MARYMOUNT UNIVERSITY
Arlington, Virginia

STUDENT LEARNING ASSESSMENT REPORT

PROGRAM: BS Information Technology (IT) (Revised)

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EXECUTIVE SUMMARY

Program Description

Marymount's Information technology (IT) program offers a solid foundation of knowledge across the system life cycle — defining requirements, developing software, administering and securing a computer network, and successfully managing IT projects. The curriculum addresses hardware, software, databases, networks, security, quality assurance, and project management. Students will focus in one of the following specialty areas:

- Applied IT — for students who wish to study computers in the context of an application area, such as biology, education, or graphic design
- Computer Science — for students who would like to design and build software products or design and build complex, secure networks
- Data Science - for students who wish to develop knowledge, skills, and abilities to collect, store, find, and interpret "big data"
- Forensic Computing — for students who wish to investigate computer crimes and prepare evidence for use in a court of law
- Health IT — for students who aim to work in the health care industry, using technology to improve patient care
- Information Systems — for students who wish to design support networks, provide technical support to system users, and design and manage websites, usually in a business context
- Interactive Media — for students who would like to design websites using audio and video components
- Networking and Cybersecurity — for students who wish to specialize in network administration and the protection of today's computer systems.

Learning Outcomes

Learning Outcome	Year of Last Assessment	Assessed This Year	Year of Next Planned Assessment
Build a broad knowledge of information technology, allowing students to function as IT professionals who can successfully analyze problems and implement IT solutions to these problems both in an internship and in a job after graduation.	**2012-2013**	**XX**	
Build specific skills in a segment of the information technology field (such as software testing) allowing students to compete successfully for internships and entry-level jobs and to work effectively in these areas.	2011-2012 2014-2015		2019-2020

Learning Outcome	Year of Last Assessment	Assessed This Year	Year of Next Planned Assessment
Become proficient in at least one programing language, but be able to learn additional programing languages based on a knowledge of programming principles, and participate in programming competitions	**2012-2013**	**XX**	
Become proficient in a variety of skills such as computer repair, computer networking, database design, and cybersecurity through a combination of theoretical knowledge and hands-on experiences sufficient to obtain industry certifications.	**2012-2013**	**XX**	
Conduct a capstone project that includes research in an aspect of information technology (hardware, software, data, or information security) and apply that research to a current information technology concern for businesses or society in general; compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications, with arguments backed by data.	2011-2012 2014-2015		2019-2020
Compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications with arguments backed up by data.	2011-2012 2014-2015		2019-2020
Work successfully in a team environment both as a team leader and as a participant of a team, and communicate effectively with team members who do not have a technical background.	2013-2014		2018-2019
Conduct themselves as responsible professionals and global citizens who are aware of ethical issues and societal needs and who can determine the most ethical response to common dilemmas in the field.	2013-2014		2018-2019
Possess the knowledge and skills required to pursue life-long learning, including advanced degrees in areas relating to information technology and to adapt to an ever-changing, global technological and business environment.	2013-2014		2018-2019

Summary of Assessment

The Marymount undergraduate BS IT program continues to grow and attract more students, particularly from community colleges and from other four-year schools. Many new students are coming because of designation as a Center of Academic Excellence by NSA and DHS and the high levels of satisfaction of our existing students and alums. In the 2016 – 17 academic year, B.S IT was the second largest undergraduate program with some 238 students (spring 2017).

The first learning outcome assessed was the ability to build a broad knowledge of information technology, allowing students to function as IT professionals who can successfully analyze problems and implement IT solutions to solve these problems, both in an internship and in a job after graduation. We increased the measures by 10% to reflect the need for increased quality in the program. Students did not meet 2 of the 3 assessment measures using these higher criteria. IT students were less confident than the previous assessment although they all performed well on their internship evaluation. Students were generally well prepared with their 21st century skills, however they still lacked confident on their ability to get a good job and to be successful in it. The internship evaluation results support our approach of providing students with both a broad education in information technology, but allowing them to specialize in fields that are needed in the workforce. It is important that we continue to introduce courses in specialized areas, which provide entry into jobs that are in demand as the information technology field grows.

The addition of the IT seminars (IT223, IT323, and IT423) has helped students understand the importance of technical and non-technical skills (such as teamwork and presentations) in the workplace and to focus on the skills that differentiate them when searching for a good job in the Workplace. More emphasis on their ability to be successful and what it means will be added to the seminars.

The second outcome assessed was the ability to become proficient in at least one programing language, but be able to learn additional programing languages based on a knowledge of programming principles, and participate in programming competitions. Two of the three outcome measures were met and there is a marked improvement in the programming skills of all students in the freshman and sophomore classes. Graduating students, however, were not as certain of their ability to engage in new situations in the workplace, including learning new languages as the technology changes. Giving students a variety of choices for the programming courses has been very successful, allowing students to develop skills in a variety of languages. We will continue to keep abreast of the changes in the IT workplace and ensure students are aware of the "new" environments.

The third learning outcome assessed was the student's ability to become proficient in a variety of skills such as computer repair, computer networking, database design, and cybersecurity through a combination of theoretical knowledge and hands-on experiences sufficient to obtain industry certifications. Two of the three assessment measures were met, with a marked increase in the numbers of students taking, or planning to take, certifications to supplement their educational credentials. Graduating students were still a little underconfident in their ability to solve problems when they enter the workforce. The seminars (IT223, IT323, and IT423) have proven to be a valuable vehicle to interact with the students and get their opinions on the program, including the addition of additional topics. We continue to develop these courses to ensure students are workforce ready and that the program is responding to trends in the IT workplace. We will focus on "new situations" and the value of certifications. In 2016-17 we ran a boot camp for the Security+ certification and several students reported taking the Security+ examination after that boot camp. More boot camps are planned.

Supporting Marymount's Mission, Strategic Plan, and Relevant School Plan

The BS in Information Technology program is fully compliant with the mission of Marymount University and the outcomes are based on both the foundation in arts and sciences (needed for a well-rounded education) and career preparation (broad IT knowledge, specialized knowledge, and specific skill proficiency leading to certifications and life-long learning). The program recognizes the new job skills required in the profession and offers specialized courses (e.g., cybersecurity, mobile app development, Python programming, software testing, health information technology) to increase each student's success in getting a good internship, first job, and ultimately a career in the field. These job skills are matched with current industry certifications such as A+, Net+, and Security+ from CompTIA, ITIL, and the Certified Software Tester (CSTE) from the QAI Global Institute. The program also includes "soft" skills that are commonly requested by today's employers (communication skills, problem solving, writing proficiency, and the ability to work in teams). Finally, it recognizes the changing nature of the IT field and hence the need for life-long learning.

Our faculty is focused on academic excellence and student success. Our work integrates Marymount's three pillars of intellectual curiosity, service to others, and building a global perspective as follow:

<u>Intellectual Curiosity</u>

- Emphasize inquiry learning at all levels and provide students and faculty with opportunities for research collaboration.

- Ensure a personalized education through small classes and faculty/student collaboration, enabling students to develop their individual talents and interests.
- Encourage cross-disciplinary collaboration.

Inquiry learning is a key in the IT program and all professors (full-time and part-time) are encouraged to use classroom time, in part, for hands-on application of the subject matter through individual and group assignments. Students are also encouraged to develop their intellectual curiosity outside the classroom through membership of clubs such as the Cybersecurity Society, the UPE Honors Society, The Cyber Competition Group, the ISACA Student Group, and the Mobile App Development Special Interest Group. Hands-on self-learning outside the classroom is also facilitated by the ability for students to acquire software for use on their own machines through the department's Imagine license (access to Microsoft software for free) or through open source software recommended by faculty. These self-learning activities promote the life-long learning necessary to be successful in the ever-changing technology sector. We constantly evaluate the subject matter covered in the program to ensure that we match the knowledge and skills required in the current work place, including new models such as the Department of Labor Competency Models (Information Technology and Cybersecurity), the National Initiative for Cybersecurity Education (NICE) framework, and the ABET Information Technology accreditation standard.

Service to Others

- Make its facilities and expertise available to support and serve the community.
- Instill in its students and the entire University community a commitment to giving back through good citizenship, civic engagement, and volunteer service.
- Actively engage Marymount alumni in serving current students and creating a strong network of support for one another.

A Marymount pillar is for all students to serve the community. IT students do so through their own individual activities, jointly through club activities, and as assigned on projects in various classes such as in IT125, Web Development, or in their capstone project IT489, IT Capstone Project. We implemented a series of IT seminars (sophomore, junior, and senior) each semester, which provide an environment for volunteer opportunities, discussions, guest speakers, and the introduction of new technology. Students are encouraged to do projects that support the campus, particularly in Cybersecurity Education Month (October) and in Computer Science Week (the first week of December). IT faculty and students also participate in a continuing education program for seniors at the Falls Church Community Center. Twice a year, we provide a series of 3 2-hour sessions in a series that facilitates use of technology by seniors. This has been highly successful and faculty and students will provide an additional series of 3 sessions in November 2017 and in February 2018.

Global Perspective

- Ensure program takes advantage of its diversity: a geographically, racially, ethnically, gender, and religiously diverse faculty and student body.
- Make available opportunities to study and work abroad.

One of the main concerns in the IT education field is the lack of underrepresented minorities (including women, African-Americans, and Hispanics). Most computer science and IT programs at other universities have fewer than 10% female participation. Marymount has close to 25% female students and has a good representation of African-Americans and Hispanic students. Many of these students are transfer students from the Northern Virginia Community College system with which we have good relations at the faculty level. The program also includes a number of international students and several athletes. The program also supports many veterans, many of whom come in as transfer students. The IT faculty, itself very diverse, is active in recruiting underrepresented minorities

to Marymount, working closely with Arlington Public schools, Bishop O'Connell High School, and the Marshall Academy in Fairfax County, for example. The summer NSa-sponsored GenCyber camps run in 2015, 2016, and 2017 are another mechanism for this with some 75 highly-engaged students coming to campus each summer

We ran our third global IT event in March 2017 and several undergraduate students came on the trip to Dublin, Ireland. They are still talking about it!! An increasing number of students also participated in the university's study abroad program.

Assessment Process and Continuous Improvement Based on Assessment

There was no outcomes assessment process in the 2015-16 academic year as it was the year after the program review.
In 2016-17, the assessment process was very efficient and undergraduate faculty responses (full-time and part-time) were completed in a timely manner. As in previous years, outcome assessment techniques were discussed early at a meeting of the Department of Information Technology and Management Science. The plans from the previous 2014-15 assessment were discussed, and plans put in place to focus on both career preparation: teamwork, programming languages, and the development of skill sand ethical decision making in the designated courses. Rubrics and data collection requirements were identified.

A number of other initiatives were also identified as part of our continuous improvement process including revising scheduling to meet the additional number of working students, the development of a new specialty in application security, and the need for a specific Python programming course for Fall 2017. Writing intensive strategies have been implemented throughout the curriculum and all undergraduate faculty have been through the writing intensive training program offered by the CTL. Oral and written communication is emphasized in every course, particularly in the seminars.

Implementation of Planned Improvements from Last Assessment:

Outcome	**Planned Improvement**	**Update** *(Indicate when, where, and how planned improvement was completed. If planned improvement was not completed, please provide explanation.)*
Build specific skills in a segment of the information technology field (such as software testing) allowing students to compete successfully for internships and entry-level jobs and to work effectively in these areas.	We proposed a new specialty in Application Security to meet the increasing workforce demand in the cybersecurity area and to open many new possibilities for employment in government and industry. To increase the confidence in obtaining a job on graduation, we proposed to increase our focus on finding and promoting opportunities through our alums, adjuncts, and business contacts. We planned to teach students to network and give	Work on the new specialty continues and two courses have been developed. The first Python Programming is running in Fall 2017 as a topic course. The second. Malware Analysis, will run as a topic course in Spring 2018. The specialty has been modified slightly, to ensure that it is transfer friendly and is now entitled Applied Cybersecurity. It will be submitted for approval by UCIC in Fall 2017.

Outcome	Planned Improvement	Update *(Indicate when, where, and how planned improvement was completed. If planned improvement was not completed, please provide explanation.)*
	them networking opportunities in the IT seminars (IT223, IT323 and IT423). Writing remains a focus and we will continue to reinforce this in the writing intensive courses (IT210, IT355 and IT489) as well as the development of a writing portfolio in the senior seminar, IT489.	We ran three networking events in the 2016-17 academic year where we bought in alums and young professionals from local companies (Deloitte, Ernst and Young, Booz Allen, Accenture etc.) and students practiced their networking and interview skills. Writing has definitely improved for the vast majority of our students as evidence by their performance in the three IT-specific writing intensive courses.
Conduct a capstone project that includes research in an aspect of information technology (hardware, software, data, or information security) and apply that research to a current information technology concern for businesses or society in general; compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications, with arguments backed by data.	IT489, the IT Capstone Project, is essentially an experiential learning activity with students initiating interaction with their designated subject matter expert. Anecdotal evidence seems to indicate that many students are not interacting with their subject matter expert early in the process, and this is impacting their ability to research their topic effectively. In fall 2015, we planned to survey the subject matter experts to determine the degree of interaction and try to correlate this with success in the project. If there is a correlation, we will work at improving this interaction.	We have been working on the IT489, IT capstone, to improve the student's performance in the research and/or project activities in the class. We surveyed the interaction with the subject matter experts and found that the level of interaction varied, with the better students engaging actively and others not interacting at all. In Fall 2017, we are choosing a different approach with group projects designated by the faculty. In Spring 2018, we also plan to enable the students to "compete" for a TechExpo which will enable them to demonstrate their products to the university and business community.
Compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications with arguments backed up by data.	All undergraduate faculty in the department have taken the Writing Intensive Workshop and they continue to work together to improve the writing outcomes for each of their courses. In the internship, it was surprising that verbal skills were evaluated by supervisors as lower than	Writing has noticeably improved in the writing intensive courses with students being sent to the Center for Teaching and Learning to get support when necessary. Writing is emphasized, not just in the three writing intensive courses but throughout the

Outcome	Planned Improvement	Update *(Indicate when, where, and how planned improvement was completed. If planned improvement was not completed, please provide explanation.)*
	written skills. A study was planned for verbal skills development throughout the program and an examination of where additional practice of verbal skills can be added.	curriculum. This has resulted improved performance in the student's writing. Several oral activities have been added to the seminars (IT223, IT323, and IT423).

Response University Assessment Committee Review from Last Year:

There was no outcomes assessment last year.

Outcomes and Past Assessment

Learning Outcome 1:

Build a broad knowledge of information technology, allowing students to function as IT professionals who can successfully analyze problems and implement IT solutions to these problems both in an internship and in a job after graduation.

The IT program is very career-focused and is responding to the needs of today's workplace which requires both soft-skills and basic and new technology knowledge. Students take part in all the liberal arts and university requirements providing them with the framework for satisfying their intellectual curiosity. They learn a broad range of technology theory in the program and must then learn how to apply that. We partly measure our success by the student's ability to effectively implement IT solutions in an internship and when they enter the workplace: the "apply" level in Blooms Taxonomy.

Is this outcome being reexamined? X☐ Yes ☐ No

When assessed in 2012-13, students were confident in their ability to find a job and succeed in a job in their field and several were awarded internships in very prestigious government agencies and companies. IT was seen as a growing field but the technology used is constantly changing, so the ability to learn new things is an important part of the student's success. Time management was seen as an issue for all students. Most students were able to find good internships in a very competitive work environment, although they did have to spend more time using personal contacts and networking to identify such opportunities. Several were able to convert these internships to full-time jobs.

MARYMOUNT UNIVERSITY
Arlington, Virginia

Assessment Activity

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process.* *2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
Direct: Each student's ability to satisfy their internship supervisor's expectations in the exit survey of the internship in relation to their knowledge and understanding of the field.	Internship supervisor's rate student performance on a 5-point scale (1 being strongly disagree and 5 being strongly agree). 90% of student should receive an overall 4 or 5 and at least 50% will receive a 5.	The data is taken from the Internship Program Semester Reports from Fall 2016 (10 students), Spring 2017 (10 students) and Summer 2017 (18 students), prepared by David Pomeroy, SBA Director of Business Learning, Career Services.	100% of the 38 students were given a 4 or 5 by their supervisor in response to the question: "The intern possessed a comprehensive understanding of the basics of the professional/business field". 50% (19) of the 38 students received a score of 5 across the three semesters. The outcomes assessment standard was met.
Indirect: Ability of the students to find a job based on their confidence level at the end of the program.	Getting a job is an important outcome for a career-oriented program, particularly in today's economy. At least 80% of graduating students should be confident of their ability to get a job in their desired field. (10% increase from the last assessment)	Results of the 2016-17 Graduating Student Survey prepared by the Office of Institutional Effectiveness.	As shown in the Graduating Student Survey results 72% of the 46 students who responded were confident (4 or 5) of their ability to find a job in the field. The outcomes assessment standard was NOT met probably because of the economic realities of finding an entry-level job. Most IT jobs require a minimum of two-years of experience making it hard to get that first position.
Indirect: Ability to be successful in an IT-related job based on their confidence level at the end of the program.	Students must not only get a job but they must be successful in that job and see their education as a career not just a first job. At least 80% of the students should feel confident that	Results of the 2016-17 Graduating Student Survey prepared by the Office of Institutional Effectiveness.	67% of the 46 students who responded were confident that they would success in an IT job Also important was the fact that high levels of confidence were given for the 21st century skills needed for success (83% to work in a team, 80% to lead a team, 80% to conduct research to support a position, and 71% to deliver a coherent oral presentation.

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process. 2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
	they can succeed in a job in the field		The outcomes assessment standard was NOT met.

Interpretation of Results

Extent this learning outcome has been achieved by students *(Use both direct and indirect measure results)***:**

Students did not meet 2 of the 3 assessment measures using higher criteria than on the last assessment. IT students were less confident than the previous assessment although they all performed well on their internship evaluation. Students were generally well prepared with their 21st century skills, however they still lacked confident on their ability to get a good first job and to be successful in it.

Program strengths and opportunities for improvement relative to assessment of outcome:

The internship evaluation results support our approach of providing students with both a broad education in information technology, but allowing them to specialize in fields that are needed in the workforce. It is important that we continue to introduce courses in specialized areas, which provide entry into jobs that are in demand as the information technology field grows.

The addition of the IT seminars (IT223, IT323, and IT423) has helped students understand the importance of technical and non-technical skills (such as teamwork and presentations) in the workplace and to focus on the skills that differentiate them when searching for a good job in the workplace. More emphasis on their ability to be successful and what it means will be added to the seminars.

Discuss planned curricular or program improvements for this year based on assessment of outcome:

We will continue to develop a new specialty in Applied Security to meet the increasing workforce demand in the cybersecurity area. This was proposed in the 2012-13 assessment and some courses have been developed and tested (e.g. Python scripting). Additional content will be added to the seminars (IT223, IT323, and IT423) and to increase the confidence in obtaining a job on graduation. We will increase our focus on finding and promoting opportunities through our alums, adjuncts, and business contacts and promoting them through the Cyber Center Canvas site introduced in Summer 2017.

Faculty will meet and explore how to measure the knowledge piece of the outcome, outside the workplace competencies.

Learning Outcome 2: Become proficient in at least one programing language, but be able to learn additional programing languages based on a knowledge of programming principles, and participate in programming competitions.

Programming (coding) skills are essential to any technology professional, however, the demands for programming in the workplace is constantly changing. In the BS IT program we must select a limited number of programming language, based on the available jobs in the workplace, but it is important that the students can apply the programming principles to any new language that might arise. Participation in programming competitions is generally regarded by academia as a measure of a student's confidence in their programming skills and is often for social good, a core Marymount pillar.

Is this outcome being reexamined? X ☐ Yes ☐ No

If yes, give a brief summary of previous results (including trends) and any changes made to the program.

Students who were interested in being programmers or software developers (Computer Science specialty) were very successful in the programming assignments and two standards of these students' performance were met. Students in the programming with less aptitude for software development generally took the Web development sequence with less emphasis on pure coding. In the later parts of the course, three programming assignments are given and a few students had major difficulties in understanding the requirements, logic development and syntax. This standard was NOT fully met although students were able to make more progress than previously evidenced in the Java courses. The dual programming paths (JAVA or Web Development) has been successful and has helped students with less aptitude for programming to scaffold their logic and coding skills in a more structured way. They do need more support in the later programming assignments. To assist students struggling in programming concepts assignments a supplemental instruction approach was proposed. Two alumni volunteered to be tutors for the students. Workshops were also proposed in a variety of programming languages to further engage students.

Assessment Activity

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process.* *2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
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 1.	Of the 22 students in IT230, 18 met the standards required by the rubric, (82%). 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,

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process.* *2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
	(10% increase from the last assessment).	The independent faculty member first reviewed the documentation to independently examine the capabilities of the software developed and evaluate it as shown in Rubric 1.	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. (10% increase from the last assessment).	In IT227, students are required to produce three assignments, three of which involve different mobile app programming techniques. There were 11 students in 16/FA and 6 students in 17/SU (total 17 students). The assignments were reviewed by a second faculty member for usability, functionality, and documentation, with the rubric shown in Rubric 2. The instructor first assessed how well the student understood the mobile app platform and implemented the 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 Rubric 2.	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. It was a new course introduced first in 16/SP in response to the growth of the mobile app job market. In the evaluation, 15 of the 17 students (88%) met the rubric requirements to be able to effectively develop a mobile app. The outcomes assessment standard was met.
Indirect: Ability of graduating students to “apply knowledge and skills to new situations” based on their confidence at the end of the program.	90% of graduating students should be confident in their ability to learn new languages in their workplace as the IT	Results of the 2016-17 Graduating Student Survey prepared by the Office of Institutional Effectiveness.	Only 85% of the students responded with good or excellent to the question “apply knowledge and skills to new situations.

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	Performance Standard *Define and explain acceptable level of student performance.*	Data Collection *Discuss the data collected and student population*	Analysis *1) Describe the analysis process.* *2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
	development environment is constantly changing .		The outcomes assessment standard was NOT met.

Interpretation of Results

Extent this learning outcome has been achieved by students *(Use both direct and indirect measure results)***:**

Two of the three outcome measures were met and there is a marked improvement in the programming skills of all students in the freshman and sophomore classes. Graduating students, however, were not as certain of their ability to engage in new situations in the workplace, including learning new languages as the technology changes.

Program strengths and opportunities for improvement relative to assessment of outcome:

Giving students a variety of choices for the programming courses has been very successful, allowing students to develop skills in a variety of languages. Students are now taking additional languages outside the core requirements, such as the Fall 2017 Python Programming special topics course. Constant change in the workplace needs to be reinforced in the seminars.

Discuss planned curricular or program improvements for this year based on assessment of outcome:

Programming, including scripting languages, are an important component in many IT jobs in the workplace. Looking at the various job descriptions, there are a variety of languages, and associated tools and libraries, too many to teach in the program. We will, however, keep abreast of the changes in the IT workplace and ensure students are aware of the "new" environments as part of the seminars (IT223, IT323, and IT423). A new assignment will be added to IT323, IT Junior Seminar, to allow students to research a new language and show how it relates to a language they have taken.

We will continue to work with the students in the seminars and programming classes to do a comparative analysis of what they have learned and what the industry is looking for to help boost their confidence. Some of their concern is the change in programming skills needed in the industry so we will show learning the principles translates into learning a new language.

Learning Outcome 3: Become proficient in a variety of skills such as computer repair, computer networking, database design, and cybersecurity through a combination of theoretical knowledge and hands-on experiences sufficient to obtain industry certifications.

Information Technology is a very fluid feel and the skills that are necessary as an IT professionals vary over time. The outcome gives examples of skills that are relevant to the field. Certifications are not required (they are all at a significant cost to the student), however, we do actively encourage them as independent assessments of their learning. Many students leave taking them until they begin work as they are often paid for by the employers, including the government.

Is this outcome being reexamined? X☐ Yes ☐ No

If yes, give a brief summary of previous results (including trends) and any changes made to the program.

In the last assessment of this learning objective (2012-13), two of the three measures were met. Certifications, as an adjunct to their education, still needs to be emphasized as an important component of evidence of "job skills" in the IT industry. **T**he IT seminars are helping to prepare students for the workplace. More emphasis was to be placed on the need for certifications and some "study groups" will be formed.

Assessment Activity

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process. 2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
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.	80% 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. (10% increase from the last assessment)	The data was collected from the evaluation reports submitted by the 3 faculty members who evaluated the report evaluation and oral defense sessions. See Rubric 3	Of the 70 students who took IT489, IT Capstone Couse, (Fall 2016 19. Spring 2017 43, and Summer2013 8), only 42 (60%) did a project that involved either a database, a network development or cybersecurity. 38 of the 42 of these students (90%) successfully defended their project report. The other 4 had difficulties in articulating one or more part of their project activities or results or did not complete the assignment. The outcomes assessment standard was met.
Direct: Students took associated industry certifications and successfully passed them.	60% of students took one or more industry certification tests and passed them. (10% increase from the last assessment)	In the IT423 senior Seminar, students are surveyed on their certification interest and status and the results posted to Canvas.	45 of the 68 students (38 in 16/FA and 30 in SP/17) of the students in the seminar (66%) graduating students has at least one certification in their senior year or were planning to take one before graduation. The outcomes assessment standard was met.
Indirect: From Graduating Student Survey, ensure that students feel confident about	80% of students believe that they will be effective at	Results of the Graduating Student Survey prepared by the Office of Institutional	78% of the 46 students who answered the survey rated their ability to solve problems in the workplace as good or excellent

Outcome Measures *Explain how student learning will be measured and indicate whether it is direct or indirect.*	**Performance Standard** *Define and explain acceptable level of student performance.*	**Data Collection** *Discuss the data collected and student population*	**Analysis** *1) Describe the analysis process.* *2) Present the findings of the analysis including the numbers participating and deemed acceptable.*
their ability to solve problems in your field using their knowledge and skills.	solving problems in the workplace.	Effectiveness for the question "Solve problems in your field using your knowledge and skills"	The outcomes assessment standard was NOT met.

Interpretation of Results

Extent this learning outcome has been achieved by students *(Use both direct and indirect measure results)***:**
Two of the three assessment measures were met, with a marked increase in the numbers of students taking, or planning to take, certifications to supplement their educational credentials. Graduating students were still a little underconfident in their ability to solve problems when they enter the workforce.

Program strengths and opportunities for improvement relative to assessment of outcome:
The seminars (IT223, IT323, and IT423) have proven to be a valuable vehicle to interact with the students and get their opinions on the program, including the addition of additional topics. We continue to develop these courses to ensure students are workforce ready and that the program is responding to trends in the IT workplace. We will focus on "new situations" and the value of certifications. In 2016-17 we ran a boot camp for the Security+ certification and several students reported taking the Security+ examination after that boot camp.

Discuss planned curricular or program improvements for this year based on assessment of outcome:
We will continue to address certifications, and their importance, in the seminars and run at least one boot camp, out of class. Certifications will not be required because of the cost, they will be encouraged however and alums will be surveyed to see which and when they take certifications. We are planning to modify our advising program, in Fall 2017 such that a single faculty member advises the students who entered Marymount as freshman the semester before. This faculty member will also teach the IT223, Sophomore Seminar, and so develop a cohesive community among these students.

MARYMOUNT UNIVERSITY
Arlington, Virginia

UNDERGRADUATE CURRICULUM MAP

Degree Program: B.S. Information Technology
Year: 206-17

Program Outcomes:

Program Outcome	Critical Thinking	Inquiry	Information Literacy	Written Communication
Build a broad knowledge of information technology, allowing students to function as IT professionals who can successfully analyze problems and implement IT solutions to these problems both in an internship and in a job after graduation.	**XX**	**XX**	**XX**	**XX**
Build specific skills in a segment of the information technology field (such as software testing) allowing students to compete successfully for internships and entry-level jobs and to work effectively in these areas.	**XX**	**XX**	**XX**	**XX**
Become proficient in at least one programing language, but be able to learn additional programing languages based on a knowledge of programming principles, and participate in programming competitions	**XX**	**XX**		
Become proficient in a variety of skills such as computer repair, computer networking, database design, and cybersecurity through a combination of theoretical knowledge and hands-on experiences sufficient to obtain industry certifications.	**XX**	**XX**		
Conduct a capstone project that includes research in a an aspect of information technology (hardware, software, data, or information security) and apply that research to a current information technology concern for businesses or society in general; compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications, with arguments backed by data.	**XX**	**XX**	**XX**	**XX**
Compose and construct written documents and give presentations articulating business needs, identifying solutions, and considering decision implications with arguments backed up by data.				**XX**
Work successfully in a team environment both as a team leader and as a participant of a team, and communicate effectively with team members who do not have a technical background.	**XX**	**XX**		
Conduct themselves as responsible professionals and global citizens who are aware of ethical issues and societal needs and who can determine the most ethical response to common dilemmas in the field.	**XX**	**XX**	**XX**	**XX**

Possess the knowledge and skills required to pursue life-long learning, including advanced degrees in areas relating to information technology and to adapt to an ever-changing, global technological and business environment.	**XX**	**XX**	**XX**	**XX**

Curriculum Map:

For each course, indicate which competencies are included using the following key. Please refer to the director of assessment in Planning and Institutional Effectiveness if you need more detailed explanation of the four core competencies.

Level of instruction: I – Introduced, R-reinforced and opportunity to practice, M-mastery at the senior or exit level

Assessment: PR-project, P-paper, E-exam, O-oral presentation, I-internship, OT-other (explain briefly)

Required Course	Critical Thinking		Inquiry		Information Literacy		Written Communication	
	Level	Assess	Level	Assess	Level	Assess	Level	Assess
IT110	**I**	**PR, P**	**I**	**PR**	**I**	**P**	**I**	**P**
IT120	**I**	**PR, E**	**I**	**PR**	**I**	**PR**	**I**	**PR**
IT125	**I**	**PR, E**	**I**	**PR**			**I**	**PR**
IT130	**I**	**PR, E**	**I**	**PR**			**I**	**PR**
IT205	**R**	**PR, E**	**R**	**PR**	**I**	**PR**	**R**	**PR**
IT210	**R**	**P, E**	**R**		**R**	**P**	**R**	**P**
IT223			**I**	**PR, O**	**I**	**PR**	**I**	**PR**
IT225	**R**	**PR, E**	**R**	**PR**			**I**	**PR**
IT227	**R**	**PR, E**	**R**	**PR**			**I**	**PR**
IT230	**R**	**PR, E**	**R**	**PR**			**I**	**PR**
IT305	**R**	**P, E**	**R**	**PR**	**I**	**P**	**R**	**P**
IT310	**R**	**PR, E**	**R**	**PR**	**I**	**P**	**R**	**P**
IT323			**R**	**PR, O**	**R**	**PR, O**	**R**	**PR**

IT345	**R**	**PR**	**R**	**PR**	**R**	**PR**	**R**	**PR**
IT355	**R**	**P, E**	**M**	**PR, P, O**	**M**	**P, O**	**M**	**P**
IT400			**M**	**I**			**R**	**OT (reflections)**
IT423			**M**	**PR, O**	**M**	**PR, O**	**R**	**PR**
IT489	**M**	**PR, P**	**M**	**PR**	**M**	**P, O**	**M**	**P**
MSC300	**R**	**PR, P**	**R**	**PR**	**I**	**P**	**I**	**P**
MSC345	**M**	**PR, E**	**M**	**PR**			**M**	**PR**