

**GEORGE MASON UNIVERSITY**  
**GENERAL EDUCATION ASSESSMENT REPORT:**  
**INFORMATION TECHNOLOGY**  
**July 2012**

The general education program at George Mason University organizes courses of study into three main areas. *Foundation* courses build knowledge and skills to promote success in the major and in future pursuits; *core* courses introduce students to a breadth of subject matter and intellectual traditions; and *synthesis* courses encourage the integration of past learning and experiences, develop critical thinking skills, and prepare students for lifelong learning. Student learning outcomes for the general education areas are created and assessed by faculty, primarily through the University General Education Committee. Results of assessment activities are reported to the faculty, the Mason community, and the State Council of Higher Education for Virginia (SCHEV) by the Office of Institutional Assessment.

The information technology (IT) competency is a foundation-level requirement for Mason undergraduates. The purpose of the IT requirement is to ensure that students achieve an essential understanding of IT infrastructure encompassing systems and devices; learn to make the most of the Web and other network resources; protect their digital data and devices; take advantage of latest technologies; and become more sophisticated technology users and consumers. Students are required to take one 3-credit course that meets all IT requirements, or an appropriate combination of courses, proficiency exams, and modules.

### ***Learning Outcomes***

The University General Education Committee approved the following set of revised learning outcomes in spring 2010. IT courses are approved for one of three IT categories: IT All, IT Only, or IT Ethics. Courses meeting IT All must address outcomes 1, 2, 3, and 5. Courses meeting IT Only must address learning outcomes 1 and 2, and one additional outcome. Courses meeting IT Ethics must address outcomes 3 and 5.

1. Students will be able to use technology to locate, access, evaluate, and use information, and appropriately cite resources from digital/electronic media.
2. Students will understand the core IT concepts in a range of current and emerging technologies and learn to apply appropriate technologies to a range of tasks.
3. Students will understand many of the key ethical, legal and social issues related to information technology and how to interpret and comply with ethical principles, laws, regulations, and institutional policies.
4. Students will demonstrate the ability to communicate, create, and collaborate effectively using state-of-the-art information technologies in multiple modalities.
5. Students will understand the essential issues related to information security, how to take precautions and use techniques and tools to defend against computer crimes.

### ***Courses Approved for the IT Requirement, 2011-12 Catalog***

IT All: ANTH 395, CDS 130, CHEM 350, CRIM 300, ENGR 117, GOVT 300, IT 103, MUSI 415

IT Only: AVT 180, CS 112, PHYS 251, PSYC 300, PSYC 301, PSYC 372, SOCI 410

IT Ethics: CDS 151, CS 105, ENGR 107, ENGR 401, IT 304, PHIL 112

### **Prior Assessment**

Assessment of the IT requirement has been conducted at least annually since 2001. Initially, general education assessment activities were embedded in IT 103. Between 2007 and 2010, a SCHEV-mandated value-added approach was used as a basis for the assessment. Assessment of the general education IT category was revised in 2011 to use Mason's course portfolio method, and was expanded to include approved general education IT courses from across the academic units (see Appendix).

## Data Collection and Assessment Process

The assessment of the general education IT category was conducted in the 2011 calendar year. Courses were selected for assessment in fall 2010, and included 11 courses in spring 2011, and five courses in fall 2011.<sup>1</sup> Multiple sections for two courses participated, for a total of 20 course portfolios.

Information sessions were conducted for the selected faculty members in January and August 2011 for the respective semesters, followed by individual consultations for those who did not attend the group sessions. Each selected faculty member was asked to create a course portfolio that consisted of a summary sheet, course syllabus, selected course assignments, samples of student work, and a brief reflection essay. The portfolios were due two weeks after the end of each semester, and were submitted via Blackboard.

Portfolio reviews were conducted in summer 2011 (for the 15 courses/sections from spring 2011), and spring 2012 (for the 5 courses from fall 2011). Reviewers were members of the University General Education Committee and assessment professionals who participated in a training session that covered the review process and criteria. Reviewers entered ratings and text in an online review form. Each portfolio received two sets of ratings.

- Total number of general education IT courses offered in review period: **16** courses (**58** sections) across **4** colleges/academic units
- Total number of students enrolled: **2202**
- Total number of courses/sections selected for assessment: **20**
- Total portfolios collected: **20** portfolios representing **16** courses. The faculty members who developed the portfolios taught a total number of **851** students (39% of the total IT course enrollment)
- Total reviewers: **9**
- Total student work samples reviewed: **111**

## Results

The course portfolio review focused on how well each course addressed the general education student learning outcomes through the course instruction, assignments/activities, and samples of student work. Portfolios were assessed on how well the faculty member articulated the learning outcomes, the congruence of the IT learning outcomes with the course content, the appropriateness of the course material for the general education curriculum, and the appropriateness of the assignments or forms of assessment in relation to the IT learning outcomes. This section presents the aggregated results of the reviews in terms of the learning outcomes, the student work samples, and overall ratings.

### *Learning Outcomes*

Faculty were asked to identify which learning outcomes they addressed in their courses. For the most part, faculty reported that they addressed the required learning outcomes for the respective category (*IT All*: 1, 2, 3, 5; *IT Only*: 1, 2, and one additional outcome; *IT Ethics*: 3, 5). Most of the *IT All* course faculty reported that they addressed all five outcomes (see Table 1). A couple *IT Only* courses also addressed additional outcomes.

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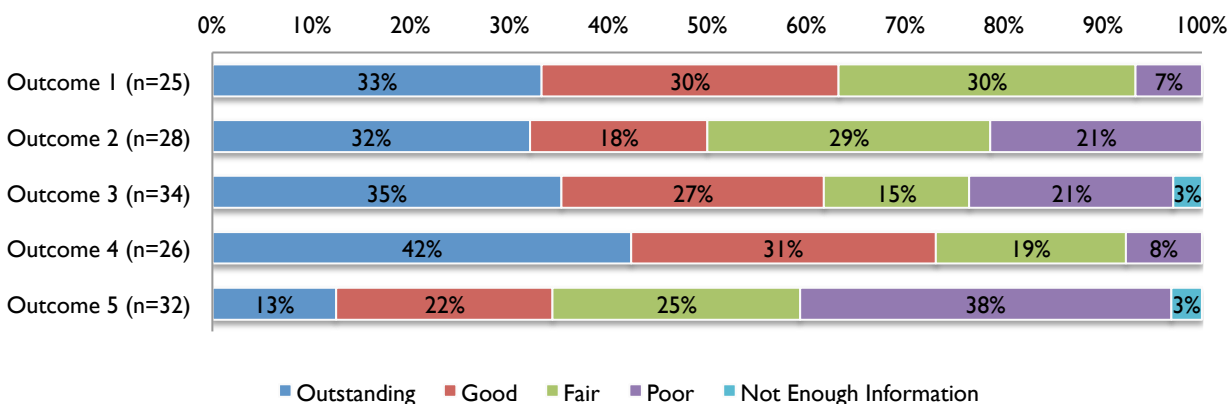
<sup>1</sup> These five courses were either not offered in spring 2011 or assessment was postponed to the fall semester.

**Table 1.** Which gen ed learning outcomes does the faculty member intend to address in the course/section?

	Courses/Sections		
	IT All N=10	IT Only N=4	IT Ethics N=6
Outcome 1: Use technology as a resource	10	4	1
Outcome 2: Understand and apply core concepts	9	4	0
Outcome 3: Understand ethical, legal, and social issues	10	1	6
Outcome 4: Communicate, create, and collaborate in multiple modalities	9	4	0
Outcome 5: Understand and defend information security	9	1	6

Using course materials, reviewers were asked to rate how well the identified learning outcomes were addressed in each course. Figure 1 illustrates the results. Outcome 1 (Use technology as a resource) was rated “outstanding” or “good” in 63% of the 15 relevant courses, while Outcome 2 (Understand and apply core concepts) rated a bit lower, at 50% for the 13 courses in which it was reported. Outcome 3 (Understand ethical, legal, and social issues) also rated highly (62%). Reviewers found that Outcome 4 (Communicate, create, and collaborate in multiple modalities) was covered the most successfully in the 13 courses/sections addressing the outcome. Outcome 4 was rated “outstanding” in 42% and “good” in 31% of the relevant courses. Reviewers were most concerned with Outcome 5 (Understand and defend information security), which they rated as “poor” in 38% of the 16 relevant courses, and only “outstanding” or “good” 35% of the time. In a few cases, reviewers did not have enough information in the portfolios to effectively judge how well the outcomes were being addressed.

**Figure 1.** How well are the intended learning outcomes addressed in the course?



### *Student Work Samples*

Faculty members were asked to submit the instructions for three course assignments, projects, or exams. From the three assignments, faculty selected one and provided samples of student work. The Office of Institutional Assessment chose 4-9 students for each section by random selection, and course faculty submitted one work sample for each student. Many faculty chose to submit an additional exemplar. A total of 111 student work samples were collected, a majority of which were completed by individual students, and a few by student teams. The work samples represented research papers, short response papers, and projects.

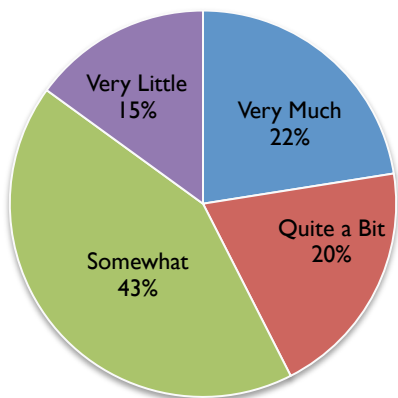
Table 2 displays the frequency in which the learning outcomes were targeted in the selected assignment. Faculty were most likely to select assignments that emphasized Outcomes 3 (85%) and 5 (78%), as well as Outcomes 1 (70%) and 4 (65%).

**Table 2.** Intended outcome(s) addressed in the selected assignment

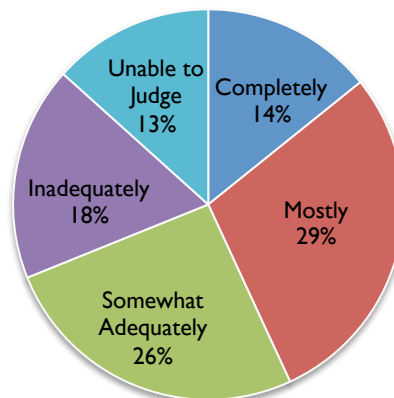
	Count	%
Outcome 1: Use technology as a resource	14	70%
Outcome 2: Understand and apply core concepts	12	40%
Outcome 3: Understand ethical, legal, and social issues	17	85%
Outcome 4: Communicate, create, and collaborate in multiple modalities	13	65%
Outcome 5: Understand and defend information security	15	78%

The reviewers judged that the assignments gave students the opportunity to demonstrate their competence in the intended outcomes “very much” (23%) or “quite a bit” (20%) (see Figure 2). Reviewers expressed concerns that assignments in some of the courses did not adequately address the intended learning outcomes. In comparing the student work samples with the assignment instructions and associated learning outcomes, reviewers determined that the work samples demonstrated the intended learning outcomes completely (14%) or mostly (29%), with another 26% performing somewhat adequately (see Figure 3). Reviewers were unable to judge the quality of 13% of the work samples, typically because the samples contained insufficient information to do so.

**Figure 2.** To what extent does the assignment give students the opportunity to demonstrate their competence in the intended outcome(s)?



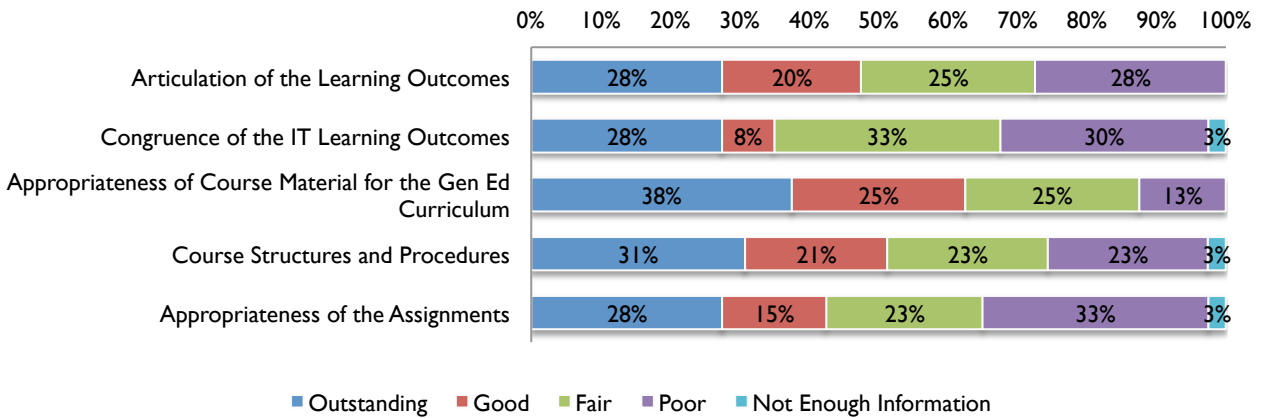
**Figure 3.** How fully do the student work samples manifest the intended outcomes?



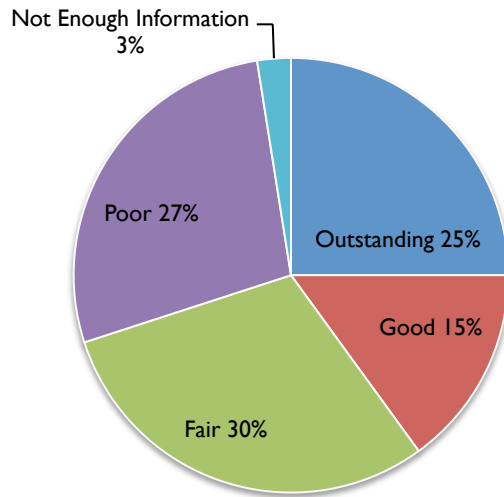
**Overall Ratings**

Course portfolios were rated holistically in five categories in relation to the general education IT learning outcomes (see Figure 4). Courses were most likely to rate “outstanding” or “good” in terms of appropriateness of course material for the general education curriculum (63%). Courses seemed to face the most challenges in demonstrating the congruence of course content and goals with the IT learning outcomes, with only 36% rating “outstanding” or “good”. In terms of the overall effectiveness of the course in addressing the IT learning outcomes, 40% were rated “outstanding” or “good”, 30% were rated “fair”, and 27% were rated “poor” (see Figure 5).

**Figure 4.** Given the mission of the General Education program, please rate the course in the following categories:



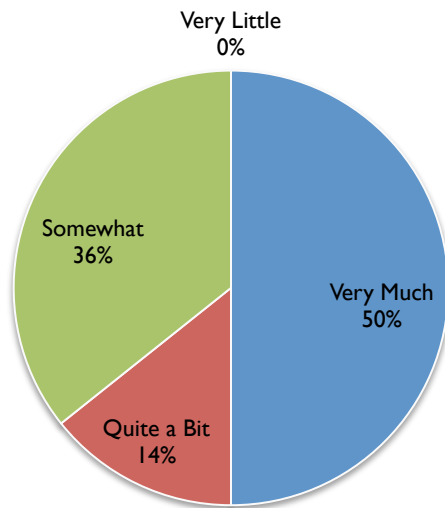
**Figure 5.** Overall effectiveness of the course in addressing IT learning outcomes



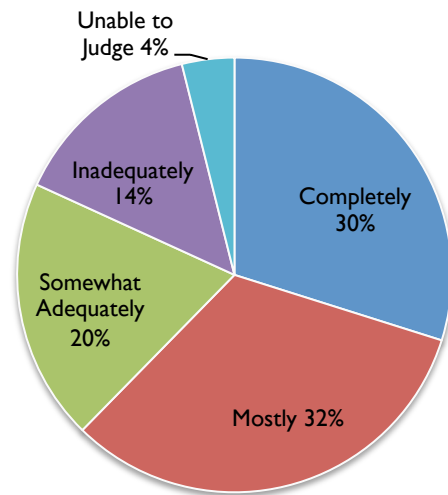
### High Enrollment Courses

During the review period, 66% of students in general education IT courses were enrolled in one of three courses: IT 103 (44%), CS 112 (12%), and CS 105 (10%). In all categories, the aggregated ratings for these courses rated higher than the aggregated scores for the 16 reviewed courses. The assignments for these high enrollment courses were more likely to give students the opportunity to demonstrate their competence in the learning outcomes (64% versus 43% of all courses). Work samples rated higher as well, with samples meeting the learning outcomes “completely” or “mostly” 62% of the time, versus 43% in all courses.

**Figure 6.** To what extent does the assignment give students the opportunity to demonstrate their competence in the intended outcome(s)?



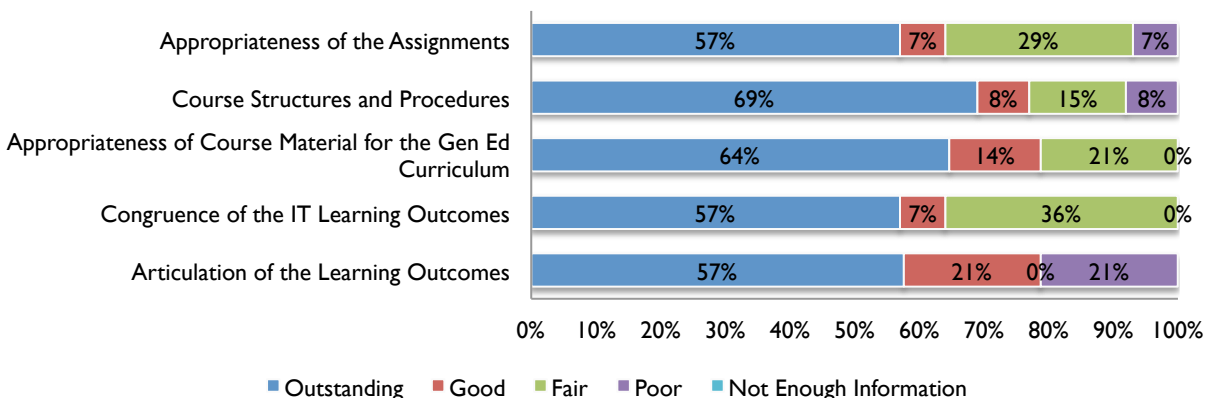
**Figure 7.** How fully do the student work samples manifest the intended outcomes?



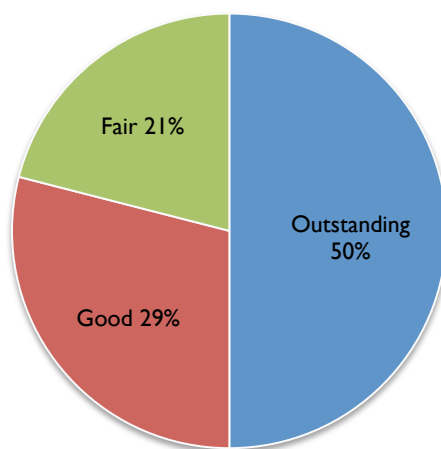
The high enrollment courses received higher overall ratings as well, earning “outstanding” or “good” at least 64% of the time in all categories, and at least 77% in three categories (see Figure 8). These three courses were rated “outstanding” (50%) or “good” (29%) in overall effectiveness of the course in addressing IT learning outcomes (see Figure 9), nearly doubling the ratings in this category for all courses (25% “outstanding” and 15% “good”).

The higher ratings in the three high enrollment courses undoubtedly reflect the efforts of course faculty and the General Education Committee to develop these courses in the context of the general education program. By designing the curriculum around the learning outcomes, the courses are more successful in achieving the intentions of the general education area for students.

**Figure 8.** Given the mission of the General Education program, please rate the course in the following categories:



**Figure 9.** Overall effectiveness of the course in addressing IT learning outcomes



**Summary of Reviewers’ Comments**

Reviewers were given an opportunity to comment on features of the courses and provide recommendations. This section displays summaries of the reviewers’ comments.

***What elements/features from the course would you recommend to other faculty members who teach IT courses?***

*Articulation and alignment of learning outcomes.* Courses that successfully integrated the general education learning outcomes with disciplinary content were highly praised. Reviewers were impressed with courses that demonstrated clear connections between learning outcomes and course material. The most successful courses clearly articulated

the learning outcomes to students through the syllabus, and some explicitly mapped learning outcomes to the course assignments and material.

*Assignments and activities.* Reviewers praised courses that featured “engaging and interesting” assignments, highlighting the use of case studies as an especially effective method to teach ethics. Projects that required hands-on programming and use of information technology to produce original research were noted as “creative” and “a nice approach,” but possibly “difficult” for all instructors to do well. Use of current publications rather than quickly outdated texts can be “effective and engaging.”

*Rubrics and grading/student feedback.* Grading rubrics for the major projects were well developed and provided students with clear information about expectations and grading requirements.

*Use of technology.* Reviewers highlighted the use of and exposure to effective IT tools such as MediaWiki, Google SketchUp, VBA Basics, virtual computing, online video, blogs, and human subjects research training modules. IT tools were noted as not only enhancing technical skills but also encouraging student engagement with the course content.

***In terms of addressing the intended IT learning outcomes, what suggestions would you give to the faculty member?***

*Addressing the learning outcomes.* Reviewers were concerned that the learning outcomes were unevenly addressed across the courses. Instructors need to better articulate the learning outcomes and how they will be addressed in the course; a course map would be useful.

*Assignments and activities.* Use real world examples to teach practical ethical issues. Reviewers suggested including questions that ask students to synthesize ideas about security issues through a broader lens.

*Use of technology.* Multimedia tools should be integrated into the student assignments to better address learning outcome 4 (Communicate, create, and collaborate in multiple modalities). The most current technologies should be used in the courses, including more video, audio, and interactive tools. The use of collaborative tools was praised.

*Concepts and focus of course.* Several courses need to add or improve content related to learning outcome 3 (Understand ethical, legal, and social issues) as well as learning outcome 5 (Understand and defend information security). Reviewers suggested that courses include more content on IT security threats, such as identity theft, spam, viruses, and how to prevent them. A broader focus on ethical and security issues could include banking, secure web pages, databases, and e-commerce. Ethics content should incorporate real world cases and material should be sufficiently complex.

***General Comments:***

Some courses (especially IT 103) were particularly strong in addressing the general education learning outcomes. Learning outcomes 1 (Use technology as a resource), 2 (Understand and apply core concepts), and 4 (Communicate, create, and collaborate in multiple modalities) were generally noted as the strongest. Reviewers were most concerned with courses that did not adequately address the general education learning outcomes for the respective course category. Several of the courses were noted as being excellent disciplinary courses, but fell short of the expectations for general education. Instructors are encouraged to better align their courses with the general education outcomes, and update material and assignments to address these requirements. Assignments and other assessment activities need to allow students the opportunity to demonstrate competency for each learning outcome.

IT security was a content area that reviewers found lacking. Assignments were either not sufficiently comprehensive of security issues (little beyond password security), or were given as optional activities. Reviewers noted that they would have rated several courses higher overall if this outcome had received better coverage.



General education IT courses should be careful to avoid training tied to a specific vendor's software, and instead should focus on "general technology and fundamental IT concepts" to accommodate ever-changing technologies. These courses should include broader discussions of IT, rather than focusing only on technical training for the specific technologies used in the course.

### **Follow-Up Actions**

This report, as well as individual course reports will be shared with participating faculty and department chairpersons to address the issues and concerns that were revealed in the assessment process. Course development resources will be made available to support faculty in their efforts to better align their courses with the general education outcomes. Exemplars will be made available to the university community with faculty consent.

## Appendix

### Information Technology Courses Taught in Spring and Fall 2011

College	Department	Course	Title	Portfolio
College of Humanities & Social Sciences	Sociology & Anthropology	ANTH 395	Work, Technology, and Society	√
	Public & International Affairs	GOVT 300	Research Method and Analysis	√
	History & Art History	HIST 390	The Digital Past	√
	Philosophy	PHIL 112	Ethics & Cybersociety	√
College of Science		CDS 130	Computing for Scientists	√
	Physics/Astronomy/ Computational Data Sciences	CDS 151	Data Ethics in the Information Society	√
		PHYS 251	Introduction to Computer Technology in Physics	√
College of Visual & Performing Arts	School of Art	AVT 180	Computers in Creative Arts	√
	School of Music	MUSI 415	Music in Computer Technology	√
Volgenau School of Engineering	Computer Science	CS 105	Computer Ethics and Society	√
		CS 112	Introduction to Computer Programming	√
		ENGR 107	Introduction to Engineering	√
	Electrical & Computer Engineer	ENGR 117	Information Technology for Engineering	√
		ENGR 401	Professional Practice for Management in Engineering	√
	Applied Information Technology	IT 103	Introduction to Computing	√
		IT 304	IT in the Global Economy	√

Portfolio Review Worksheet

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**GENERAL EDUCATION LEARNING OUTCOMES FOR INFORMATION TECHNOLOGY**

The purpose of the information technology requirement is to ensure that students achieve an essential understanding of information technology infrastructure encompassing systems and devices; learn to make the most of the Web and other network resources; protect their digital data and devices; take advantage of latest technologies; and become more sophisticated technology users and consumers.

IT Only*	IT & Ethics	IT Ethics	Learning Outcomes
X	X		1. Students will be able to use technology to locate, access, evaluate, and use information, and appropriately cite resources from digital/electronic media.
X	X		2. Students will understand the core IT concepts in a range of current and emerging technologies and learn to apply appropriate technologies to a range of tasks.
	X	X	3. Students will understand many of the key ethical, legal and social issues related to information technology and how to interpret and comply with ethical principles, laws, regulations, and institutional policies.
			4. Students will demonstrate the ability to communicate, create, and collaborate effectively using state-of-the-art information technologies in multiple modalities.
	X	X	5. Students will understand the essential issues related to information security, how to take precautions and use techniques and tools to defend against computer crimes.

\*Courses meeting the "IT only" requirement must address learning outcomes 1 and 2, and one additional outcome

**Course Name:** \_\_\_\_\_ **Reviewer's Name:** \_\_\_\_\_

- Which gen ed learning outcomes does the faculty member intend to address in the course/section? Check all that apply. (The sources of evidence include syllabus, faculty reflection and assignments.)
  - Outcome 1: Use technology as a resource
  - Outcome 2: Understand and apply core concepts
  - Outcome 3: Understand ethical, legal, and social issues
  - Outcome 4: Communicate, create, and collaborate in multiple modalities
  - Outcome 5: Understand and defend information security

- How well are the intended learning outcomes addressed in the course?

	Outstanding	Good	Fair	Poor	Not enough information	NA*
Outcome 1	4	3	2	1	IN	NA
Outcome 2	4	3	2	1	IN	NA
Outcome 3	4	3	2	1	IN	NA
Outcome 4	4	3	2	1	IN	NA
Outcome 5	4	3	2	1	IN	NA

\*NA: not applicable or not intended to address in the course.

- Please evaluate the following based on the selected assignment and the related student work for that assignment. You are not asked to re-grade the student work. Please pay attention to the faculty member's syllabus, reflection and description of the assignment.

- a. Intended Outcome(s) addressed in the selected assignment (Check all that apply):
- Outcome 1: Use technology as a resource
  - Outcome 2: Understand and apply core concepts
  - Outcome 3: Understand ethical, legal, and social issues
  - Outcome 4: Communicate, create, and collaborate in multiple modalities
  - Outcome 5: Understand and defend information security
- b. To what extent does the assignment give students the opportunity to demonstrate their competence in the intended outcome(s)?
- Very much       Quite a bit       Somewhat       Very little
- c. How fully do the student work samples manifest the intended outcomes? (Please ignore the faculty's grade on the work samples.)

Student Name or Work Sample #	Completely	Mostly	Somewhat Adequately	Inadequately	Unable to Judge
#1	4	3	2	1	
#2	4	3	2	1	
#3	4	3	2	1	
#4	4	3	2	1	
#5	4	3	2	1	
#6	4	3	2	1	

4. Given the mission of the General Education program, please rate the course in the following categories:

	Outstanding	Good	Fair	Poor	Not enough info
Articulation of the IT learning outcomes for students	4	3	2	1	IN
Congruence of the IT learning outcomes with the course content and goals	4	3	2	1	IN
Appropriateness of course material for the gen ed curriculum	4	3	2	1	IN
Course structures and procedures that contribute to the likely achievement of the IT outcomes by students	4	3	2	1	IN
Appropriateness of the assignments or forms of assessment, in relation to the IT learning outcomes	4	3	2	1	IN
Overall effectiveness of the course in addressing IT learning outcomes	4	3	2	1	IN

5. What elements/features from the course would you recommend to other faculty members who teach IT courses?
6. In terms of addressing the intended IT learning outcomes, what suggestions would you give to the faculty member?
7. To what extent does the course portfolio demonstrate an exemplary IT course?
- Definitely Yes       Probably Yes       Probably Not       Definitely Not
8. Other comments about the course or the review process.