



State University of New York at Fredonia  
 Department of Computer and Information Sciences  
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**SUNY Fredonia**  
**Department of Computer and Information Sciences**  
**Assessment Plan of the Program Outcomes Aligned to ABET Criteria**

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
A1. Demonstrates an understanding of basic data structures and their representation	CSIT 121, 221, 341	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects
A2. Demonstrates an understanding of a high-level object-oriented programming language and software design	CSIT 121, 221, 224	CSIT 224	Selected questions extracted from course examinations and assignments; selected components of course projects
A3. Demonstrates an understanding of number systems and digital logic	CSIT 241	CSIT 241	Selected questions extracted from course examinations and assignments
A4. Demonstrates an understanding of computer organization and architecture	CSIT 311	CSIT 311 CSIT 312	Selected questions extracted from course examinations and assignments
A5. Demonstrates an understanding of analysis of algorithms	CSIT 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects

Prepared by Dr. Reneta Barneva and Dr. Junaid Zubairi, February 2012. Revised by Dr. Barneva April 2013. Final corrections by Dr. Zubairi and Prof. Olson. Considered at department meeting on May 1, 2013. Approved on May 2, 2013 by paper ballot.

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME A.**  
*An ability to apply knowledge of computing and mathematics appropriate to the discipline*

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
A1. Demonstrates an understanding of basic data structures and their representation.	Does not demonstrate knowledge about ADT such as an array, file, stack, etc.).	Demonstrates knowledge about ADT such as an array, file, stack, etc.).	Select an ADT appropriate for a given task and appropriately use it.	Extend a given ADT with additional features or use it for an application.
A2. Demonstrates an understanding of a high-level object-oriented programming language.	Does not demonstrate ability to use objects.	Demonstrates the ability to use simple operations on predefined classes and declare simple classes.	Demonstrates the ability to recognize the need for simple design patterns and declare/extend appropriate classes to meet the design needs.	Demonstrates the ability to extend a given class with additional features or use it in an application in a way that integrates multiple design concepts.
A3. Demonstrates an understanding of number systems and digital logic	Does not demonstrate knowledge of number systems and digital logic.	Able to convert numbers from one digital system to another. Basic understanding of digital logic.	Conversion from decimal to binary. Operations on binary and hexadecimal numbers. Able to perform basic Boolean operations.	Conversion from one number system to another. Operations in it. Able to apply in practice Boolean functions and a composition of them.
A4. Demonstrates an understanding of computer organization and architecture.	No understanding about the computer organization.	Basic understanding about the computer organization.	Ability to describe the functions of the memory, CPU, and peripherals.	Complete understanding of the computer organization. Ability to use the knowledge in solving practical problems.
A5. Demonstrates an understanding of analysis of algorithms	The algorithm does not work correctly.	The algorithm works correctly in some cases.	The algorithm works correctly in the general case and in the special cases.	The algorithm is efficient and works correctly in the general case and in the special cases.

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
B1. Demonstrates abilities of writing program specifications and documentation	CSIT 425	CSIT425	Selected components of course projects and assignments
B2. Demonstrates competency in analyzing the problem and proposing different models for solution	CSIT 224, 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects
B3. Demonstrates competency in analyzing models using appropriate paradigms and following standard practices	CSIT 224, 425	CSIT 224	Selected questions extracted from course examinations and assignments
B4. Demonstrates competency in determining physical resources and the time required to come to a the solution	CSIT 425	CSIT 425	Selected questions extracted from course examinations and assignments; selected components of course projects

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME B.**

*An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution*

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
B1. Demonstrates abilities of writing program specifications and documentation	Fails to write program specs and appropriate comments	Is able to write appropriate comments in programs	Is able to write appropriate comments as well as specifications of the program	Is able to put together a user guide in addition to specifications and comments
B2. Demonstrates competency in analyzing the problem and proposing different models for solution	Does not show competency in analyzing the problem	Analyzes given problem but fails to propose solution models	Ability to analyze the problem and give at least one model for its solution	Ability to analyze the problem and give different models for its solution
B3. Demonstrates competency in analyzing models using appropriate paradigms and following standard practices	Does not demonstrate competency in analyzing models and following standard practices	Is able to analyze models using appropriate paradigms but does not follow standard practices	Ability to analyze models using appropriate paradigms and follow standard practices.	Is able to analyze variety of models consistently and following standard practices
B4. Demonstrates competency in determining physical resources and the time required to come to a solution	Has no idea of determining resources and time for a solution	Is able to calculate the memory size of the solution but fails to compute time complexity of proposed solution	Ability to calculate memory size and time complexity of the proposed solution.	Ability to calculate the time complexity and memory size of the proposed solution and work backwards to optimize the solution

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
C1. Demonstrates competency in computer based system design	CSIT 425	CSIT 425 CSIT 351	Selected questions extracted from course examinations and assignments; selected components of course projects
C2. Demonstrates ability in eliciting requirements	CSIT 425	CSIT 425 CSIT 351	Selected questions extracted from course examinations and assignments; selected components of course projects
C3. Demonstrates competency in developing project metrics	CSIT 425	CSIT 425 CSIT 351	Selected questions extracted from course examinations and assignments; selected components of course projects
C4. Demonstrates competency in creating and executing test plans	CSIT 425	CSIT 425 CSIT 351	Selected questions extracted from course examinations and assignments; selected components of course projects
C5. Demonstrates competency in comparing alternative solutions and selecting the optimal one	CSIT 425	CSIT 425 CSIT 351	Selected questions extracted from course examinations and assignments; selected components of course projects

## RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME C

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

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
C1. Demonstrates competency in computer based system design	Is unable to match the problem to the desired solution parameters	Is able to design computer based system in its initial form to meet desired needs	Is able to design and implement a computer based system to meet desired needs	Is able to design and implement and evaluate a computer based system to meet desired needs
C2. Demonstrates ability in eliciting requirements	Inability to arrive at requirements of the computer based system	Is able to specify some of the requirements of the computer based system	Is able to specify all of the requirements of the computer based system	Is able to specify all the requirements of the computer based system and modify the requirements based on elicitation process
C3. Demonstrates competency in developing project metrics	Inability to develop project metrics	Is able to define part of the project metrics	Ability to develop all of the project metrics	Is able to evolve and modify project metrics during the development process
C4. Demonstrates competency in creating and executing test plans	Inability to identify test plan basics	Is able to define at least one test scenario	Ability to specify the complete test plan	Ability to specify and execute test plans for the project and estimate test coverage
C5. Demonstrates competency in comparing alternative solutions and selecting the optimal one	Inability to develop a single solution	Is able to analyze at least one solution	Is able to specify alternative solutions and select optimal one	Is able to estimate time and size requirements for all the solutions and justify the optimal solution

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
D1. Demonstrates ability to document well the work	All senior level courses	CSIT425	Project portfolio
D2. Demonstrates ability to communicate with team members, listen actively, provide feedback and share information	All senior level courses	CSIT425	Peer evaluation report
D3. Demonstrates ability to write programs that conform to the pre-set requirements	All senior level courses	CSIT425	Peer evaluation report, project portfolio
D4. Demonstrates ability to meet deadlines	All senior level courses	CSIT425	Peer evaluation report, project portfolio

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME D**  
*An ability to function effectively on teams to accomplish a common goal*

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
D1. Demonstrates ability to document well the work	Unable to produce documentation of work done	Ability to produce some documentation covering only some part of the work done	Is able to describe the work done in well formatted report	Ability to prepare consistent, regular and coherent description of work in standard format
D2. Demonstrates ability to communicate with team members, listen actively, provide feedback and share information	Does not communicate with team members effectively	Is able to communicate with team members but does not provide information or feedback	Ability to communicate with team members and share information with them	Ability to coordinate well with team members and motivate them to work
D3. Demonstrates ability to write programs that conform to the pre-set requirements	Does not demonstrate the ability to write programs as per requirements	Is able to write partial programs that confirm to the pre-set requirements	Is able to write complete programs that confirm to the pre-set requirements	Ability to write full programs confirming to pre-set requirements and extending the same to meet additional requirements
D4. Demonstrates ability to meet deadlines	Usually demands an extension in the deadline	Is able to meet some but not all requirements by the deadline	Is generally able to submit the project on time	Is able to finish the project ahead of the time

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
E1.Understands the ethical issues related to technology	CSIT120, CSIT201	CSIT201	Selected questions extracted from course examinations and assignments
E2. Understands the security issues and problems of identity theft	CSIT201, CSIT435	CSIT201	Selected questions extracted from course examinations and assignments
E3. Demonstrates knowledge about the characteristics of different malware types and the differences between them.	CSIT201, CSIT251, CSIT435	CSIT201	Selected questions extracted from course examinations and assignments

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME E**  
**An understanding of professional, ethical, legal, security and social issues and responsibilities**

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
E1.Understands the ethical issues related to technology	Unable to relate ethics to use of technology	Able to understand only partially the ethical issues with technology	Ability to understand ethical issues in using technology	Ability to understand ethical issues in technology and determine relevant issues in new situations
E2. Understands the security issues and problems of identity theft	Does not realize the importance of security and risks of ID theft	Is able to understand security concerns however not the ID theft risks	Ability to understand the risks and concerns with respect to security issues including ID theft	Ability to suggest correct course of action in a scenario where ID could be compromised
E3. Demonstrates knowledge about the various types of malware	Does not possess knowledge of various malware types	Can define viruses but does not know the difference between a virus and a worm	Ability to define all types of malware and differentiate between viruses and worms	In addition to meeting the standard, understands how viruses are structured and how they attack the host system

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

Performance Criteria	Curriculum Map (Where Developed)	Where Assessed	Assessment Method
F1. Demonstrates an ability of good verbal skills	Oral comm. Courses incl. CSIT413, CSIT425, CSIT431, CSIT441, CSIT455, CSIT462	Any oral comm. course	Instructor's report; Peer evaluation report
F2. Demonstrates good knowledge of presentation software	Oral comm. Courses incl. CSIT413, CSIT425, CSIT431, CSIT441, CSIT455, CSIT462	Any oral comm. course	Instructor's report; Peer evaluation report
F3. Demonstrates an ability of good organization of the talk	Oral comm. Courses incl. CSIT413, CSIT425, CSIT431, CSIT441, CSIT455, CSIT462	Any oral comm. course	Instructor's report; Peer evaluation report
F4. Demonstrates knowledge of the topic	Oral comm. Courses incl. CSIT413, CSIT425, CSIT431, CSIT441, CSIT455, CSIT462	Any oral comm. course	Instructor's report; Peer evaluation report

### RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME F *An ability to communicate effectively with a range of audiences*

Performance Criteria	Inadequate	Approaches Standard	Meets Standard	Exceeds Standard
F1. Demonstrates an ability of good verbal skills	Reads from script; does not face audience; gaps in material, breaks down during presentation	Ability to complete the presentation although without showing confidence	Confidently presents the topic and faces the audience	Excellent presentation and interaction with the audience throughout the talk
F2. Demonstrates good knowledge of presentation software	Does not know how to start or resume presentation; spends long time adjusting the presentation software	Able to use standard features of presentation software with some help from audience	Uses standard features of presentation software with confidence and without help from audience	Able to control the presentation fully and the presentation uses advanced features of the host software
F3. Demonstrates an ability of good organization of the talk	The talk is haphazard with no real organization	Able to define an outline in the beginning but does not follow it in the presentation	Follows outline and presents a coherent talk with distinct sections	Presents an unusually brilliant talk with clear objectives and coherent structure
F4. Demonstrates knowledge of the topic	It is obvious that the speaker is unfamiliar with the topic	Shows some knowledge of the topic but does not answer related questions	Demonstrates full knowledge of the topic and handles questions well	Ability to command the topic and respond with various options to show thorough knowledge of the topic

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
G1. Demonstrates an ability to analyze the local and global impact of computing on individuals	CSIT201, CSIT251, CSIT456	CSIT201	Selected questions extracted from course examinations and assignments; selected components of course projects
G2. Demonstrates an ability to analyze the local and global impact of computing organizations and society	CSIT201, CSIT251, CSIT456	CSIT201	Selected questions extracted from course examinations and assignments; selected components of course projects

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME G**

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

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
G1. Demonstrates an ability to analyze the local and global impact of computing on individuals	Does not realize the scope and impact of computing on individuals	Ability to relate to at least one aspect of impact of computing on individuals	Ability to understand the scope and impact of computing on individuals and relate to it	Ability to determine best computing practices to enhance the positive impact on individuals
G2. Demonstrates an ability to analyze the local and global impact of computing organizations and society	Does not realize the scope and impact of computing on organizations and society	Ability to relate to at least one aspect of impact of computing on organizations and society	Ability to understand the scope and impact of computing on organizations and society and relate to it	Ability to determine best computing practices to enhance the positive impact on organizations and society

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
H1. Participates in independent studies, theses, projects, internships	CSIT 300, CSIT 400, CSIT 499, CSIT 497	CSIT 300, 490, 499, 497	Graduating Senior Exit Survey
H2. Demonstrates ability to learn skills related to new technology and research.	Advisement	Outside class	Graduating Senior Exit Survey
H3. Understands the need to maintain currency in the discipline	Advisement	Outside class	Graduating Senior Exit Survey

**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

- a. Computer Science \_\_\_\_\_ Advanced Computing Track / \_\_\_\_\_ Software Development Track/ \_\_\_\_\_ General Track
- b. Computer Information Systems \_\_\_\_\_ Systems Development/ \_\_\_\_\_ System Management
- c. 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?

- a. Yes                      b. No

5. Did take any of the courses (circle what is appropriate):

- |                      |                                |
|----------------------|--------------------------------|
| a. CSIT 499 Project, | d. CSIT 400 Independent Study, |
| b. CSIT 497 Thesis,  | e. CSIT 300 Internship.        |
| c. HONR 400 Thesis,  |                                |

6. Did you attend any conferences, workshops, seminars to broaden knowledge and skills?

- a. Yes                      b. No

7. Do you already have a job offer?

- b. Yes                      b. No

If yes, is it related to your major?

- a. Yes                      b. No

8. Do you plan to attend graduate school?

- a. Yes, already accepted into graduate school; Field: \_\_\_\_\_
- b. Yes, applying now; Field: \_\_\_\_\_
- c. Yes, in the future
- d. 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?

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

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

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(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

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

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

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

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
I1. Demonstrates competency in C++ programming	CSIT 121, 221	CSIT 221	Selected questions extracted from course examinations and assignments; selected components of course projects
I2. Demonstrates competency in assembly language programming	CSIT 311	CSIT 311	Selected questions extracted from course examinations and assignments; selected components of course projects
I3. Demonstrates competency in programming in other languages	CSIT 321	CSIT 321	Selected questions extracted from course examinations and assignments; selected components of course projects
I4. Demonstrates competency in the use of the UNIX operating system	CSIT 231	CSIT 231	Selected questions extracted from course examinations and assignments; selected components of course projects

**RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME I**  
*An ability to use current techniques, skills, and tools necessary for computing practice*

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
I1. Demonstrates competency in C++ programming	Cannot write a single C++ program without syntax and semantic mistakes	Is able to write a C++ program with correct syntax but it does not achieve the target	Ability to write C++ program that achieves the target and it is free from syntax errors	Ability to write C++ program that achieves target and extends functionality further
I2. Demonstrates competency in assembly language programming	Cannot write a single assembly language program without syntax and semantic mistakes	Is able to write a assembly language program with correct syntax but it does not achieve the target	Ability to write assembly language program that achieves the target and it is free from syntax errors	Ability to write assembly language program that achieves target and extends functionality further
I3. Demonstrates competency in other programming languages	Cannot write a single program without syntax and semantic mistakes	Is able to write a program with correct syntax but it does not achieve the target	Ability to write a program that achieves the target and it is free from syntax errors	Ability to write a program that achieves target and extends functionality further
I4. Demonstrates competency in the use of the UNIX operating system	Cannot use simple UNIX commands to maintain directories and files	Ability to issue simple UNIX commands but cannot write a shell script	Is able to use UNIX commands comfortably and write simple shell scripts	Ability to use UNIX system comfortably and develop complex shell scripts to automate the usage

**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.**

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
J1. Demonstrates an ability to apply mathematical modeling to computing problems	CSIT 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects
J2. Demonstrates an ability to develop different algorithms for a computing problem	CSIT 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects
J3. Demonstrates an ability to evaluate algorithm efficiency	CSIT 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects
J4. Understands the tradeoff between memory and running time	CSIT 341, 441	CSIT 341	Selected questions extracted from course examinations and assignments; selected components of course projects

### RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME 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*

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
J1. Demonstrates an ability to apply mathematical modeling to computing problems	Cannot perform modeling of simple problems for solving on the computer	Can model simple problems with some errors for solving on the computer	Applies mathematical modeling on computing problems	Ability to use variety of modeling techniques on computing problems
J2. Demonstrates an ability to develop different algorithms for a computing problem	Cannot design an algorithm for a computing problem	Is able to design an algorithm for a computing problem with some help	Can independently design more than one algorithms for solving problems on the computer	In addition to meeting the standard, ability to understand the rationale behind selecting specific techniques for solving problems on computer
J3. Demonstrates an ability to evaluate algorithm efficiency	Cannot relate to analyzing an algorithm for its order; unfamiliar with big-O notation	Is able to compute big-O for simple and basic algorithms	Can perform complexity analysis of algorithms and calculate their time complexity	In addition to meeting the standard, ability to suggest modifications to improve the efficiency of the algorithms
J4. Understands the tradeoff between memory and running time	Cannot understand the impact of program size on its running time	Can determine the effect of program size on running time of simple and basic programs	Can independently determine the trade-offs between memory and running time	In addition to meeting the standard, ability to suggest ways to reduce program size without affecting the outcome

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

<b>Performance Criteria</b>	<b>Curriculum Map (Where Developed)</b>	<b>Where Assessed</b>	<b>Assessment Method</b>
K1. Demonstrates an ability of formally describing a software system	CSIT425	CSIT425	Project portfolio
K2. Able to establish estimates.	CSIT425	CSIT425	Project portfolio
K3. Able to develop a project plan	CSIT425	CSIT425	Project portfolio
K4. Able to provide adequate internal and external documentation	CSIT425	CSIT425	Project portfolio

## RUBRIC SHEET FOR ASSESSMENT OF PROGRAM OUTCOME K

### An ability to apply design and development principles in the construction of software systems of varying complexity

<b>Performance Criteria</b>	<b>Inadequate</b>	<b>Approaches Standard</b>	<b>Meets Standard</b>	<b>Exceeds Standard</b>
K1. Demonstrates an ability of formally describing a software system	Unable to formally describe own or given software system	Can write requirements but not the specifications of software	Ability to formally describe a software system including its requirements, design and specs	In addition to meeting the standard, ability to comply with UML specs in documenting the flow of the software
K2. Able to establish estimates.	Unable to begin estimation process	Ability to start and perform simple estimation	Ability to prepare software project estimates accurately and reliably	Ability to understand and apply work estimation plus tracking and measurement effort for software development process
K3. Able to develop a project plan	Unable to determine scope, estimate or schedule of software project	Ability to determine scope and work estimate but not the actual project schedule	Ability to develop complete project plan including its scope, work estimate and schedule	Ability to develop project plan and monitor the progress through the software development process
K4. Able to provide adequate internal and external documentation	Cannot write a single description of the work done on a software project	Ability to describe one or two modules but not the whole project	Ability to put together complete documentation of the project	Ability to provide documentation of the software project including user guide

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