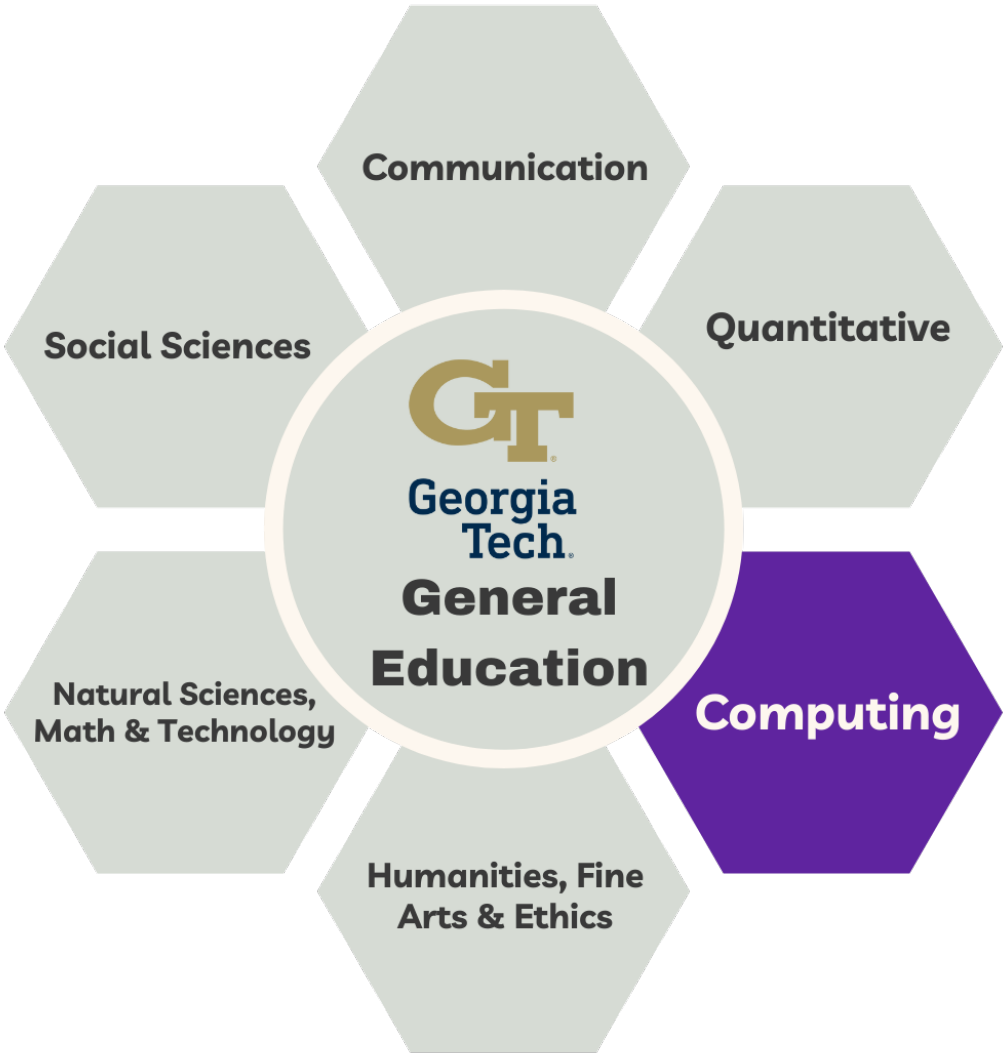
Georgia Institute of Technology
Office of Academic Effectiveness

General Education

Learning Outcome Assessment

Computing Outcome

(AY 2023-2024)



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Executive Summary

The General Education curriculum provides foundational knowledge in academic disciplines, exposing students to diverse learning perspectives and ways of knowing in Mathematics, Science, Social Sciences, and Arts and Humanities (University System of Georgia). Georgia Institute of Technology (Georgia Tech) General Education (Gen Ed) has six learning outcomes: (1) Communication, (2) Quantitative, (3) Computing, (4) Humanities, Fine Arts, and Ethics (5), Natural Sciences, Math, and Technology, and (6) Social Sciences. They are assessed in accordance with our established timeline. Nurtured by the Subcommittee on Gen Ed and Policy, the 3-Year Georgia Tech Gen Ed Assessment Plan (2021-2024) sets the framework for good practice in course delivery and assessment, capitalizing on the good judgment of faculty members regarding students' levels of attainment of Gen Ed learning outcomes. Faculty develop signature assignments in their Gen Ed courses, and the assignments, along with student performance, are collected for review and analysis at the end of each semester. To better understand our students' performance, the Office of Academic Effectiveness (OAE) then partnered with faculty to develop a scale for scoring. The general scale is structured to assess each Gen Ed learning outcome on a continuum: 1-Developing, 2-Meets Expectations, 3-Exceeds Expectations.

This report summarizes the evidence of student learning (n = 1,533) and provides descriptive statistics for the **Computing** outcome to support conversations regarding Gen Ed learning and opportunities for improvement.

Highlights

- **98.3%** (n = 1,506) of students met or exceeded the Computing Outcome expectations, which means students were able to develop solutions to problems involving data and implement those solutions using an appropriate computer language. Students' performance on the Computing outcome met or exceeded the institution's acceptable target (85%).

- Comparing student demographics for the Computing Outcome, the results indicated that all demographic groups met or exceeded the target of 85%.

Background

An integral part of the delivery of General Education (Gen Ed) at the Georgia Institute of Technology (Georgia Tech) includes the assessment of the learning outcomes. The learning outcomes were approved by the Undergraduate Curriculum Committee at Georgia Tech, the Faculty Senate, and by the University System of Georgia's (USG) Council on General Education in April 2011:

- **Communication (Core Area A1)**
  Outcome: Student will demonstrate proficiency in the process of articulating and organizing rhetorical arguments in written, oral, visual, and nonverbal modes, using concrete support and conventional language.

- **Quantitative (Core Area A2)**
  Outcome: Student will demonstrate the ability to apply basic elements of differential and integral calculus to solve relevant problems.

- **Computing (Institutional Options B)**
  Outcome (2021 Fall): Student will be able to develop algorithms and implement them using an appropriate computer language and will understand algorithmic complexity and reasonable versus unreasonable algorithms. Based on the 2021 assessment results, the learning outcome was modified in Fall 2023:
  Provisional Outcome (2023 Fall): Students will be able to develop solutions to problems involving data and to implement these solutions using an appropriate computer language.

- **Humanities, Fine Arts, and Ethics (Core Area C)**
  Outcome: Student will be able to describe relationships among languages, philosophies, cultures, literature, ethics, or the arts.

- **Natural Sciences, Math, and Technology (Core Area D)**
  Outcome: Student will be able to demonstrate the ability to obtain, analyze, interpret, and criticize qualitative observations and quantitative measurements to explain natural phenomena and to test hypotheses.

- **Social Sciences (Core Area E)**
  Outcome: Student will demonstrate the ability to describe the social, political, and economic forces that influence social behavior.

The purpose of this report is to provide assessment results to support conversations regarding Gen Ed learning and opportunities for improvement.

Methods

Georgia Tech conducted an intensive review of the Gen Ed learning outcomes and how students demonstrate their learning in these areas by engaging faculty in Gen Ed assessment conversations in the following steps: (1) Study course enrollment and identify representative courses. We examined enrollment patterns for students taking courses in Gen Ed for the last five years. Patterns were determined, too, by class size (large class-100

or more students; middle class-50-99 students; small class-20-49 students). This exercise led to the value that all class sizes would be included in the 3-year Gen Ed Assessment Plan, as well as coverage of each discipline that contributes to Gen Ed. A total of 41 courses representing the appropriate colleges were selected (See Appendix A and B). (2) Identify or develop signature assignments that align with the outcome. Faculty identified measures that are tangible, visible, self-explanatory, and provide compelling evidence of what students have learned. (3) Develop performance scale. Faculty met and developed a scale for scoring. The general scale is structured to assess each Gen Ed learning outcome: 1-Developing, 2-Meets Expectations, 3-Exceeds Expectations. The following image indicates our goal for this step.

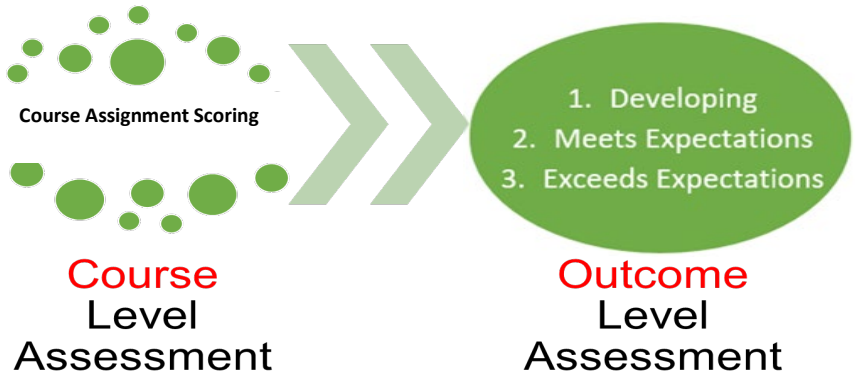

Figure 1 Scoring Method from Course Level Assessment to Outcome Level Assessment

This three-step process has become the basic collaborative framework across courses and units for meaningful Gen Ed assessment.

The following table indicates the representative nature of the sample.

Sample Size

Table 1 Sample Size by Undergraduate Student Demographics (Source: GT LITE)

Student Demographic	Sample N (%)	Institutional Population N(%)
Gender	(Total 1,533)	(Total 19,510)
Male	852 (55.6%)	11,860 (60.8%)
Female	681 (44.4%)	7,650 (39.2%)
Race/Ethnicity		
White	446 (33.6%)	6,793 (34.8%)
Black or African or American	146(11.0%)	1,523 (7.8%)
Asian	513 (38.6%)	5,936 (30.4%)
Hispanic or Latino	151 (11.4%)	1,536 (7.9%)
Two or More Races	61 (4.6%)	887(4.5%)
Unknown	11 (0.8%)	209 (1.1%)
First Generation College Student		
Continuing Generation	1,137 (85.6%)	15,592 (79.9%)
First Generation	192 (14.4%)	1,310 (6.7%)
Citizenship		

Domestic Student	1,329 (86.7%)	16,902 (86.6%)
International Student	204 (13.3%)	2,608 (13.4%)
Transfer Student Status		
Non-Transfer Student	1,310 (85.5%)	18,754 (96.1%)
Transfer Student	223 (14.5%)	756 (3.9%)
Class		
Freshman	570 (37.2%)	2,330 (11.9%)
Sophomore	519 (33.9%)	4,257 (21.8%)
Junior	146 (9.5%)	4,529 (23.2%)
Senior	70 (4.6%)	7,151 (36.7%)
GA Residence		
GA Residence	1,062 (69.3%)	12,062 (61.8%)
Out of State Residence	471 (30.7%)	7,102 (38.2%)

The Computing Outcome Statement and Representative Courses

CS1301, CS1315, and CS 1371 are listed under General Education Core Area B Institutional Options, which is associated with the following outcome:

Students will be able to develop solutions to problems involving data and to implement these solutions using an appropriate computer language.

The Computing Outcome Measures and Targets in the Assessment Plan

In CS 1301, CS 1315, and CS 1371, students will be asked to respond to two questions. On average, 85% of students are expected to achieve "Meets Expectations" or "Exceeds Expectations".

Data analysis

For the Computing outcome, students were asked to respond to two questions, and each question addresses a part of the Computing outcome. This Computing Outcome report presents student performance data collected for CS1301, CS 1315, and CS1371 classes from Fall 2023. The following table indicates the sample size and the scoring methods.

Table 2 Computing Scoring

Course Scoring	Signature Assignment	Scoring Method	N[1]
CS 1301	2 questions	Correct or Not Correct	1,077
CS 1315	2 questions	Correct or Not Correct	219
CS 1371	2 questions	Correct or Not Correct	237
Total			1,533

Faculty determined a common evaluation scale for the Computing outcome achievement in Table 3. The acceptable target for this outcome is 85% students met or exceeded the expectations.

Table 3 Score Interpretation

Students Performance	Score Interpretation
0 question correct	Developing
1 question correct	Meets expectations

2 questions correct	Exceeds expectations

Findings

Based on faculty agreement on the score interpretation, the frequency and percentage were calculated. Overall, 98.3% (n = 1,506) of students met or exceeded the Computing Outcome expectations.

Table 4 Computing Outcome Overall Performance

Score Interpretation	Students Performance % (n)		85% Target Achiev0ed?
Developing	0 question correct	1.8% (n = 27)	
Meets expectations	1 question correct	9.8% (n = 150)	Yes (98.3%)
Exceeds expectations	2 questions correct	88.5% (n = 1,356)	

In addition, the following table shows students' performance data by different demographic populations. The results indicated that all demographic groups met or exceeded the target of 85%.

Table 5 Computing Outcome Overall Performance by Demographic

(From All Represented Courses)	Developing	Meets Expectations	Exceeds Expectations	Overall Score	Target (85%) Achieved?
	n (%within subgroup)	n (%within subgroup)	n (% within subgroup)	Mean (SD)	
Gender					
Male (n=852)	19 (2.2%)	70 (8.2%)	763 (89.6%)	2.87 (0.39)	Yes (97.8%)
Female (n=681)	8 (1.1%)	80 (11.7%)	593 (87.1%)	2.86 (0.38)	Yes (98.8%)
Race/Ethnicity					
White (n=446)	5 (1.1%)	52 (11.7%)	389 (87.2%)	2.86 (0.38)	Yes (98.9%)
Black or African American (n=146)	3 (2.1%)	13 (8.9%)	130 (89.0%)	2.87 (0.39)	Yes (97.9%)
Asian (n=513)	8 (1.6%)	51 (9.9%)	454 (88.5%)	2.87 (0.38)	Yes (98.4%)
Hispanic or Latino (n=151)	4 (2.6%)	10 (6.6%)	137 (90.7%)	2.88 (0.40)	Yes (97.3%)
Two or More Races (n=61)	1 (1.6%)	4 (6.6%)	56 (91.8%)	2.90 (0.35)	Yes (98.4%)
Unknown (n=11)	0 (0.0%)	1 (9.1%)	10 (90.9%)	2.91 (0.30)	Yes (100%)
First-Generation College Student					
Continuing Generation (n=1,137)	18 (1.6%)	111 (9.8%)	1,008 (88.7%)	2.87 (0.38)	Yes (98.5%)
First Generation (n=192)	3 (1.6%)	20 (10.4%)	169 (88.0%)	2.86 (0.39)	Yes (98.4%)
Citizenship					
Domestic Student (n= 1,329)	21 (1.6%)	131 (9.9%)	1,177 (88.6%)	2.87 (0.38)	Yes (98.5%)
International student (n=204)	6 (2.9%)	19 (9.3%)	179 (87.7%)	2.85 (0.43)	Yes (97.0%)
Transfer Student Status					
Transfer Student (n=223)	6 (2.7%)	26 (11.7%)	191 (85.7%)	2.83 (0.44)	Yes (97.4%)

Non-Transfer Student (n=1,310)	21 (1.6%)	124 (9.5%)	1,165 (88.9%)	2.87 (0.38)	Yes (98.4%)
Class					
Freshman (n=570)	12 (2.1%)	42 (7.4%)	516 (90.5%)	2.88 (0.38)	Yes (97.9%)
Sophomore (n=519)	9 (1.7%)	55 (10.6%)	455 (87.7%)	2.86 (0.40)	Yes (98.3%)
Junior (n=146)	2 (1.4%)	20 (13.7%)	124 (84.9%)	2.84 (0.41)	Yes (98.6%)
Senior (n=70)	0 (0.0%)	7 (10.0%)	63 (90.0%)	2.90 (0.30)	Yes (100%)
GA Residence					
GA Residence (n=1,062)	16 (1.5%)	116 (10.9%)	930 (87.6%)	2.86 (0.39)	Yes (98.5 %)
Out of State Residence (n=471)	11 (2.3%)	34 (7.2%)	426 (90.4%)	2.88 (0.39)	Yes (97.6%)
Course mode					
In-Person (n=1,029)	20(1.9%)	91 (8.8%)	918 (89.2%)	2.87 (0.39)	Yes (98.0%)
Online (n=504)	7(1.4%)	59 (11.7%)	438 (86.9%)	2.86 (0.50)	Yes (98.6%)

Appendix A: Representative Courses List

Outcomes	Represented Courses	Total
Communication	ENGL 1101, ENGL 1102	2
Quantitative	MATH 1552, MATH 1712	2
Computing	CS 1301, CS 1315, CS 1371	3
Humanities, Fine Arts, and Ethics	Large Class: FREN 1002, SPAN 2001, ID 2202, ID 2241, PHIL 3109, ARCH 2111 Middle Class: LMC 3226, ML 2500, LMC 2350, LMC 3219 Small Class: CHIN 2001, LMC 2100, PHIL 4176	13
Natural Sciences, Math, and Technology	CHEM 1310, BIOS 1207DL, EAS 1600, PHYS 2212, MATH 1554, MATH 1711	6
Social Sciences	Large Class: ECON 2100, HIST 2111, HIST 2112, INTA 1200, 2030, POL 1101, PSYC 1101, PSYC 2210, PSYC 2230, SOC 1101 Small Class: ARCH 3135, CP 4020, POL 2101, PUBP 3000, PUBP 3315	15

Appendix B: Representative Courses Associated by College

Represented course associated college	Number of courses from the represented course list	Associated outcome
Ivan Allen College of Liberal Arts	22	Communication, Humanities, Fine Arts, and Ethics, Social Sciences
College of Sciences	11	Quantitative, Natural Sciences, Math, and Technology, Social Sciences
College of Design	5	Humanities, Fine Arts, and Ethics, Social Sciences
College of Computing	3	Computing