SUNY at Fredonia
College of Arts & Sciences
Department of Computer and Information Sciences
Assessment Report, AY 2020-2021

Department Information	
Department	Computer and Information Sciences
Academic Programs	Computer Science; Computer Information Systems
Degrees	BS
Contact Person (*This should be the person coordinating/reporting on the department's assessment efforts*)	
Name	Gurmukh Singh
Title	Senior Lecturer & Kasling Award Winner 2007
E-Mail Address	gurmukh.singh@fredonia.edu
Extension	4734
Name	
Title	
E-Mail Address	
Extension	

SUNY Fredonia Mission Statement: Fredonia educates, challenges, and inspires students to become skilled, connected, creative, and responsible global citizens and professionals. The university enriches the world through scholarship, artistic expression, community engagement, and entrepreneurship.

CIS Department Mission Statement: To provide state-of-the-art education to our students to excel in key fields of Computer and Information Sciences (CIS) and engage them in activities that enhance the welfare of Western New York and our society at large. Through student-centered education in an environment that fosters creative thinking and innovative problem-solving, we prepare our graduates for an assortment of career goals, including graduate studies. We view scholarly investigations and software development as an integral part of instruction, providing opportunities to students for active learning through practicum, research, and internship. Through active involvement in general education and interaction with cross-discipline course work, our programs embody students with life skills that help them become productive citizens and professionals.

The CIS department has adopted eleven student learning outcomes (SLOs) or Goals as per Academic Assessment Program Map of SUNY at Fredonia, which could be categorized into four Institutional Learning Goals (IGLs), i.e., (1) Skilled, (2) Connected, (3) Creative and (4) Responsible. How these four IGLs are aligned with eleven SLOs, please refer to Table I on page # 3 & 4. This means that the assessment selection depends upon which CS/IS track is to be considered at the present time. Please keep in mind that for Information Systems (IS) track, SLO 'K' is not valid. We have mapped these SLOs to the corresponding Campus Baccalaureate Goals. A list of the CIS department SLOs is displayed initially and then our Program Educational Objectives (PEOs) are presented. We reiterate that the same list of SLOs from A through I is applicable to both CS and IS tracks. That is why SLO 'J' occurs two times in the list of SLOs: the upper SLO is for CS track and the lower one is for IS track of the CIS Department.

The following list indicates the Student Learning Outcomes (SLOs/Goals) for the CIS Department:

A. An ability to apply knowledge of computing and mathematics appropriate to the discipline.

B. An ability to analyze a problem and identify and define the computing requirements appropriate to its solution.

C. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

D. An ability to function effectively in teams to accomplish a common goal.

E. An understanding of professional, ethical, legal, security and social issues and responsibilities.

F. An ability to communicate effectively with a range of audiences.

G. An ability to analyze the local and global impact of computing on individuals, organizations, and society.

H. Recognition of the need for and an ability to engage in continuing professional development.

I. An ability to use current techniques, skills, and tools necessary for computing practice.

J. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]

    [J] An understanding of and an ability to support the use, delivery, and management of information systems within an Information Systems environment. [IS]

K. An ability to apply design and development principles in the construction of software systems of varying complexity. [CS]

The SLOs/Goals 'A' through 'J' and 'K' for CS track are assessed based on the courses being taught in CIS Department during each fall and spring semester and they correlate strongly with our three PEOs, which could be found in our former Assessment Reports. However, for the sake of clarity, we are listing them here too. These are three Program Educational Objectives (PEOs) for our CIS Department:

- PEO1: Be prepared for a successful career in computer and information science or pursue graduate studies.
- PEO2: Utilize strong problem solving and communication skills.
- PEO3: Acquire life-long learning skills and engage in professional development.

Following is a depiction of the relationship between the PEOs and SLOs (this was initially done by Dr. Zubairi), and SLOs to the campus baccalaureate goals. Table I shows mapping of PEOs to the corresponding SLOs. Just to point out here that each SLO from 'A' through 'K' is further subdivided into three to five categories or performance criteria (PC) depending on the complexity of algorithm or project work or oral presentation of the assigned work. In Table I, we present mapping of the CIS Department Goals/SLOs that correspond to the SUNY Fredonia campus's four baccalaureate goals: (1) Skilled, (2) Connected, (3) Creative and (4) Responsible.

Table I: Mapping of SLOs with corresponding SUNY Fredonia baccalaureate goals

Student Learning Outcomes/Goals (SLOs/Goals)	SUNY Fredonia Institutional Learning/Baccalaureate Goals (IGLs)			
	Skilled	Connected	Creative	Responsible
A: An ability to apply knowledge of computing and mathematics appropriate to the discipline	Students learn programming through a sequence of progressively difficult courses		Learn to be creative in developing algorithms and in modeling data	
B: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution	challenging the students in several courses to solve real-life problems on the computer by developing programs		Learn to be creative in developing algorithms for solving problems and in modeling data	
C: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	Learning and using skills to design and implement a computer-based solution.			Make sure the program or solution meets the needs
D: An ability to function effectively on teams to accomplish a common goal		Students work in teams to complete a project and share their part of solution with others		Students meet deadlines for various reports
E: An understanding of professional, ethical, legal, security and social issues and responsibilities				Students get the knowledge of ethical and security issues in IT and computer industry.

F: An ability to communicate effectively with a range of audiences		In oral communication courses, students give presentations, handle Q & A and evaluate each other		Ability to command the topic and respond with various options to show thorough knowledge of the topic
G: An ability to analyze the local and global impact of computing on individuals, organizations, and society	Students are prepared to be global technological citizens, looking at issues facing other countries and cultures.			Students study examples of the impact of computing on global society.
H: Recognition of the need for and an ability to engage in continuing professional development		Through Internships, the students connect to each other and engage in continuous professional development		Students show a sense of responsibility by taking the professional internships seriously
I: An ability to use current techniques, skills, and tools necessary for computing practice.	In programming and web design courses, students need to use modern tools and be on top of the technology.		Students find creative ways of using current technique and skills.	
J: An understanding of processes that support the delivery and management of information systems within a specific application environment. [IS]	Students acquire appropriate skills on several topics in concerning information systems processes		Students create models that support delivery/management of information systems	
J: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]			Students do model and design computing systems in a variety of ways using creative options.	
K: An ability to apply design and development principles in the construction of software systems of varying complexity. [CS}	Students enhance their skills by designing software systems in a variety of languages and platforms.			

Dr. Singh and Dr. Zubairi have created the curriculum map and assessment plan 2014 for Computer Science (CS) and Information Systems (IS) tracks, respectively. The curriculum map shows a mapping of the courses to one or more corresponding SLOs. In the assessment plan, several performance criteria (PC) have been developed for each SLO/Goal. In each fall and spring semester, the specific courses are identified that satisfy these performance criteria, and consequently are picked for the data collection that is used to create the final annual assessment report. For each Goal/SLO, a rubric is designed that depicts specific milestones to

be achieved by the students to meet or exceed or approach a given standard. The rubric sheet also identifies the shortcomings, which are demonstrated by those students who fail to meet a particular standard.

In the beginning of each fall and spring semester, the Assessment Coordinator (Dr. Singh) identifies the courses to be picked for assessment report and informs the instructors teaching those courses for which Goals/SLOs data collection is to be done. Instructors refer to the rubric sheets as a guideline to figure out the specific milestones for students to achieve. This prior information helps instructors to prepare and include specific questions in their quizzes, assignments, exams and projects/presentations. Consequently, instructors design quizzes, exams, assignments, projects, and presentations that include the relevant kind of work to be performed by the students. As the semester progresses, instructors are reminded periodically by the Assessment Coordinator about the collection of assessment data in a timely manner. Finally, at the end of each fall and spring semester, the instructors turn in the collected assessment data to the Assessment Chair (Dr. Singh). Based on the data collected, the pertinent SLOs/Goals are assessed. In fall 2020 and spring 2021 semesters, a list of courses to be assessed is presented in Table II and Table III, respectively. Each Table lists the courses to be assessed, which is based on the curriculum map and the response received from the instructors teaching relevant courses/courses in fall 2020 and spring 2021 semesters. It is obvious from Table II that we did not offer the CSIT321 course in fall 2020. However, this course CSIT321 was offered in spring 2021 and therefore, we can perform the limited assessment analysis for SLOs, I3. The same situation is true for the CSIT201 course that was offered only in fall 2020 but not in spring 2021 and thus we have limited assessment analysis performed on SLOs, E1, E2, E3, G1 and G2. The same conclusion may be drawn from three courses, CSIT431, CSIT441 and CSIT462 for all Fs. These six courses, i.e., CSIT201, CSIT311, CSIT321, CSIT431, CSIT441 and CSIT462, are heighted in yellow color in Tables II and III. The main reason being that we could not offer so many courses in fall 2020 and spring 2021 that three tenure-track faculty members resigned from the department, which effected the course offering in both fall 2020 and spring 2021 semesters. On top of it, one tenured faculty member is going on sabbatical leave in the coming fall 2021 and that will also affect the course offerings both in fall 2021 and spring 2022 semesters.

Table II: Information of each course, its instructor, and SLOs to be assessed for fall 2020.

S. No.	Course # & Instructor	Student Learning Outcomes (SLOs) To Be Assessed
1.	CSIT201: Cole	All Es, & G1, G2
2.	CSIT221: Arnavut & Denise	I1
3.	CSIT231: Szocki	I4
4.	CSIT241: Maloney	A3
5.	CSIT311: Zubairi	A4, I2
6.	CSIT321* (Not offered this Fall 2020)	I3
7.	CSIT324: Singh	A2, B3
8.	CSIT341: Haider	A1, A5, B2, & All Js
9.	CSIT425: Denise	B1, B4, and All Cs, Ds, Fs, & Ks
10.	CSIT431: Haider	All Fs
11.	CSIT441* (Not offered this Fall 2020)	All Fs
12.	CSIT455: Denise	All Fs
13.	CSIT462*: (Not offered this Fall 2020)	All Fs
14.	CSIT300, CSIT400, CSIT497* & CSIT499*: Zubairi & Pratt	Graduating Senior Exit Survey

Table III: Information of each course, its instructor, and SLOs to be assessed for spring 2021

S. No.	Course # & Instructor	Student Learning Outcomes (SLOs) To Be Assessed
1.	CSIT201: (Not offered this Spring 2021)	All Es, & G1, G2
2.	CSIT221: Arnavut & Haider	I1
3.	CSIT231: Szocki	I4
4.	CSIT241 & CSIT242: Maloney	A3
5.	CSIT311: Shimanovich	A4, I2
6.	CSIT321: Denise	I3
7.	CSIT324: Singh	A2, B3
8.	CSIT341: Haider	A1, A5, B2, & All Js
9.	CSIT425: Denise	B1, B4, and All Cs, Ds, Fs, & Ks
10.	CSIT431: (Not offered this Spring 2021)	All Fs
11.	CSIT441: Arnavut	All Fs
12.	CSIT455: Denise	All Fs
13.	CSIT462: (Not offered this Spring 2021)	All Fs
14.	CSIT300, CSIT400, CSIT497 & CSIT499: Arnavut, Pratt & Zubairi	Graduating Senior Exit Survey

In the actual assessment analysis of a given course taught during fall 2020 and spring 2021 semesters, we now present a comprehensive discussion on how each SLO/Goal, 'A' through 'K', is being assessed. In the 1st row of Table IV displayed on next page, we present the statement of a given SLO/Goal to be assessed, followed by its Assessment Method in the 2nd row, its Data Source in the 3rd row and Assessment Results in the last row. For example, for SLO/Goal, 'A', we first list its five Performance Criteria (PC), e.g., A1, A2, A3, A4 & A5. For each PC, we assign an abbreviation that relates to its actual description. Then, an inset table is plugged into it for each course, and in the end, its corresponding PC is presented. This table contains the raw assessment data, which is then combined and aggregated to produce final-result for a given SLO/Goal that is being assessed. Each entry in an inset table contains a triplet, (x, y, z), corresponding to a given PC that indicates Exceeds Standard, Meets Standard, and Approaches Standard. Arithmetic means are used to combine and aggregate the results. At the end of computation, an actual number of students is used for calculating percentile performances. Arithmetic means are used instead of geometric means because for each PC, the range of values is the same, i.e., the total number of students in a class is normalized to the maximum number of students in a course offered for that SLO/Goal. Adding the PC values across multiple courses by columns still results in similar patterns, which preserve consistency of the actual results. For presenting the results in three categories, i.e., X (Exceeds), M (Meets) and I (Approaches/Insufficient), the following mathematical formulas are used to aggregate the percentile performances. Here, 'L' is the number of courses in which a given SLO is to be assessed and 'N' is the number of performance criteria for each SLO. Each PC's performance data is listed as a fractional number, p/q, where 'q' is the total number of students in the course and 'p' is the number of students that fulfills X or M or I category of performance. As an example, X/(X+M+I) would be the fraction of the number of students that exceeds a specific performance criterion (PC) in a course being taught. The following three mathematical equations are employed to determine X, M and I percentile performance, respectively:

$$X = 100 \times \sum_{j=1}^{L} [(100 \times \sum_{i=1}^{n} \frac{PCX_i}{N}]/L \qquad (1)$$

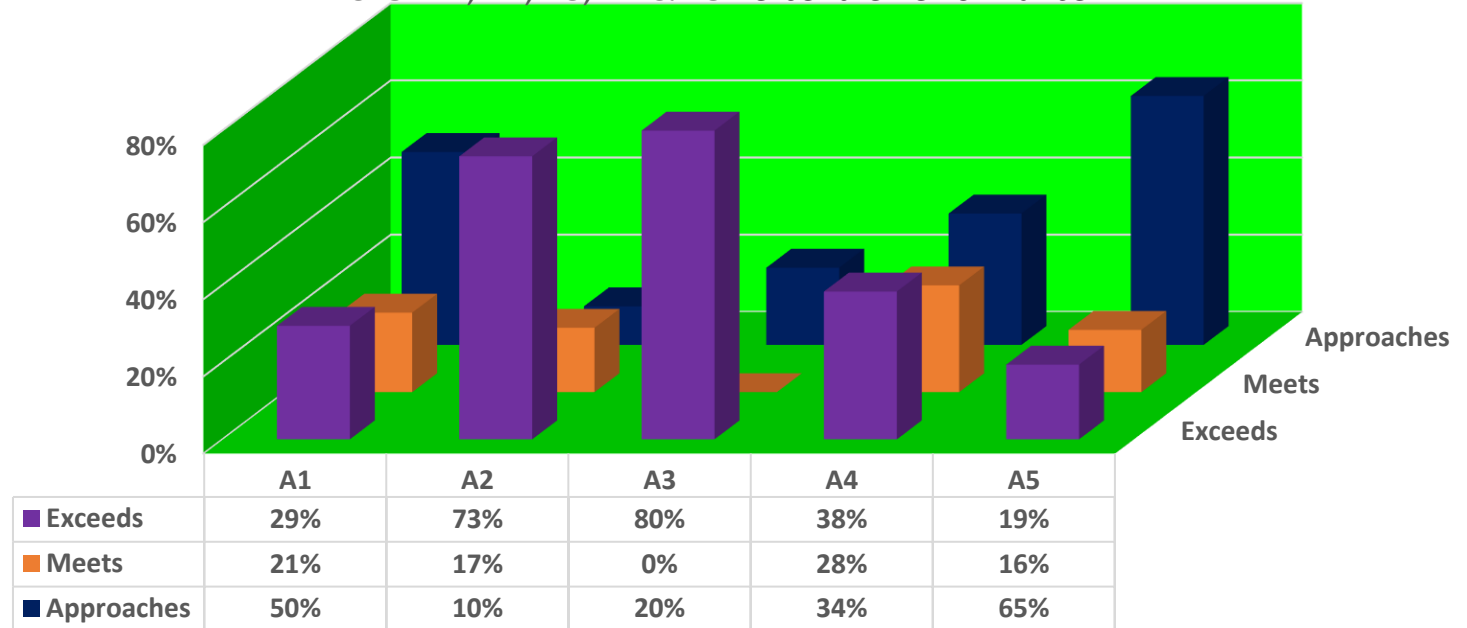$$M = 100 \times \sum_{j=1}^{L} [(100 \times \sum_{i=1}^{n} \frac{PCM_i}{N}]/L$$

(2)

$$I = 100 \times \sum_{j=1}^{L} [(100 \times \sum_{i=1}^{n} \frac{PCI_i}{N}]/L$$

(3)

Table IV: Assessment of Student Learning Outcomes/Goals (SLOs/Goals)	
Programs: Computer Science and Computer Information Systems	
SLO/Goal A	An ability to apply knowledge of computing and mathematics appropriate to the discipline.
Assessment Method(s)	The first column of this table shows the CS course offered and its semester. F20 stands for fall 2020 and S21 is used for spring 2021 semester. Instructors assign program-based questions/projects to the student of five courses, CSIT241, CSI311, CSIT324, and CSIT341 during F20 and S21 semesters. The programs/projects are thoroughly reviewed and graded by the instructors. The instructors provide the Assessment Committee Chair with a graded portfolio of a given number of assignments/exam questions or project work. Instructors include in their instrument relevant exams questions, program/project work of CSIT241, CSIT242 and CSIT341 courses as per the assessment plan.
Data Source	Data source is based on the programs written by students depending on assigned work, which is then graded by instructors teaching these courses CSIT324, CSIT241, CSIT242, CSIT311 and CSIT341. Some specific exam questions could be picked from these listed courses too.
Assessment Results	Following are the assessment results as per performance criteria A1, A2, A3, A4 and A5: A1. (DATA) Demonstrates an understanding of basic data structures and their representation. A2. (OOPL) Demonstrates an understanding of a high-level object-oriented programming language and software design. A3. (DIGITAL) Demonstrates an understanding of number systems and digital logic A4. (ORGA) Demonstrates an understanding of computer organization and architecture. A5. (ALGM) Demonstrates an understanding of analysis of algorithms. Each triplet (x, y, z) indicates (exceeds, meets, insufficient or approaching) {{TABLE}}

Course Offered	A1 (DATA)	A2 (OBJECT)	A3 (DIGITAL)	A4 (ORGA)	A5 (ALGM)
CSIT341 (F20)	5, 3, 8	-	-	-	-
CSIT341 (S21)	5, 4, 9	-	-	-	-
CSIT324 (F20)	-	10, 5, 0	-	-	-
CSIT324 (S21)	-	12, 0, 3	-	-	-
CSIT311 (F20)	-	-	-	5, 5, 9	-

CSIT311 (S21)	-	-	-	13, 8, 3	-
CSIT241 (F20)	-	-	10, 0, 2	-	-
CSIT241(S21)	-	-	12, 0, 4	-	-
CSIT242 (S21)	-	-	13, 0, 1	-	-
CSIT341 (F20)	-	-	-	-	2, 2, 9
CSIT341 (S21)	-	-	-	-	4, 3, 11

SLO: A1, A2, A3, A4 & A5 Percentile Performance

	A1	A2	A3	A4	A5
Exceeds	29%	73%	80%	38%	19%
Meets	21%	17%	0%	28%	16%
Approaches	50%	10%	20%	34%	65%

SLO/Goal B:	An ability to analyze a problem and identify and define the computing requirements appropriate to its solution.
Assessment Method(s)	Students are given programming assignments in which they analyze and solve a problem using appropriate paradigms and resources to arrive at its solution
Data Source	The data was collected by the Instructors of CSIT324, CSIT341 and CSIT425 in both fall 2020 and spring 2021 semesters. In CSIT425 course, data were collected by the same instructor using Final Project/Final Exam/assignments, whereas in CSIT341 data were collected on competency in analyzing some problems and proposing different models for its solution in fall 2020 and spring 2021 semesters. In CSIT324, data were collected using one midterm and one final online exam and two C# projects assigned to students.
Assessment Results	Following are the assessment results as per performance criteria B1, B2, B3 and B4. B1. (SPEC) Demonstrates abilities of writing program specifications and documentation.

B2. (ANALYZE) Demonstrates competency in analyzing the problem and proposing different models for solution.
B3. (APPROPR) Demonstrates competency in analyzing models using appropriate paradigms and following standard practices.
B4. (RESOURCES) Demonstrates competency in determining physical resources and the time required to come to a solution.

Each triplet x, y, z indicates (exceeds, meets, insufficient or approaching).

Course Offered	B1 (SPEC)	B2 (ANALYZE)	B3 (APPROPR)	B4 (RESOURCES)
CSIT324 (F20)	-	-	8, 3, 4	-
CSIT324 (S21)	-	-	12, 0, 3	-
CSIT341 (F20)	-	4, 3, 9	-	-
CSIT341(S21)	-	1, 6, 7	-	-
CSIT425-01 (F20)	8, 8, 0	-	-	8, 8, 0
CSIT425-01 (S21)	3, 3, 3	-	-	3, 3, 3

SLO: B1, B2, B3 & B4 Percentile Performance

	B1	B2	B3	B4
■ Exceeds	46%	22%	74%	46%
■ Meets	46%	30%	11%	46%
■ Approaches	8%	23%	26%	8%
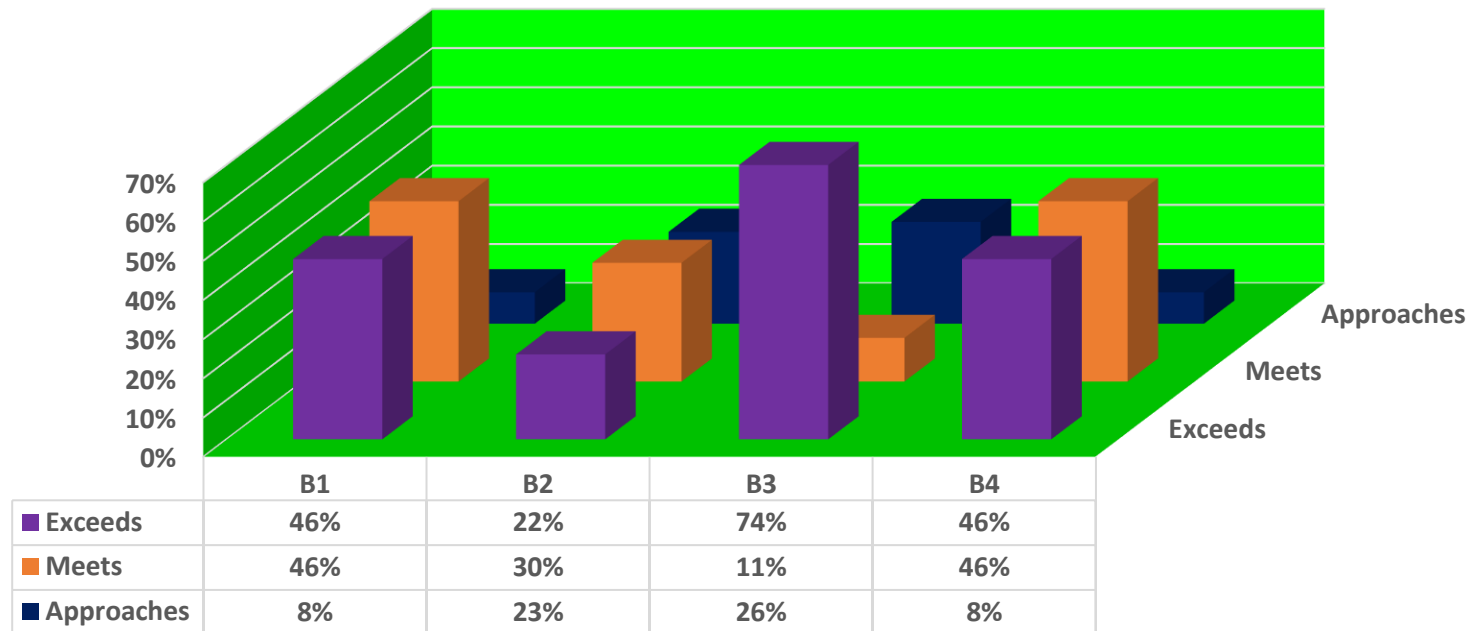
SLO/Goal C:	An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
Assessment Method(s)	Students are assigned lab projects to develop a computer-based system to meet the stated objectives.

Data Source	The data for course CSIT425 was collected by the same instructor in both fall 2020 and spring 2021 semesters The data collection is based on Final Project assigned to a team of 3/4 students for C1, C2, C3 and C4. The instrument used for C4 was based on Assignment 2. This instructor collected data on creation of documentation relating to the project work, communicating with team members, writing programs to conform to requirements and to meet deadlines in completion of project work. Only three groups completed the project work, and one group did not.
Assessment Results	Following are the assessment results as per performance criteria C1, C2, C3, C4 and C5. C1. (DESIGN) Demonstrates competency in computer-based system design. C2. (REQ) Demonstrates ability in eliciting requirements. C3. (METRIC) Demonstrates competency in developing project metrics. C4. (TEST) Demonstrates competency in creating and executing test plans. C5. (OPTIM) Demonstrates competency in comparing alternative solutions and selecting the optimal one. Each triplet x, y, z indicates (exceeds, meets, insufficient or approaching).

Course Offered	C1 (DESIGN)	C2 (REQ)	C3 (METRIC)	C4 (TEST)	C5 (OPTIM)
CSIT425-01 (F20)	8, 0, 8	8, 0, 8	8, 0, 8	8, 0, 8	6, 4, 6
CSIT425-01 (S21)	3, 3, 3	3, 3, 3	3, 3, 3	3, 3, 3	3, 3, 3

SLO: C1, C2, C3, C4 and C5 Percentile Performance

	C1	C2	C3	C4	C5
Exceeds	44%	44%	44%	44%	36%
Meets	12%	12%	12%	12%	28%
Approaches	44%	44%	44%	44%	36%

SLO/Goal D:	An ability to function effectively on teams to accomplish a common goal.
Assessment Method(s)	Done through project portfolio and peer evaluations.
Data Source	The data for course CSIT425 was collected by the same instructor in both fall 2020 and spring 2021 semesters The data collection is based on Final Project assigned to a team of 3/4 students for D1, D2, D3 and D4. This instructor collected data on creation of documentation relating to the project work, communicating with team members, writing programs to conform to requirements and to meet deadlines in completion of project work. All four groups completed the project work in fall 2020 but and one group did not do that in spring 2021.
Assessment Results	Following are the assessment results as per performance criteria D1, D2, D3 and D4. D1. (DOCU) Demonstrates ability to document well the work. D2. (INTER) Demonstrates ability to communicate with team members, listen actively, provide feedback and share information. D3. (VALID) Demonstrates the ability to validate research on an assigned relational database systems topic using empirical evidence to support claims. D4. (DEAD) Demonstrates ability to meet deadlines. Each triplet x, y, z indicates (exceeds, meets, insufficient or approaching).

Course Offered	D1 (DOCU)	D2 (INTER)	D3 (VALID)	D4 (DEAD)
CSIT425-01 (F20)	4, 8, 4	4, 8, 4	4, 8, 4	4, 8, 4
CSIT425-01 (S21)	3, 3, 3	3, 3, 3	3, 3, 3	3, 3, 3

SLO D: Percentile Performance of D1, D2, D3 and D4

	D1	D2	D3	D4
■ Exceeds	28%	28%	28%	28%
■ Meets	44%	44%	44%	44%
■ Approaches	28%	28%	28%	28%

SLO/Goal E:	An understanding of professional, ethical, legal, security and social issues and responsibilities.
Assessment Method(s)	Specific questions are included in the assignments and tests for assessing this goal. Instructor teaching this course collects assessment data and forwards it to the assessment Committee Chair.
Data Source	The data collection for E goal is done only for CSIT201 course taught in fall 2020 and this course was not offered in spring 2021. The instructor picked relevant questions from two exams. Consequently, the instructor picked five questions for E1, two questions for E2 and four questions for E3.
Assessment Results	Following are the assessment results as per performance criteria E1, E2 and E3.

Assessment Results (continued):

E1. (ETHIC) Understands the ethical issues related to technology.
E2. (SECUR) Understands the security issues and problems of identity theft.
E3. (MAL) Demonstrates knowledge about the characteristics of different malware types and the difference between them.

Each triplet x, y, z indicates (exceeds, meets, insufficient or approaching).

Course Offered	E1 (ETHIC)	E2 (SECUR)	E3 (MAL)
CSIT201 (F20)	3, 91, 0	4, 18, 0	16, 6, 0
CSIT201 (S21)	Not offered	Not offered	Not offered

SLO E: Percentile Performance of E1, E2, and E3

	E1	E2	E3
Exceeds	14%	18%	73%
Meets	86%	82%	27%
Approaches	0%	0%	0%

SLO/Goal F:	An ability to communicate effectively with a range of audiences.
Assessment Method(s)	In oral communication courses, class is divided into several groups of three/four students depending on the complexity of assigned project. Each group presents their project work during class time in last four/five weeks of the course work. Each group presentation is evaluated by their peers as well as by the instructor. Instructor collects assessment data and forwards it to the assessment Committee Chair.
Data Source	The data collection was done by three instructors offering CSIT425, CSIT431, and CSIT455 in fall 2020 semester, whereas four Instructors offering CSIT425-01, CSIT431, CSIT441, and CSIT455 courses in spring 2021. However, CSIT462 course was not offered in both fall 2020 and spring 2021 semesters due to shortage of instructors in the department since three instructors resigned in summer 2020. Data presented here is collected on Final Project, Categories 2, 4 & 5. Items 1-5 of student presentations, which is a measure of good verbal skills and interaction with other students, good control on power point slides, well organization of talk, and covering the topic completely.

The method of data collection may vary depending on the choice of each instructor since six instructors are involved in teaching these courses: three courses in fall 2020 and three courses in spring 2021 semester. We may mention here that we did not offer CSIT441 in fall 2020. Similarly, CSIT462 was not offered in spring 2021. There is another issue involving course offering of CSIT431 and CSIT462 in both fall 2020 and spring 2021 semester that we did not have qualified instructors to teach these courses. Consequently, we were unable to perform a comprehensive analysis of three courses, e.g., CSIT431 (S21), CSIT441 (F20) and CSIT462 (F20 and S21). Thus, we were unable to include the results of data collection and analysis of two courses, namely CSIT431 and CSIT462, in the current report. Remedy to such like problem is that our department needs more resources specially to teach speech intensive 400 level courses in future course offerings. |
| Assessment Results | Following are the assessment results as per performance criteria (PC) F1 through F4.
F1. (VERBAL) Demonstrates an ability of good verbal skills.
F2. (PRESENT) Demonstrates good knowledge of presentation software.
F3. (ORGN) Demonstrates an ability of good organization of the talk.
F4. (KNOW) Demonstrates knowledge of the topic.

Each triplet (x, y, z) indicates (exceeds, meets, insufficient or approaching). |

Course Offered	F1 (VERBAL)	F2 (PRESENT)	F3 (ORGN)	F4 (KNOW)
CSIT425-01 (F20)	7.5, 5.5, 3	7.5, 5.5, 3	7.5, 5.5, 3	7.5, 5.5, 3
CSIT425-01 (S21)	2, 3.5, 3.5	2, 3.5, 3.5	2, 3.5, 3.5	2, 3.5, 3.5
CSIT431 (F20)	2, 5, 1	8, 0, 0	2, 3, 3	2, 5, 1
CSIT431 (S21)	Not offered in spring 2021			
CSIT441 (F20)	Not offered in fall 2020			
CSIT441 (S21)	2, 4, 3	2, 4, 3	2, 4, 3	2, 4, 3
CSIT455 (F20)	5, 3, 4	5, 3, 4	5, 3, 4	5, 3, 4
CSIT455 (S21)	4, 1, 3	4, 1, 3	4, 1, 3	4, 1, 3
CSIT462 (F20)	Not offered in fall 2020			
CSIT462 (S21)	Not offered in spring 2021			

SLO F: Percentile Performance of F1, F2, F3 and F4

	F1	F2	F3	F4
Exceeds	28%	39%	28%	28%
Meets	39%	28%	33%	39%
Approaches	33%	28%	33%	33%

SLO/Goal G:	An ability to analyze the local and global impact of computing on individuals, organizations, and society.
Assessment Method(s)	Selected questions extracted from course examinations and assignments; selected components of course projects.
Data Source	The data was collected for CSIT201 course taught by one instructor one in Fall 2020 and this course was not offered in spring 2021, so that data analysis on goal G could be performed and reported in current assessment report for the fall 2020 semester. The instructor of fall 2020 picked three questions from exams for G1 and for G2 and one question was specially designed to collect the data on this goal.
Assessment Results	Following are the assessment results as per performance criteria G1 and G2. Performance Criteria G1. (IMPACT) Demonstrates an ability to analyze the local and global impact of computing on individuals. G2. (SOCIETY) Demonstrates an ability to analyze the local and global impact of computing organizations and society. Each triplet x, y, z indicates (exceeds, meets, insufficient or approaching) percentile performance of each SLO.

Course Offered	G1 (IMPACT)	G2 (SOCIETY)
CSIT201 (F20)	20, 2, 0	18, 4, 0
CSIT201 (S21)	Not offered in spring 2021	

SLO G: Percentile Performance of G1 and G2
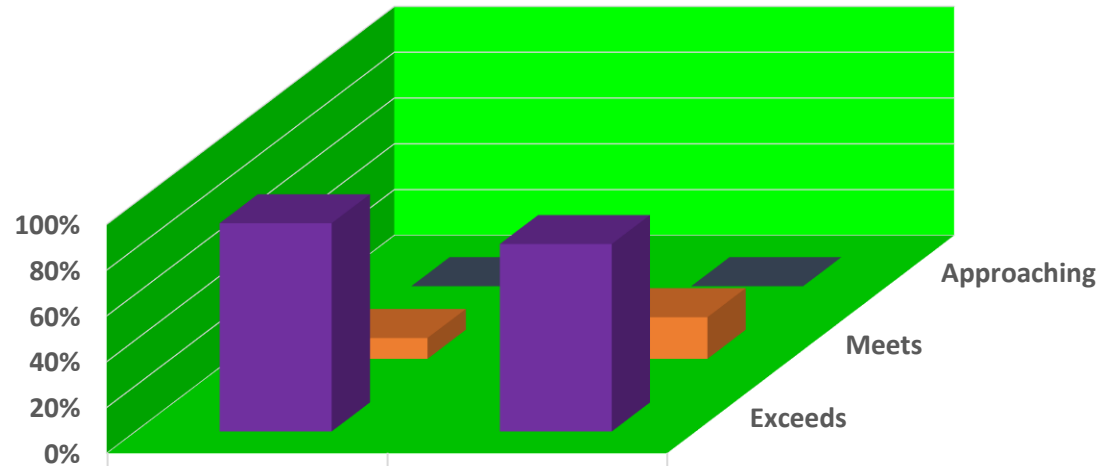
	G1	G2
■ Exceeds	91%	82%
■ Meets	9%	18%
■ Approaching	0%	0%

SLO/Goal I:	An ability to use current techniques, skills, and tools necessary for computing practice.
Assessment Method(s)	Selected questions extracted from course examinations and assignments; selected components of course projects.
Data Source	Eight courses were picked for the data collection in fall 2020 and spring 2021. The data was collected by the three Instructors offering CSIT221 course: one section in fall 2020 and two sections in spring 2021 for SLO I1. Two sections of CSIT231 course were used to collect data for I2: one section in fall 2020 and another section in spring 2021. One section of CSIT311 course offered in fall 2020 and another section of CSIT321 course were used to collect data for I2 and I3, respectively. The data collection is done with C++ using MS VB.NET, Bash/C on Linux server and one other computing language for the three respective courses. Two sections of CSIT311 course were offered - one in fall 2020 and the other one in spring 2021, and therefore, data was collected on Assembly Language for Goal/SLO, I2. One section of CSIT321 offered in spring 2021 was used for data collection of Goal I3.
Assessment Results	Following are the assessment results as per performance criteria I1, I2 I3 and I4.

Performance Criteria |

I1. (C++) Demonstrates competency in C++ programming.
I2. (ASSEMB) Demonstrates competency in assembly language programming.
I3. (OTHER) Demonstrates competency in programming in other languages.
I4. (UNIX) Demonstrates competency in the use of the UNIX operating system.

Each triplet (x, y, z) indicates (exceeds, meets, insufficient or approaching).

Course Offered	I1 (C++)	I2 (ASSEMB)	I3 (OTH)	I4 (LINUX)
CSIT221-01 (F20)	9, 0, 2	-	-	-
CSIT221-01 (S21)	7, 0, 2	-	-	-
CSIT221-02 (S21)	4, 2, 8	-	-	-
CSIT231 (F20)	-	-	-	2, 4, 5
CSIT231 (S21)	-	-	-	2, 5, 4
CSIT311 (F20)	-	0, 5, 14	-	-
CSIT311 (S21)	-	2, 15, 11	-	-
CSIT321 (S21)	-	-	7, 6, 9	-

SLO: I1, I2, I3 & I4 Percentile Performance

	I1	I2	I3	I4
■ Exceeds	55%	5%	32%	18%
■ Meets	7%	45%	27%	40%
■ Approaching	38%	50%	41%	42%
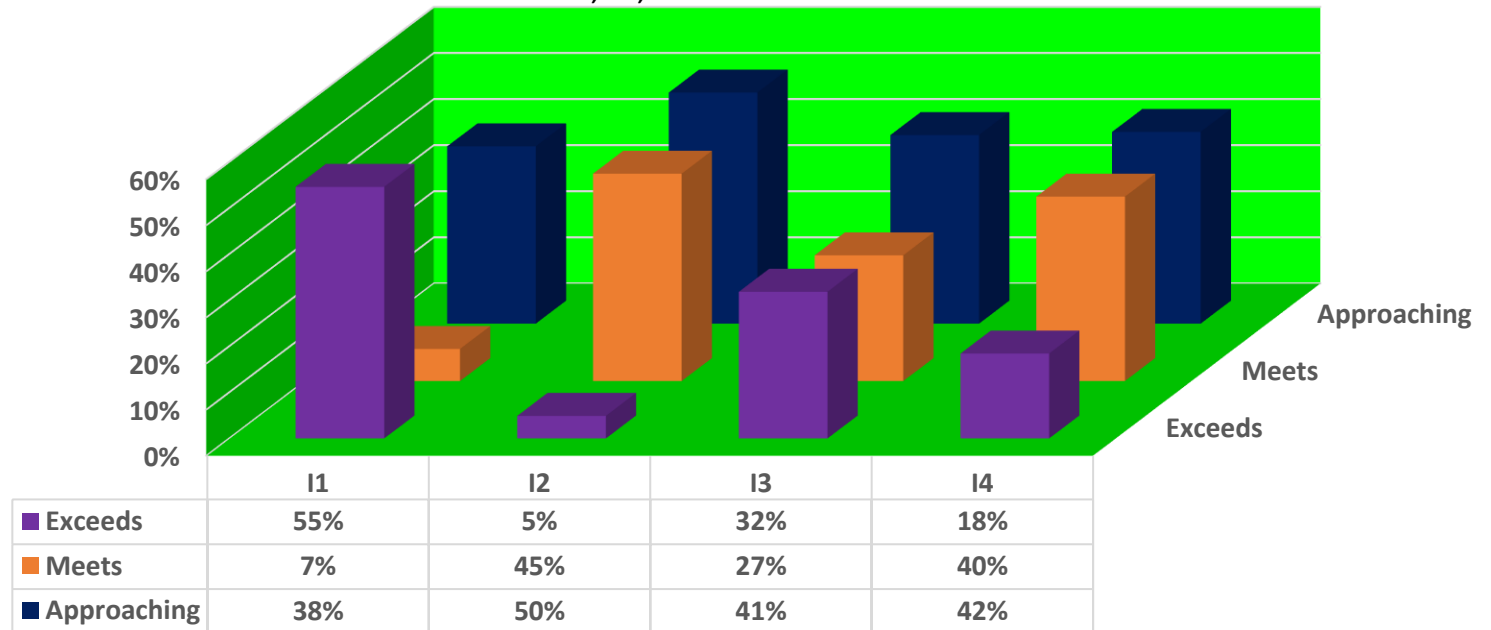
SLO/Goal J:	An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
Assessment Method(s)	Selected questions extracted from course examinations and assignments; selected components of course projects.
Data Source	The data was collected by just one Instructor offering the same CSIT341 course in fall 2020 and spring 2021 semesters. The instructor picked the data from assigned homework and programming problems as well as from some exam questions.
Assessment Results	Following are the assessment results as per performance criteria J1, J2, J3 and J4. Performance Criteria J1. (MODEL) Demonstrates an ability to apply mathematical modeling to computing problems. J2. (ALGM) Demonstrates an ability to develop different algorithms for a computing problem. J3. (EFFIC) Demonstrates an ability to evaluate algorithm efficiency. J4. (MEMORY) Understands the tradeoff between memory and running time.

Each triplet (x, y, z) indicates (exceeds, meets, insufficient or approaching).

Course Offered	J1 (MODEL)	J2 (ALGM)	J3 (EFFIC)	J4 (MEMORY)
CSIT341 (F20)	4, 2, 9	5, 3, 8	4, 4, 8	4, 2, 9
CSIT341 (S21)	4, 3, 11	5, 4, 9	3, 5, 7	4, 3, 11

SLO: J1, J2, J3 and J4 Percentile Performance

	J1	J2	J3	J4
Exceeds	24%	29%	23%	24%
Meets	15%	21%	29%	15%
Approaches	61%	50%	48%	61%

SLO/Goal K:	An ability to apply design and development principles in the construction of software systems of varying complexity.
Assessment Method(s)	Based on project portfolio.
Data Source	The data was collected by the same Instructor offering one section of CSIT425 course in fall 2020, and one section of the same course in spring 2021 semester. This instructor picked the measures to achieve this goal K from Group Project's functional and non-functional requirements, deliverables and milestones, project plan, and group project's total points awarded.
Assessment Results	Following are the assessment results as per performance criteria K1 through K4.

Performance Criteria
K1. (FORMAL) Demonstrates an ability of formally describing a software system.
K2. (ESTIM) Ability to establish estimates.
K3. (PLAN) Able to develop a project plan.
K4. (DOCU) Able to provide adequate internal and external documentation.

Each triplet (x, y, z) indicates (exceeds, meets, insufficient or approaching).

Course Offered	K1 (FORMAL)	K2 (ESTIM)	(K3 PLAN)	K4 (DOCU)
CSIT425-01 (F20)	3, 3, 3	3, 3, 3	3, 3, 3	3, 3, 3
CSIT425-01 (S21)	8, 8, 0	8, 8, 0	8, 8, 0	8, 8, 0

SLO: K1, K2, K3 and K4 Percentile Performance

	K1	K2	K3	K4
■ Exceeds	46%	46%	46%	46%
■ Meets	46%	46%	46%	46%
■ Approaches	8%	8%	8%	8%

SLO/Goal H:	Recognition of the need for and an ability to engage in continuing professional development.

Assessment Method(s)	Senior students graduating in fall 2020 and spring 2021 semesters were requested to fill out senior exit survey before/on a deadline date set by the department. This anonymous senior exit survey would help us out to refine the CIS curriculum, and consequently, to refine the assessment report during its future data collection and analysis work. A hard copy of the senior exit survey is also attached in Appendix I. In both fall 2020 and spring 2021 semesters, the department secretary invited the graduating senior students to fill out an online senior exit survey.
Assessment Results	The data is collected by the department secretary and is forwarded to the Department Chair and Assessment Coordinator (Dr. Singh). Table V given below lists some salient features of the results of this assessment report based on the senior graduating students exit surveys conducted in fall 2020 and spring 2021 semesters. Total number of students graduated in fall 2020 and spring 2021 semesters is 23, (which does not include the number of 8 seniors who graduated in CIS minor in spring 2021 semester). Among 23 graduating seniors, 17 students graduated in Computer Science (CS) and the remaining 6 senior students graduated in Information Systems (IS). I am to state that none of the CIS senior graduating students participated in the senior exit survey in fall 2020. On the other hand, only 2 senior graduating students participated in the senior exit survey in spring of 2021 although the number of students graduating in fall 2020 semester was 10 and this number was 13 for spring 2021 semester. In spring 2021 semester, the senior student participation is very low - only 15%. This very low participation may be attributed to the existence of pandemic during fall 2020 and spring 2021 semesters. The overall senior student participation both in fall 2020 and spring 2021 semesters is only 8.5%. Due to lack of data, we are unable to report the number of semesters spent by the senior students to graduate from the CIS department in fall 2020 semester. However, senior students graduating in spring 2021 semester and who participated in the senior exit survey could graduate in the CIS major after spending 6 – 8 semesters at Fredonia University. Unfortunately, I did not have the data on the number of transferred graduating senior students and the number of their credits transferred in fall 2020 and spring 2021 semesters. Therefore, those numbers are not presented in Table V. The number of credits earned by the senior students who participated in the senior exit survey is over 75 at Fredonia University Positive and negative feedback from two senior students who participated in spring 2021 senior graduating exit survey will be discussed below in the concluding section.

Table V: A list of Senior Graduating Students in fall 2020, J-Term 2020 and spring 2021 semesters

	Total # of Majors	CS Majors	IS Majors	Senior Survey Participation	Percentile of Senior Survey Participation	Number of Transfer	Number of Semesters	Number of Credits Earned
Fall 2020 & J-Term 202	10	6	4	0	0 %	-	-	-
Spring 2021	13	11	2	2	15 %	-	6 - 8	Over 75
Grand Total	23	17	8	2	8.5 %	-	-	-

Conclusions	
Have you had an opportunity to discuss these results within your department? If	The results reported here have been compiled after spending a lot of time and effort on the part of Dr. Singh in reminding the CIS faculty periodically throughout the fall 2020 and spring 2021 semesters and providing them with a tailor-made rubric for recording the assessment data. In case any instructor needed this rubric, Dr. Singh emailed it to that instructor. All instructors teaching fall 2020 and spring 2021 semester courses did send their assessment data in a timely manner except one instructor who sent the data late, and of course with several additional/

so, what form did this take?	repeated emails. As done before in the annual Assessment Report for the AY 2019-2020, I have set a lower limit on to the percentile performance of a given SLO/Goal to 70%. If any course offered in fall 2020/spring 2021 semester has percentile performance less than 70%, it is mandatory to reexamine that course's SLO/Goal in future assessment analysis, which will help us to close the loop. If we implement this percentile performance criteria to all the courses offered in fall 2020 and spring 2021 semesters, we find that six courses, CSIT221, CSIT231, CSIT311, CSIT321 CSIT341 and CSIT425 require the special attention to improve their percentile performance. Therefore, we list here six courses along with their SLOs/Goals to be reexamined in the future data collection and analysis work: CSIT221 (I1), CSIT311 (I2), CSIT321 (I3), CSIT231 (I4), CSIT341 (A1, A4, A5, B2, J1, J2, J3, J4) and CSIT425 (C1, C2, C3 & C4). I would request the Department Chair to include an agenda item in the first faculty meeting to be held during beginning of Fall 2021 semester so-as-to take proper steps to enhance the quality of collected data especially for CSIT221, CSIT231, CSIT311, CSIT321, CSIT341 and CSIT425 courses to be taught by their respective instructors (excluding the data of one instructor who taught CSIT221 course in fall 2020 and spring 2021 semesters - since for his course the results were satisfactory) in the coming fall 2021 and spring 2022 semesters. Special emphasis is to be given to SLOs/Goals as listed in parentheses of above mentioned six courses.
What conclusions were drawn about student learning as a result of their assessment efforts?	The current assessment report represents a systematic study of compiled results of assessment data collected for eleven Goals or SLOs: A, B, C, D, E, F, G, H, I, J and K during fall 2020 and spring 2021 semesters. As reported in my former assessment reports that Eq. (1, 2 & 3) listed on page # 6-7 have been rewritten elegantly in mathematical form by Dr. Singh. Additionally, for the past several years, Dr. Singh had been collecting the assessment raw data from all the instructors teaching relevant courses in fall 2020 and spring 2021 semesters. The raw data processing and its analysis work are accomplished using the latest version of MS Excel 2019 software and the conclusions of the analysis work are presented in this assessment report. All Instructors have cooperated and provided the assessment data in a timely in fall 2020 as well as spring 2021 semesters. We believe that the assessment of eleven SLOs/Goals in two semesters is itself a great achievement. Additionally, Dr. Singh being a full-time continent faculty in the CIS department has an exceptionally tremendous amount of teaching/service load.

The results of assessment data analysis are presented in tabular/graphical forms in the assessment report at the appropriate places. If we combine the percentile performance of two categories: Meets and Exceeds Standard, our results are satisfactory for almost all the eleven Goals/SLOs investigated in the current study except for the following six courses : CSIT221 (I1), CSIT311 (I2), CSIT321 (I3), CSIT231 (I4), CSIT341 (A1, A4, A5, B2, J1, J2, J3, J4), CSIT425 (C1, C2, C3, C4 & C5) and F1, F2, F3 and F4 for CSIT425, CSIT431, CSIT41, CSIT455, where all SLOs/Goals A1, A4, A5, B2, C1, C2, C3, C4, C5, F1, F2, F3, F4, I1, I2, I3, I4, J2, J3 and J4 fall below 70%, but particularly for Goal B2 & I2 of CSIT311, I4 for CSIT231 and all Js of CSIT341 courses, percentile performance is less than 50%. This conclusion can be obtained for A1 and A5 for CSIT341 for which the percentile performance is less than 50%. Similarly, Goals A4 for CSIT311, C1-C4 and C5 for CSIT425 are 64%, 56% and 64%, respectively. In addition to it, all Fs for CSIT425, CSIT431, CSIT4441, CSIT455 also fall below 70%. For the SLOs of courses for which we obtain percentile performance that lies in the range of 70-100%, we do not need any further improvement in the future data collection. However, there are plenty of courses where we require considerable improvement in the future data collection, e.g., A1, A5 and B2 for CSIT341, C1-C4 for CSIT425, A4 & I2 for CSIT311 course and Goal J4 for CSIT341 course. Therefore, more data collection is needed to improve our results in the future data collection of course offerings in fall 2021 and maybe in spring 2022 semester. Therefore, we conclude that for most of the courses more data collection is clearly required to improve upon the percentile performance of several SLOs as listed above, which is a necessary step to close the loop. This important issue could be included and discussed in the first faculty meeting to be held in the coming fall 2021 semester.

Now, we list some of the comments made by instructors about their low percentile performance of SLOs pertaining to two courses - CSIT311 and CSIT425. As reported by one instructor about his CSIT311 course that he taught in fall 2020 and he commented that *"The poor performance* |

in A4 in CSIT311 offered in fall 2020 is mainly due to the changed classroom operation. The zoom meeting lecture proved difficult to adapt for many students and the lectures were not recorded.” Similarly, he has made comments about SLO I2 of his course CSIT311 that was offered in fall 2020: *“The poor performance of the students in I2 can be attributed to the problem that the faculty office computer was locked down and unable to build and run Assembly programs. Therefore, the introduction to Assembly in class was mostly discussing the instructions without any demo of Assembly in action.”*

As commented by another instructor about her low percentile performance of SLOs, C1, C2, C3,C4 & C5 and F1, F2, F3 & F4 for CSIT425 course offered in fall 2020 and spring 2021, *which can be attributed to the fact that two groups in fall 2020 and one group in spring 2021 did not accomplish the final project work at all.* This may be attributed to the reason that the delivery of instruction through Zoom in COVID-19 pandemic semesters did not let the students explore their full potential to complete their final project work. We hope this situation will improve in the coming fall 2021 and spring 2022 semesters.

At the end of this assessment report, the results of the senior exit survey are presented. When asked to rate their level of satisfaction with the CIS Department on a scale of 0 to 5, only two graduating senior students responded to the Senior Exit Survey and gave a score of 4/5. Two students rated it 3/5 points and the remaining four students rated the department in a scale of 1 - 2. The overall average of the department rating is 3.5/5.0, which is not so bad considering the current situation that most of the CIS faculty is contingent. Therefore, to enhance department rating, Fredonia University must allocate more resources to the CIS department. Unfortunately, the seniors who participated in this exit survey only one student took independent study/senior project course. Senior students who participated in the senior exit survey, only one senior student listed the following very useful upper-level courses offered in the CIS Department: CSIT455, CSIT425, CSIT463, CSIT324, STAT350, CSIT308 and CSIT321. However, among these listed courses, one course, STAT350, is not taught in the CIS Department.

When we talk about the accessibility of faculty offices and classrooms in the CIS department, the average rating in fall 2020 and spring 2021 semesters is 4/5, which appears to be good. But when asked about the access to workspace and equipment for their course work in the CIS department, graduating seniors gave the average rating of 4/5 in both fall 2020 and spring 2021 semesters, which is once again is really good When asked to list the activities or courses that helped the students most to understand the need to remain current in their discipline, the answer is: Introduction to Digital Image Processing and Computer Vision (CSIT463), Relational and Object Databases (CSIT455), Software Engineering (CSIT425), Intro to Operating Systems (CSIT431), and Paradigms of Programming Languages (CSIT321). When asked to list the technology-related skills, if any, seniors have learned outside classes at Fredonia, answer is Python, JavaScript, Blender, some basic computer networks info, analytics, WordPress/web development, some broadcast engineering, hardware management, and CRM management.

Here are some plus points, cited only by only one senior student in a sample of two students who participated in the senior exit survey, about the CIS Department and its faculty:

1. Instructor 1 and instructor 2 were terrific professors.
2. Instructor 3 was also great and seemed very invested in students.

Here are some adverse remarks made by one senior student about the CIS Department:

	1. I never felt like there was a CS/CIS department for me to be a part of. Don't know the students outside of classes, don't interact with the faculty outside of classes. I did join CS Club, which I think could use more support from the department to keep students invested in the field outside of their class assignments, but its format (presentations about various tech topics) wasn't inherently interactive and still made it difficult to feel connected with anyone in the major. Also, too many of the classes are lecture-based when I think project-based would be more engaging and educational. I also would have loved it if, in Computer Science I, the class took a day to teach students how to set up Visual Studio on their own computers (if they had one/wanted to). I struggled in any programming tasks for classes because it took me a long time to set up a programming environment on my computer, and I didn't want to rely on school computers.

Appendix-I

SUNY FREDONIA

State University of New York at Fredonia
Department of Computer and Information Sciences
2154 Fenton Hall (716) 673-4820

RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME H

Recognition of the need for and an ability to engage in continuing professional development

GRADUATING SENIORS EXIT SURVEY

Please check the appropriate entry, or choose the most suitable option, or fill the blanks for each of the question given below where possible.

Date: _____

1. You earned your B.S. degree in
    - Computer Science _____Advanced Computing Track /_____Software Development Track/ _____General Track
    - Computer Information Systems _____ Systems Development/ _____ System Management
    - Another major, but I got a minor in _____ Computer Science/ _____ Computer Information Systems

2. a. Year started at SUNY Fredonia_____ Year graduated_____
   b. Did you change your major? Yes _____ No_____
        If Yes:
                c. What was your previous major?_____
   d. Did you transfer from another college to SUNY Fredonia? Yes _____ No_____
        If Yes:
                e. How many credit hours did you transfer?
                Less than 30_____ Between 30 and 60_____ Between 60 and 75_____ Over 75_____
                f. How many semesters overall you spent at college (at SUNY Fredonia and the college your transferred from)? _____
3. On a scale of 6 to 1 (with 6 being Excellent and 1 being very poor): How satisfied are you with your education at the Department of Computer and Information Sciences in SUNY Fredonia?

4. Did you participate in any independent study or group project?
- Yes
- b. No

5. Did take any of the courses (circle what is appropriate):
-
- CSIT 499 Project,
- CSIT 497 Thesis,
- HONR 400 Thesis,
- CSIT 400 Independent Study,
- CSIT 300 Internship.

6. Did you attend any conferences, workshops, seminars to broaden knowledge and skills?
- Yes
- b. No

7. Do you already have a job offer?
- Yes
- b. No

If yes, is it related to your major?
- Yes
- b. No

8. Do you plan to attend graduate school?
- Yes, already accepted into graduate school; Field: _____
- Yes, applying now; Field: _____
- Yes, in the future
- No

9. List five courses you liked the most at Fredonia

a. _____

b. _____

c. _____

d. _____

e. _____

10. If you have a job offer, list four courses that were most beneficial to you in securing the job.

a. _____

b. _____

c. _____

d. _____

11. If you had the option to take more elective choices in the discipline, what topic areas would you have liked to have taken at SUNY Fredonia?

- _____

- _____

- _____

- _____

12. How accessible do you feel faculty offices and classrooms were?
(inaccessible)   1   2   3   4   5   (very accessible)

13. Do you think the access you had to workspace and equipment were sufficient for your coursework
(disagree)   1   2   3   4   5   (agree)

14. What activities or courses helped you most to understand the need to maintain currency in the discipline
_____
_____
_____

15. List what technology-related skills, if any, you have learned outside classes at SUNY Fredonia
_____
_____
_____

16. Do you have a positive remark/comment(s) to share?
_____
_____
_____

17. Do you have a negative remark/comment(s) to share?
_____
_____
_____