobile application which fully implemented all the requirements but added extraneous content.	Student fully understood the requirements, and developed a mobile application which fully implemented all the requirements without adding extraneous content.
Usability of mobile interface	Student did not submit an working app	Student's code is basic and code sufficient to implement the user interface	Student's code was complete but lacked detailed validation functions.	Student mobile form collected the appropriate data, with validation, but was not fully intuitive to use.	Student's mobile application was easy to use, included appropriate validation controls, and gave users sufficient information to

Criteria	Incomplete 0	Does Not Meet Expectations 1	Proficient 2	Very Good 3	Outstanding 4
					complete the form efficiently.
Efficiency of Web server code	Student did not submit a server page.	Student submitted some code but it did not process the data correctly.	Student's code processes the form but could use more validation techniques such as try, except code.	Web server code accurately processes the data from the Web form but could use more efficient methods or data flows.	Web server code accurately processes the data from the Web form and is efficient in its use of methods and data flow
Effectiveness of the error page returned to the user	No page returned	Page code exists but does not work.	Page works but is a little difficult to understand the results of the Web server calculation	Page is written in good English and presented well to communicate the results of the Web server calculation.	Page is very well written and well-presented and communicates the results of the server calculation.
Evidence of proficiency in 3 coding languages	No evidence of proficiency in any language	Limited proficiency in all three languages	Proficiency in only one language	Proficiency in only two languages	Proficiency in three or more languages
Code included comments	There was no code to comment	Student only submitted the minimum comment such as his/her name	Student provided comments at the top of each set of code	Student provided good comments in one set of code but not in all code	Student provided detailed comments in both sets of code.