

Annual Departmental Report

Amended for 2020-2021 Academic Year to Accommodate and Reflect Adjustments due to Pandemic

*There are amended instructions throughout this document to reflect the special circumstances of this academic year (AY20-21) that you will find **red**. As an institution and as departments we have learned that we can use our creativity to deliver learning even in the most difficult of circumstances.*

Program Information

Program/Department: *Computer Science/Computer Information Systems*
Department Chair: Nadimpalli Mahadev
Department Assessment Committee Contact: Brady Chen

This document is to be kept in the department and an electronic file is due to the AVP of Institutional Research & Planning by June 1, 2021.

A. Departmental Special Section for AY2021

Department Lessons Learned and Accomplishments

In thinking through the academic year, report on how the department adapted to changes brought on by the pandemic. Reflect on actions that surprised you, on lessons learned that will help in the future, and major accomplishments.

Both students and faculty needed to adapt to remote teaching, mainly using synchronous course delivery (ONSYNC) rather than the standard asynchronous delivery (ONLINE). We also used ONSYNC for conducting departmental meetings as well as meetings with the administrative assistant. The meetings were quite productive.

We were unable to hold our usual high school programming contest as it needs onsite facilities and support. We also did not have our yearly "Program Advisory Committee" meeting as we felt that meeting remotely would not be conducive to discussions.

We make the following observations regarding the remote teaching.

1. Many students had serious technical issues such as inadequate personal computer performance/resources, poor internet connections, unavailable cameras/microphones, serious difficulty connecting to the software labs. All of this resulting in

organizational and motivational problems for students ... particularly among the freshmen. As a result, there was a historically high number of dropouts, failures, and suspensions. The number of suspensions that resulted at the end of the Fall, 2020 semester was truly tragic.

2. In addition to technical issues, many students reported difficulty maintaining mental health. Issues with depression and anxiety were reported in many classes.
3. Conducting hardware labs remotely was a challenge. Students began with enthusiasm that quickly waned after the first few weeks. Several different methods for delivering content and providing feedback were tried but the rigor of these courses is demanding even during normal times. Many 2nd year students were lost moving into the Spring semester.
4. One-on-one help provided in software labs became a time-consuming process.
5. Teaching remotely was an all-consuming process for some faculty. Leaving them with little or no down time ... always trying new things to improve remote engagement.
6. Nevertheless, some mature students with access to sufficient technical resources (particularly those in the higher-level courses) embraced the ONSYNC classes and performed very well.

For the most part, the academic year went smoothly in that we had no gaps in content delivery and our 3rd and 4th year students were able to progress toward graduation. However, we strongly believe that returning to the in-class, face-to-face, mode of teaching that students attending FSU expect, is the best way to help our students succeed.

We also believe that it's important to reach out to students that have legitimate reasons for not being able to attend campus classes, by either letting them attend classes remotely or by providing recorded lectures for later viewing. These recordings may only include the instructor and the students that are participating remotely. However, students should be required to qualify for remote learning using an application to disability services which will verify and approve a student's need for such an arrangement.

B. Program Learning Outcomes (PLOs) (Educational Objectives)

I. List of PLOs and the timeline for assessment.

PLO #	PLO – Stated in assessable terms	Where are the learning outcomes for this level/program published? (please specify) Include URLs where appropriate	Timing of assessment (annual, semester, bi-annual, etc.)	When was the last assessment of the PLO completed?
1.	Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.	The learning outcomes are published in the computer science department website: https://www.fitchburgstate.edu/academics/programs/computer-information-systems-bs	Annual	Not assessed yet due to the COVID-19
2.	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.		Annual	Not assessed yet due to the COVID-19
3.	Communicate effectively in a variety of professional contexts.		Annual	Not assessed yet due to the COVID-19
4.	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.		Annual	Not assessed yet due to the COVID-19
5.	Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.		Annual	Not assessed yet due to the COVID-19
6.	Support the delivery, use, and management of information systems within an information systems environment.		Annual	May 2020. We performed sample

				assessment for PLO #6.
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II. **PLO Assessment** (Please report on the PLOs assessed and/or reviewed this year. Programs should be assessing at least one each year.)

Using the table below, list and briefly describe the **direct method(s)** used to collect information assessing whether students are learning the core sets of knowledge (K), skills (S) and attitudes (A) identified as essential.

PLO # (from above)	Assessment description (exam, observation, national standardized exam, oral presentation with rubric, etc.)	When assessment was administered in student program (internship, 4 th year, 1 st year, etc.)	To which students were assessments administered (all, only a sample, etc.)	What is the target set for the PLO? (criteria for success)	Reflection on the results: How was the “loop closed”?
1	<p>The capstone courses CSC3710 and CSC4700 are used to assess the PLO # 1. The following instruments are used to assess four performance indicators (a) – (d):</p> <ul style="list-style-type: none"> • Semester Project Milestones 1, 2, 3, 4, and 8. • Assignments 1, 2, 3, and 5 in CSC3710. • Assignments 4 and 5 in CSC4700. <p>See the table in Appendix A for the assessment results.</p>	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below. We assess the students’ outcomes based on their performance on each PI	<p>After analyzing the collected assessment data for PLO #1, we found out that the target percentiles are met for all PIs for PLO #1.</p> <p>We believe that one reason for this is that the class size is small (with only 9 students).</p> <p>Action: We decide to continue monitoring the outcome to ensure consistency in</p>

					quality in the following year.
2	<p>CSC3710 and CSC4700 are used to assess the PLO # 2. The following instruments are used to assess four performance indicators (a) – (d):</p> <ul style="list-style-type: none"> • Semester Project Milestones 1, 5, 6, and 8. • Assignments 1 and 2 in CSC3710. • Assignments 5 and 6 in CSC4700. <p>See the table in Appendix A for the assessment results.</p>	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below.	Same as PLO #1. Action: We decide to continue monitoring the outcome to ensure consistency in quality in the following year.
3	<p>CSC3710 and CSC4700 are used to assess the PLO # 3. The following instruments are used to assess four performance indicators (a) – (d):</p> <ul style="list-style-type: none"> • All Semester Project Milestones. • Assignments 5 and 6 in CSC4700. 	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below.	Same as PLO #1. Action: We decide to continue monitoring the outcome to ensure consistency in quality in the following year.

	See the table in Appendix A for the assessment results.				
4	<p>CSC 4102 Ethical Issues in Computer Science is used to assess the PLO # 4. The following instruments are used to assess three performance indicators (a) – (c):</p> <ul style="list-style-type: none"> • Assignments of Chapters 2, 3, 4, 5, 6, and 9. <p>See the table in Appendix A for the assessment results.</p>	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below.	Same as PLO #1. Action: We decide to continue monitoring the outcome to ensure consistency in quality in the following year.
5	<p>CSC3710 and CSC4700 are used to assess the PLO # 5. The following instruments are used to assess three performance indicators (a) – (c):</p> <ul style="list-style-type: none"> • All Semester Project Milestones. • Assignment 2 in CSC4700. <p>See the table in Appendix A for the assessment results.</p>	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below.	Same as PLO #1. Action: We decide to continue monitoring the outcome to ensure consistency in quality in the following year.

6	The capstone courses CSC3710 and CSC4700 is used to assess the PLO # 6. The following instruments are used to assess three performance indicators (a) – (c): <ul style="list-style-type: none"> All Semester Project Milestones. See the table in Appendix A for the assessment results.	4 th year	All Due to small class sizes all the students are assessed.	See the sixth column “Target %tile scoring better than 70% proficient” in Table below.	Same as PLO #1. Action: We decide to continue monitoring the outcome to ensure consistency in quality in the following year.

If applicable, use the space below to report on PLO assessment impacted by the move to remote learning.

All classes were converted to some form of remote format. Most courses were taught using an online synchronous model. Many instructors selected online books, materials, and other resources. Academic advising was easily accomplished remotely when students were motivated to make and keep appointments.

Implementing changes to courses for remote learning was difficult and, in many cases, not a satisfactory substitute for face-to-face learning. A significant number of students struggled with internet connectivity and motivation due to being physically isolated from instructors and peers. In many cases the assessment tools for online learning are not on par with exams administered face-to-face.

Summary of Findings: Briefly summarize the results of the PLO assessments reported in Section II above combined with other relevant evidence gathered and show how these are being reviewed/discussed. How are you “closing the loop”?
Please reflect on changes that the department has had to engage in given changes to teaching modality and especially capstone experiences.

Reflection Prompt	Narrative Response
<p>Other than GPA, what data/evidence is used to determine that graduates have achieved the stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)</p>	<p>The performance indicators for each PLO are used to determine that graduates have achieved the stated outcomes and thus the PLO.</p>
<p>Who interprets the evidence? What is the process? (e.g. annually by the curriculum committee)</p>	<p>The department met to assign to each PLO, a faculty in-charge who will contact the instructors conducting the assessments and collect all the required data and documents. The instructor of a course which is used to assess the PIs presents and interprets the evidence in the department curriculum meetings and the department curriculum committee discusses and makes recommendations on what changes/actions the instructor needs to be taken.</p>
<p>What changes have been made as a result of using the data/evidence? (close the loop)</p>	<p>Even though all the student outcomes are met from the assessment data, we still don't have conclusions on the strengths and weaknesses in our practices. We believe that this is due to the following reasons:</p> <ul style="list-style-type: none"> • The student sample is too small. We only have 9 students who are divided into two project teams in the on-going case. <p>Because, we decide to continue monitoring the outcomes to ensure consistency in quality in the following year.</p>

C. Assessment Plan for Program/Department

- I. Insert the program or department Assessment Plan
We will provide a complete program assessment every year based on 21 performance indicators. Three courses CSC3710, CSC4700 and CSC4100 Ethics and Impacts of Computing Solutions will be used for assessment purposes. The next assessment cycle will start from fall 2021 to spring 2022. See Appendix B for the details of the next assessment cycle.
- II. Explain any changes in the assessment plan including new or revised PLOs, new assessments that the program/department plans to implement and new targets or goals set for student success.
The new assessment plan was revised and then approved by our accreditor ABET.
- III. If you do not have a plan, would you like help in developing one?
 Yes

D. Program Review Action Plan or External Accreditation Action Letter/Report

Annual Reflection/Follow-up on Action Plan from last Program Review or external accreditation (only complete the table that is appropriate for your program)

I. Programs that fall under Program Review:

- i. Date of most recent Review:
In Spring 2020, only PLO #6 was assessed for the newly implemented assessment plan.
- ii. Insert the Action Plan table from your last Program Review and give any progress towards completing the tasks or achieving targets set forth in the plan.

Specific area where improvement is needed	Evidence to support the recommended change	Person(s) responsible for implementing the change	Timeline for implementation	Resources needed	Assessment Plan	Progress Made this Year

- iii. If you do not have an action plan, would you like help in developing one based on your last program review and needs of the program?

Yes

II. Programs with external Accreditation:

- i. Professional, specialized, State, or programmatic accreditations currently held by the program/department.
ABET
- ii. Date of most recent accreditation action by each listed agency.
A team of ABET Computing Accreditation Commission visited our campus on September 22-24, 2019
- iii. Date and nature of next review and type of review.

ABET accredited the program till September 30, 2022 with an interim report on one weakness that is due by July 1, 2021.

- We only submitted the assessment data on one student outcome as the assessment process needed to be revamped. The next interim report must complete assessing all the 6 outcomes.

List key issues for continuing accreditation identified in accreditation action letter or report.	Key performance indicators as required by agency or selected by program (licensure, board or bar pass rates; employment rates, etc.)(If required.)	Update on fulfilling the action letter/report or on meeting the key performance indicators.
Continuous Improvement	Student data from selected CS courses upon which assessment is based Minutes of the assessment committee showing the evaluations outcome Evidence that the results of these evaluations of the assessments are systematically utilized as input for the continuous improvement of the program	The report is created for submission and will be submitted by June 10, 2021.

E. Departmental Strategic Initiatives

<p>Accomplished Initiatives AY 20-21 <small>Add more rows as needed</small></p>	<p>Corresponding Strategic Plan Goal & Strategy <small>Goal # followed by Strategy # ex: 1.3</small></p>	<p>Indicate if a Diversity, Equity and Inclusiveness (DEI) Goal</p>
<p>Adapt to the new LA&S curriculum.</p>	<p>Curriculum was updated to include new “General Education” requirements. Program descriptions were updated for the catalog. New 4-year plans were developed. Developed and added new 3-credit Ethics Course CSC 4102 with ER designation. New capstone designation (IHIP) for CSC 4400. Developed FYE 1021 CS Freshman Seminar and supported QR and PLT designations for MATH 1800 and 1900. Changes were approved by AUC.</p>	<p style="text-align: center;"><input type="checkbox"/></p>
<p>Review our course descriptions and prerequisites and update as needed.</p>	<p>Course descriptions were reviewed and updated.</p>	<p style="text-align: center;"><input type="checkbox"/></p>
<p>Revamp our ABET assessment plan based on feedback from site visitors.</p>	<p>Our assessment plan that was developed as recommended by ABET site visitors in AY2013-14 was criticized as being too complex by site visitors in AY2019-20. A new assessment plan was developed In Spring, 2020 and was received with approval from ABET. We</p>	<p style="text-align: center;"><input type="checkbox"/></p>

	continued with this plan in the current year.	
		<input type="checkbox"/>

Planned Initiatives for AY 2021-22 <small>Add more rows as needed</small>	Associated Strategic Plan Goal & Strategy <small>Goal # followed by Strategy # ex: 1.3</small>	Indicate if a Diversity, Equity and Inclusiveness (DEI) Goal
Further streamline the curricula and introduce tracks and new concentrations.	Goal is to provide students more options which in turn can help with enrollments and retention.	<input type="checkbox"/>
Upgrade the hardware labs	Goal is to increase the capacity of the labs.	<input type="checkbox"/>
		<input type="checkbox"/>
		<input type="checkbox"/>

F. Departmental Reflection:

Take this section to reflect on--

- 1) *Initiatives that you may be considering for 22-23 academic year that you did not already capture above.*

- 2) *Reflect on how the department adapted to the pandemic. Reflect on actions that surprised you and on lessons learned that will help in the future.*

APPENDIX: ASSESSMENT DATA

FITCHBURG STATE UNIVERSITY COMPUTER INFORMATION SYSTEMS ASSESSMENT REPORT

As part of the continuous improvement process, we decided to match the assessment cycle with academic year. While the data is collected as needed in each of FA/SP semesters, the department will meet at the end of each Spring semester to review the data against performance targets and identify where action is needed and discuss appropriate action to be implemented for the next assessment cycle.

A table is created to summarize the outcome assessment of each SO followed by an analysis regarding any steps needed for continuous improvement with respect to that outcome. You find in those tables that we set the performance target of at least 70% of the class meeting the proficiency requirements as stated in the rubrics.

Minutes of these discussions will be included with the report each assessment cycle. The minutes for the FA20-SP21 cycle are included here.

Please note: All the performance data and the descriptions of the instruments used, are included in the Appendix A of this report. Appendix B includes the department minutes from the assessment discussions. Appendix C includes the ABET's Post-30-Day Due-Process Response. Appendix D includes parts of the report we submitted prior to that ABET response.

Glossary

Proficiency Score:

Represents the minimum score in each instrument that qualifies at meeting the Proficiency level or better (as defined in the Rubric).

Number Proficient:

Actual number of students that meet or exceed the proficiency score.

% Proficient:

Percentage of the students that meet or exceed the proficiency score.

CISSO-1 Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

Faculty-in-Charge: Ricky Sethi

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Understand the application domain.	SP 21	CSC 3710 Systems Analysis & Design	Milestone 1 Assignment 1	Brady Chen	70% proficient	89	No
b) Understand the inputs, outputs and other requirements for the problem.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	Milestone 3 Assignment 3 Assignment 4 Milestone 7	Brady Chen	70% proficient	94.5	No
c) Compare and contrast multiple approaches to solving the problem.	SP 21	CSC 3710 Systems Analysis & Design	Milestone 2 Assignment 2	Brady Chen	70% proficient	94.5	No
d) Understand relevant computing principles.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	Milestone 4 Assignment 5 Milestone 8 Assignment 5	Brady Chen	70% proficient	97.2	No

CISSO-1 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in analyzing complex computational problems as well as applying relevant computational principles to other disciplines.

CISSO-2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.

Faculty-in-Charge: Frits Lander

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Identify design principles appropriate to the problem.	SP 21	CSC 3710 Systems Analysis & Design	Milestone 1 Assignment 1 Assignment 2	Brady Chen	70% proficient	89	No
b) Plan and document computing-based solution development.	SP 21	CSC 4700 Systems Design & Implementation	Milestone 5 Milestone 6 Assignment 5	Brady Chen	70% proficient	96.3	No
c) Design and implement test cases for solution evaluation.	SP 21	CSC 4700 Systems Design & Implementation	Milestone 8	Brady Chen	70% proficient	100	No
d) Implement a computing-based solution.	SP 21	CSC 4700 Systems Design & Implementation	Milestone 8 Assignment 6	Brady Chen	70% proficient	100	No

CISSO-2 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in designing, implementing, and evaluating a computing-based solution to meet a given set of computing requirements.

CISSO-3 Communicate effectively in a variety of professional contexts.

Faculty-in-Charge: N Mahadev

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Understand and translate stakeholder requirements into computing specifications.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	Milestone 3 Milestone 8 Assignment 5	Brady Chen	70% proficient	100	No
b) Present solution prototypes to the customer.	SP 21	CSC 4700 Systems Design & Implementation	Milestone 8 Assignment 6	Brady Chen	70% proficient	100	No
c) Communicate the solution design to the project managers.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	All milestones All milestones	Brady Chen	70% proficient	97.25	No
d) Participate in group discussions with team members.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	All milestones All milestones	Brady Chen	70% proficient	97.25	No

CISSO-3 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in communicating effectively in a variety of professional contexts.

CISSO-4 Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

Faculty-in-Charge: Natasha Kurtonina

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Understand legal and ethical responsibilities.	SP 21	CSC 4102 Ethical Issues in Computer Science	Chapter 2, 4, 5	Lori Leonard	70% proficient	AVG 71.4	No
b) Understand social impacts of potential solutions.	SP 21	CSC 4102 Ethical Issues in Computer Science	Chapters 3, 6, 7, 8, 10	Lori Leonard	70% proficient	AVG 78.8	No
c) Make informed ethical decisions.	SP 21	CSC 4102 Ethical Issues in Computer Science	Chapter 9	Lori Leonard	70% proficient	85.7	No

CISSO-4 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in recognizing professional responsibilities and making informed judgments in computing practices based on legal and ethical principles. We also observed that the proficiency level has improved over the semester as they are exposed to more viewpoints through discussions.

CISSO-5 Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.

Faculty-in-Charge: Robin C

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Cooperate and contribute fully within the team.	SP 21	CSC 3710 Systems Analysis & Design	All milestones	Brady Chen	70% proficient	97.5	No
		CSC 4700 Systems Design & Implementation	All milestones				
b) Communicate effectively with the team.	SP 21	CSC 3710 Systems Analysis & Design	All milestones	Brady Chen	70% proficient	97.5	No
		CSC 4700 Systems Design & Implementation	All milestones				
c) Demonstrate time and project management skills.	SP 21	CSC 3710 Systems Analysis & Design	All milestones	Brady Chen	70% proficient	96.3	No
		CSC 4700 Systems Design & Implementation	All milestones Assignment 2				

CISSO-5 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in functioning effectively as a member or leader of a team engaged in relevant activities.

CISSO-6 Support the delivery, use, and management of information systems within an information systems environment.

Faculty-in-Charge: Kevin Austin

Performance Indicator	Semester	Course	Instrument(s)	Instructor	Target %	Actual %	Action Needed?
a) Cooperate and contribute fully in the planning and analysis phases of the systems development life cycle (SDLC) in a project within an IS environment.	SP 21	CSC 3710 Systems Analysis & Design	Milestones 1-4	Brady Chen	70% proficient	97.25	No
b) Cooperate and contribute fully in the design phase of the SDLC in a project within an IS environment.	SP 21	CSC 3710 Systems Analysis & Design CSC 4700 Systems Design & Implementation	Milestone 4 Milestones 5-8	Brady Chen	70% proficient	95.6	No
c) Cooperate and contribute fully in the implementation phase of the SDLC in a project within an IS environment.	SP 21	CSC 4700 Systems Design & Implementation	Milestone 8	Brady Chen	70% proficient	100	No

CISSO-6 Analysis

A review of the performance indicators suggests that Fitchburg State University Computer Information Systems graduates are proficient in delivering, using, and managing information systems within an IS environment.

Data from FA20 CSC 3710 Systems Analysis & Design.

Performance Data

Name	Assignment 1	Milestone 1	Assignment 2	Milestone 2	Test 1	Assignment 3	Assignment 4	Milestone 3	Test 2	Assignment 5	Assignment 6	Final Milestone
<i>Student 1</i>	16	80	17.5	90	74	19	14	85	80.5	17	18.5	76
<i>Student 2</i>	15.5	74	19	86	90	18	18.5	85	92	20	20	72
<i>Student 3</i>	0	72	19	86	88	20	19	76	89	18.5	19.5	70
<i>Student 4</i>	19	74	20	90	100	20	0	85	96	20	20	71
<i>Student 5</i>	19.5	80	19	90	88	19	18	85	76.5	18.5	19	72
<i>Student 6</i>	16.5	98	19	92	91	19	20	96	98.5	19.5	19	83
<i>Student 7</i>	18.5	96	19	92	89	20	20	94	88	20	20	83
<i>Student 8</i>	16	92	16	88	94.5	16	16	92	0	20	19	80
<i>Student 9</i>	0	96	0	88	96	0	0	90	95	19	20	83
Proficiency Score	16	80	16	80	80	16	16	80	80	16	16	80
Number Proficiency	7	9	8	9	9	8	6	9	8	9	9	8
% Proficient	78%	100%	89%	100%	100%	89%	67%	100%	89%	100%	100%	89%

Instruments Described

- **An ongoing project “Kaitaia Publishing Collective”:**

This ongoing project is used to simulate a real-world system besides the classroom lecturing. The project was divided into several assignments called milestones based on the various phases in the SDLC. Students are divided into groups to work on the project. Each group presented their solutions to the milestone. We use the following grading policy for each milestone:

Submitted documents and presentation for each assignment	70%
Peer evaluation	10%
Group evaluation	10%
My adjustment	10%

In fall 2020, we have a total of 9 students divided into two groups.

- **Milestone 1:**

You are creating a systems design; thus the work on each assignment will be part of that process, and will bring you closer to a finished design. Roughly speaking, you will be going through the steps as learned in each chapter.

In this milestone your team must do and submit the following:

1. (10 points) Study the information in the CASE details and the interview notes below and provide the summary of their business and system. Decide what problem is being solved, and answer the question “Is this project worth looking at?” To answer this question you need to determine the scope and purpose of the project, and the perceived problems, opportunities, and directives that triggered the project.
2. (15%) Create a system request. Put yourself in Maria Burdett’s shoes – which problems do you believe are the most urgent, have the highest visibility, and how should they be ranked? Try to determine the annual benefits. State the assumptions and be prepared to justify your answers.
3. (15 points) Perform the feasibility analysis and prepare your feasibility analysis report. Discuss the three aspects of feasibility.
4. (25 points) Provide a first attempt at a cost estimate. Create the cost-benefit analysis sheet and include the calculations of the ROI and break-even point.
5. (5 points) Give your recommendation as to whether to go forward with this project or not with your reasons.

Each group should organize and submit the work specified in 1-5 above. You will also be presenting a summary of this work to the top management of the company. They want to know if you understand what the company is all about, what they plan to do and what each group plans to do to support them. Each group will have around 30 minutes to make your presentation. The “top brass” have asked for a half hour and failing to provide what they have requested could result in the project being shot down right then.

○ **Milestone 2:**

In this milestone your team must do and submit the following:

1. (10 points) Try to modify the cost-benefit analysis sheet. Note that this is ongoing process.
2. (20 points) Try to identify the project size. You may use either the Planning Phase Approach or Function Point Approach to get the estimated size of the project.
3. (15 points) Try to determine the number of staff needed for the project based on the estimate of project size.
4. (10 points) Perform some Risk assessment.
5. (15 points) Create a workplan using Microsoft Project. Please note that the workplan will be modified throughout this project.

You need to create a written document for your second assignment. Also you should create a presentation document. You will have around 30 minutes to make your presentation. Please be aware that the presentations are a very important part of this course because it's very important in business.

○ **Milestone 3:**

For this milestone your group has a two-part assignment of tasks: Fact finding and systems requirements. Here are the tasks you should perform:

1. (20 points) Assume your team is responsible for performing the requirement gathering and would need to conduct some interviews. Determine three individuals or groups that you would most want to obtain information from. Prepare for those interviews by creating a one-page list of questions you would want answers to for each of the three interviewees. Please list all three types of interview questions: closed-ended, open-ended, and possible probing questions (I know it's hard as you don't have answers to the other questions).
2. (20 points, in which 10 points for the functional requirements and 10 points for the nonfunctional requirements) Provide a complete and detailed requirement definition for this project. This includes the functional and nonfunctional requirements. You could use the same format as Figure 3-13 on page 118 of the textbook. Initially, the list may not be very accurate before you perform your requirements-gathering techniques.

3. (20 points) Perform the use case analysis and identify and build the major use cases for the system. For each use case, you should include three main parts: basic information, inputs and outputs, and details. You could use the same formation as the one in figure 4-1 on page 128 of the textbook.
4. (10 points) Continue to update the work plan

You need to create a written document and presentation materials for this assignment. You will have around 30 minutes to make your presentation on the due date. Please be aware that the presentations are a very important part of this course because it's very important in business.

- **Milestone 4 (Final Milestone):**

We have completed the planning phase which includes the feasibility analysis and requirements gathering. Please note that this is an ongoing process, which means that you can continuously revise the contents of your previous assignment works. Again for this assignment your group should perform the following tasks:

5. (20 points) We have performed the use case analysis and identified and built the major use cases for the system in the last assignment. Make any necessary updates on the use cases before we start the DFDs.
6. (40 points) Create and modify DFDs for the system including context diagram, level 0 diagram, and lower level diagrams whenever necessary. Please follow the rules in chapter 5 of the textbook to make sure your DFDs are correct and balanced. You should use Microsoft Visio to draw your diagrams.
7. (10 points) Please continue to update your Project to reflect any project progress.

You need to create a written document for your 4th assignment. Also you should create a presentation document. You will have around 30 minutes to make your presentation and again the potential audience will be your peers and the entire project team. I don't expect that the use cases would be perfect. You will continue to slash your use cases before you start the process and data modeling in the next semester.

- **Assignments:**

- **Assignment 1:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the basic systems development life cycle and its phases.

- how organizations identify IS development projects.
- How to perform feasibility analysis
- How to create a cost-benefit analysis sheet.

○ **Assignment 2:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- how projects are selected in some organizations.
- approaches to the SDLC that can be used to structure a development project.
- how to select a project methodology based on project characteristics.
- project estimation.
- Creation of a project work plan.
- project staffing issues and concerns.
- techniques to coordinate and manage the project.
- how to manage risk on the project.

○ **Assignment 3:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the analysis phase of the SDLC.
- the content and purpose of the requirements definition statement.
- Classifications of business, user, functional, or nonfunctional requirements.
- the requirement elicitation techniques of interviews, JAD sessions, questionnaires, document analysis, and observation.
- the role that each requirement elicitation technique plays in determining requirements.
- analysis strategies that can help the analyst discover requirements.

○ **Assignment 4:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the purpose of use cases in the analysis phase of the SDLC.
- the various parts of a use case and the purpose of each part.
- how use cases contribute to the functional requirements.
- how use cases inform the development of test plans.
- the process used to create a use case.

○ **Assignment 5:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the rules and style guidelines for data flow diagrams.
- the process used to create data flow diagrams.
- the process used to create data flow diagrams.
- Creation of data flow diagrams.

○ **Assignment 6:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the rules and style guidelines for creating entity relationship diagrams (ERDs).
- creation and validation of an ERD
- how to balance ERDs and data flow diagrams.
- the process of normalization.

● **Tests:**

There are two tests that are used to assess the concept, knowledge, conceptual understanding, and skills in various phases in SDLC.

Data from SP21 CSC 4700 Systems Design & Implementation.

Performance Data

Name	Milestone 5	Assignment 1	Milestone 6	Assignment 2	Assignment 3	Test 1	Milestone 7	Assignment 4	Assignment 5	Test 2	Assignment 6	Final Presentation
<i>Student 1</i>	90	18	90	15	18	82.5	94	17.5	19.5	92	17.5	88
<i>Student 2</i>	90	20	90	20	19	96.5	94	20	20	95.5	20	88
<i>Student 3</i>	90	19	90	20	20	92	94	14	16.5	95	19	88
<i>Student 4</i>	90	20	90	20	19.5	100	94	20	16	100	20	88
<i>Student 5</i>	90	17	90	18	20	93	94	15	20	92	17	88
<i>Student 6</i>	78	17	90	20	20	90	95	20	20	96	20	87
<i>Student 7</i>	78	20	89	19	20	97	95	19	20	93.5	20	87
<i>Student 8</i>	78	18	90	13.5	20	79.5	95	18.5	17.5	91	19	87
<i>Student 9</i>	67.5	16	89	16	16	86.5	95	15	20	93	20	87
Proficiency Score	80	16	80	16	16	80	80	16	16	80	16	80
Number Proficiency	8	9	9	8	9	9	9	8	9	9	9	9
% Proficient	89%	100%	100%	89%	100%	100%	100%	89%	100%	100%	100%	100%

Instruments Described

- An ongoing project “Kaitaia Publishing Collective”:

This ongoing project is the continuation of the one in CSC3710. Again, the project was divided into several milestones. We use the following (same) grading policy for each milestone:

Submitted documents and presentation for each assignment	70%
Peer evaluation	10%
Group evaluation	10%
My adjustment	10%

In spring 2021, we have the same number of students with the same two groups.

o **Milestone 5:**

This is the 1st assignment for this semester. We have created a complete list of project requirements, the use cases and the DFDs last semester. Please note that this is an ongoing process, which means that you can continuously revise the contents of your previous assignment works. You are required to perform the process modeling and data modeling

1. (30 points) Please review and update the DFDs in Milestone 4
 - a. Validate the DFDs to make sure there is no syntax errors (See table below)

Within DFD	
Process	<ul style="list-style-type: none"> ● Every process has a unique name that is an action-oriented verb phrase, a number, and a description. ● Every process has at least one input data flow. ● Every process has at least one output data flow. ● Output data flows usually have different names than input data flows because the process changes the input into a different output in some way. ● There are between three and seven processes per DFD.
Data Flow	<ul style="list-style-type: none"> ● Every data flow has a unique name that is a noun, and a description. ● Every data flow connects to at least one process. ● Data flows only in one direction (no two-headed arrows). ● A minimum number of data flow lines cross.
Data Store	<ul style="list-style-type: none"> ● Every data store has a unique name that is a noun, and a description.

	<ul style="list-style-type: none"> • Every data store has at least one input data flow (which means to add new data or change existing data in the data store) on some page of the process model. • Every data store has at least one output data flow (which means to read data from the data store) on some page of the process model.
External Entity	<ul style="list-style-type: none"> • Every external entity has a unique name that is a noun, and a description. • Every external entity has at least one input or output data flow.

- b. Validate the Semantics errors
 - c. Walk-through diagrams with users
 - Verify that inputs shown are logically sufficient to produce the outputs
 - Check for consistent levels of decomposition
 - Check for consistent use of terminology
2. (30 points) Provide the final version of your DFDs for the system including context diagram and lower level diagrams whenever necessary.
 3. (10 points) Update the Project

You need to create a written document for your 5th assignment. Also you should create a presentation document. You will have around 30 minutes to make your presentation and again the potential audience will be your peers and the entire project team.

○ **Milestone 6:**

We have created a complete list of project requirements, the use cases, the DFDs, and ERDs last semester. All in all, we have completed the analysis phase of the SDLC. Before we start the new phase, just make sure you correct all the possible errors based on the grading comments in the last project.

1. Provide the Entity-Relationship Diagrams (ERDs) for the system. (60%)
2. Update the Project (10%)

You need to create a written document for your 6th assignment. No presentation is required for this assignment.

○ **Milestone 7:**

We have completed the DFDs and ERDs. All in all, we have completed the analysis phase of the SDLC. This is the first assignment for the design phase. In this assignment, you need to design and then code the user interface. Please follow the user interface design techniques in Chapter 9 and present the following works.

1. (25 points) First list various different system acquisition strategies, and then use the alternative matrix (see figures 7-5 and 7-6 for example) to choose the best strategy.
2. (35 points) User interface design:
 - a. User Interface Layout: You need to present the layout of the user interface. Your design should consider the facts such as who will use the system. Creating a working prototype will be a very good idea and therefore is highly recommended.
 - b. User Interface Design Process: Please follow the user interface design process including User scenario, Interface structure design, and Interface design prototyping.
 - c. Navigation Design: You should provide your own Navigation design such as Menu or commands.
 - d. Input Design: Please coordinate with your data design (in Assignments 5 and 6).
 - e. Output Design: Please coordinate with your data design as well as the copies of report sample from the Accounting department.
3. (10 points) Update the Project

You need to create a written document for your 7th assignment. Also you should create a presentation document. You will have around 30 minutes to make your presentation and again the potential audience will be your peers and the entire project team.

○ **Milestone 8 (Final Milestone):**

We have completed the DFDs, ERDs, and user interface design. In this assignment, you need to do the following:

1. (15 points) Check all the steps in chapter 10 to see whether it is necessary to create physical DFDs.
2. (15 points) You should pick a portion of DFD designs to build the structure charts. Please following the following steps defined in chapter 10.
 - a. Identify modules and levels: please follow the step in pages 332-334 and identify the modules for the structure charts.
 - b. Identify special connections. (page 334)
 - c. Add couples. Page 334)

3. Test Plan: You need to develop a test plan that contains various scenarios. Figure 12-1 on page 393 provides a test plan template. Also I have provided sample test cases that include the objective, steps to achieve proper outcome, outcome expected, Pass / Fail, and reason for failing. You can design your own template of test cases, use the textbook one, or use the one I provide. (25%)
4. Migration Plan: Analyze the system and select your conversion strategy such as style, locations, and modules. (15%)

You need to create a written document for your 8th assignment. Also you should create a presentation document. You will have around 30 minutes to make your presentation and again the potential audience will be your peers and the entire project team.

- **Assignments:**

- **Assignment 1:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the rules and style guidelines for creating entity relationship diagrams (ERDs).
- creation and validation of an ERD
- how to balance ERDs and data flow diagrams.
- the process of normalization.

- **Assignment 2:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the initial transition from analysis to design.
- system specification.
- three ways to acquire a system: custom, packaged, and outsourced alternatives.

- **Assignment 3:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the fundamental components of an information system.
- client-server, server-based, and mobile application architectures.
- how cloud computing can be incorporated as a system architecture component.

- operational, performance, security, cultural, and political requirements affect the architecture design.
- hardware and software specification.

○ **Assignment 4:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the user interface.
- fundamental user interface design principles.
- the process of user interface design.
- basic principles of navigation design.
- types of navigation controls

○ **Assignment 5:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- physical DFDs.
- how to create a structure chart.
- program specification.
- structured programming.
- event-driven programming.

○ **Assignment 6:**

This assignment assesses the concept, knowledge, conceptual understanding, and skills of the following

- the system construction process.
- different types of tests and when to use them.
- how to develop user documentation.
- the system installation process.
- the elements of a migration plan.

- different types of conversion strategies and when to use them.
- **Tests:**
There are two tests that are used to assess the concept, knowledge, conceptual understanding, and skills in various phases in SDLC.

Appendix B: Rubric for the Assessment of CIS PLOs:

RUBRIC FOR THE ASSESSMENT OF COMPUTER INFORMATION SYSTEMS STUDENT OUTCOMES

CISSO-1 Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

Faculty-in-Charge: Ricky Sethi

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Understand the application domain.	Demonstrates a mature understanding of 1. The stakeholders' needs and capabilities. 2. The deployment environment. 3. The available computing resources.	Demonstrates some understanding of 1. The stakeholders' needs and capabilities. 2. The deployment environment. 3. The available computing resources.	Demonstrates some awareness of 1. The stakeholders' needs and capabilities. 2. The deployment environment. 3. The available computing resources.	Shows no awareness of 1. The stakeholders' needs and capabilities. 2. The deployment environment. 3. The available computing resources.
b) Understand the inputs, outputs and other requirements for the problem.	Demonstrates a mature understanding of 1. Requirements gathering processes. 2. Inputs and outputs associated with the problem domain. 3. How to design tests to validate problem solutions.	Demonstrates some understanding of 1. Requirements gathering processes. 2. Inputs and outputs associated with the problem domain. 3. How to design tests to validate problem solutions.	Demonstrates some awareness of 1. Requirements gathering processes. 2. Inputs and outputs associated with the problem domain. 3. How to design tests to validate problem solutions.	Shows no awareness of 1. Requirements gathering processes. 2. Inputs and outputs associated with the problem domain. 3. How to design tests to validate problem solutions.
c) Compare and contrast multiple approaches to solving the problem.	Demonstrates full ability to 1. Propose different solution approaches 2. Decide criteria for best solution 3. Evaluate and identify best solutions	Demonstrates some ability to 1. Propose different solution approaches 2. Decide criteria for best solution 3. Evaluate and identify best solutions	Demonstrates very little ability to 1. Propose different solution approaches 2. Decide criteria for best solution 3. Evaluate and identify best solutions	Shows no ability to 1. Propose different solution approaches 2. Decide criteria for best solution 3. Evaluate and identify best solutions.
d) Understand relevant computing principles.	Demonstrates a mature understanding of 1. Underlying mathematical and computational ideas.	Demonstrates some understanding of 1. Underlying mathematical and computational ideas.	Demonstrates some awareness of 1. Underlying mathematical and computational ideas.	Shows no awareness of 1. Underlying mathematical and computational ideas.

RUBRIC FOR THE ASSESSMENT OF COMPUTER INFORMATION SYSTEMS STUDENT OUTCOMES

	2. Underlying design principles. 3. Efficient algorithm design.	2. Underlying design principles. 3. Efficient algorithm design.	2. Underlying design principles. 3. Efficient algorithm design.	2. Underlying design principles. 3. Efficient algorithm design.
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CISSO-2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

Faculty-in-Charge: Frits Lander

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Identify design principles appropriate to the problem.	Demonstrates a mature understanding of 1. Underlying mathematical and computational ideas. 2. Modularize the problem. 3. Selecting appropriate design elements for the solution.	Demonstrates some understanding of 1. Underlying mathematical and computational ideas. 2. Modularize the problem. 3. Selecting appropriate design elements for the solution.	Demonstrates some awareness of 1. Underlying mathematical and computational ideas. 2. Modularize the problem. 3. Selecting appropriate design elements for the solution.	Shows no awareness of 1. Underlying mathematical and computational ideas. 2. Modularize the problem. 3. Selecting appropriate design elements for the solution.
b) Plan and document computing-based solution development.	Demonstrates full ability to 1. Identify the sequence of tasks and the dependencies. 2. Identify the needed tools. 3. Document the process.	Demonstrates some ability to 1. Identify the sequence of tasks and the dependencies. 2. Identify the needed tools. 3. Document the process.	Demonstrates some awareness of how to 1. Identify the sequence of tasks and the dependencies. 2. Identify the needed tools. 3. Document the process.	Demonstrates no awareness of how to 1. Identify the sequence of tasks and the dependencies. 2. Identify the needed tools. 3. Document the process.
c) Design and implement test cases for solution evaluation.	Demonstrates full ability to 1. Identify all test cases and set of exceptions. 2. Implement the tests and exception handling methods.	Demonstrates some ability to 1. Identify all test cases and set of exceptions. 2. Implement the tests and exception handling methods.	Demonstrates some awareness of how to 1. Identify all test cases and set of exceptions. 2. Implement the tests and exception handling methods.	Demonstrates no awareness of how to 1. Identify all test cases and set of exceptions. 2. Implement the tests and exception handling methods.
d) Implement a computing-based solution.	Demonstrates full ability to 1. Identify an appropriate computational solution.	Demonstrates some ability to 1. Identify an appropriate computational solution.	Demonstrates some awareness of how to	Demonstrates no awareness of how to

RUBRIC FOR THE ASSESSMENT OF COMPUTER INFORMATION SYSTEMS STUDENT OUTCOMES

	2. Develop logical design of the solution. 3. Implement the solution appropriate to the computing context. 4. Test the implementation in phases.	2. Develop logical design of the solution. 3. Implement the solution appropriate to the computing context. 4. Test the implementation in phases.	1. Identify an appropriate computational solution. 2. Develop logical design of the solution. 3. Implement the solution appropriate to the computing context. 4. Test the implementation in phases.	1. Identify an appropriate computational solution. 2. Develop logical design of the solution. 3. Implement the solution appropriate to the computing context. 4. Test the implementation in phases.
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CISSO-3 Communicate effectively in a variety of professional contexts.

Faculty-in-Charge: N Mahadev

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Understand and translate stakeholder requirements into computing specifications.	Demonstrates full ability to 1. Interact with stakeholders to establish requirements. 2. Communicate the specifications to all the stakeholders. 3. Document the specifications.	Demonstrates some ability to 1. Interact with stakeholders to establish requirements. 2. Communicate the specifications to all the stakeholders. 3. Document the specifications.	Demonstrates some awareness of how to 1. Interact with stakeholders to establish requirements. 2. Communicate the specifications to all the stakeholders. 3. Document the specifications.	Demonstrates no awareness of how to 1. Interact with stakeholders to establish requirements. 2. Communicate the specifications to all the stakeholders. 3. Document the specifications.
b) Present solution prototypes to the customer.	Demonstrate full ability to present the prototypes to customers and solicit feedback.	Demonstrate some ability to present the prototypes to customers and solicit feedback.	Demonstrate some awareness of how to present the prototypes to customers and solicit feedback.	Demonstrate no awareness of how to present the prototypes to customers and solicit feedback.
c) Communicate the solution design to the project managers.	Demonstrate full ability to organize and present the solution design to the project managers.	Demonstrate some ability to organize and present the solution design to the project managers.	Demonstrate some awareness to organize and present the solution design to the project managers.	Demonstrate no awareness to organize and present the solution design to the project managers.

RUBRIC FOR THE ASSESSMENT OF COMPUTER INFORMATION SYSTEMS STUDENT OUTCOMES

d) Participate in group discussions with team members.	Demonstrate leadership through peer evaluation.	Demonstrate significant contribution through peer evaluation.	Demonstrate inconsistent contribution through peer evaluation.	Demonstrate no contribution to the team discussions.
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CISSO-4 Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

Faculty-in-Charge: Natasha Kurtonina

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Understand legal and ethical responsibilities.	Demonstrate full ability to identify and evaluate legal and ethical issues in computing practices.	Demonstrate some ability to identify and evaluate legal and ethical issues in computing practices.	Demonstrate some awareness of how to identify and evaluate legal and ethical issues in computing practices.	Demonstrate no awareness of how to identify and evaluate legal and ethical issues in computing practices.
b) Understand social impacts of potential solutions.	Demonstrate full ability to identify impacts of potential solutions on society.	Demonstrate some ability to identify impacts of potential solutions on society.	Demonstrate some awareness of how to identify impacts of potential solutions on society.	Demonstrate no awareness of how to identify impacts of potential solutions on society.
c) Make informed ethical decisions.	Demonstrate full ability to make proper ethical choices.	Demonstrate some ability to make proper ethical choices.	Demonstrate some awareness of how to make proper ethical choices.	Demonstrate no awareness of how to make proper ethical choices.

CISSO-5 Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

Faculty-in-Charge: Robin Chataut

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Cooperate and contribute fully within the team.	Considered by peers as fully cooperating and contributing to the team project.	Considered by peers as significantly cooperating and contributing to the team project.	Considered by peers as somewhat cooperating and contributing to the team project.	Considered by peers as not cooperating and contributing to the team project.

RUBRIC FOR THE ASSESSMENT OF COMPUTER INFORMATION SYSTEMS STUDENT OUTCOMES

b) Communicate effectively with the team.	Considered by peers as an excellent communicator.	Considered by peers as a good communicator.	Considered by peers as having communication issues.	Considered by peers as non-communicative.
c) Demonstrate time and project management skills.	Demonstrate full ability to set milestones and meet them.	Demonstrate some ability to set milestones and meet them.	Demonstrate some awareness of setting milestones and meet them.	Demonstrate no ability to set milestones and meet them.

CISSO-6 Support the delivery, use, and management of information systems within an information systems environment.

Faculty-in-Charge: Kevin Austin

Performance Indicator	Exemplary	Proficient	Marginal	Weak
a) Cooperate and contribute fully in the planning and analysis phases of the systems development life cycle (SDLC) in a project within an IS environment.	Demonstrated as a key coordinator and contributor in the planning and analysis of the project.	Demonstrated as a major coordinator and contributor in the planning and analysis of the project.	Considered by peers as somewhat cooperating and contributing in the planning and analysis of the project.	Considered by peers as not cooperating and contributing in the planning and analysis of the project.
b) Cooperate and contribute fully in the design phase of the SDLC in a project within an IS environment.	Demonstrated as a key coordinator and contributor in the design of the project.	Demonstrated as a major coordinator and contributor in the design of the project.	Considered by peers as somewhat cooperating and contributing in the design of the project.	Considered by peers as not cooperating and contributing in the design of the project.
c) Cooperate and contribute fully in the implementation phase of the SDLC in a project within an IS environment.	Demonstrated as a key coordinator and contributor in the implementation of the project.	Demonstrated as a major coordinator and contributor in the implementation of the project.	Considered by peers as somewhat cooperating and contributing in the implementation of the project.	Considered by peers as not cooperating and contributing in the implementation of the project.

