

William Paterson University
College of Science and Health - Department of Computer Science

Fall 2013 – Spring 2015 Assessment Cycle
Assessment Plan

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The following activities are performed every semester:

- A. Starting with the fall 2014 semester, the instructor of each course in the CS department completes the Course Coverage Assessment Report (CCAR) form designed for that course and returns it to the chair of the department Curriculum Committee.

The purpose of these Course Coverage Assessment Reports is to collect comments and suggestions about a course's prerequisite/co-requisites, objectives, topics, and learning outcomes that are based on each faculty member's experience while teaching that course. The template of the CCAR form is provided in Appendix G.

- B. The instructors of each CS course in which one or more program's student outcomes are assessed complete the Faculty Course Assessment Reports (FCAR) for that course and return it to the chair of the department Assessment Committee.

The purpose of a course FCAR is to report the performance levels of students on the CS program's student outcomes that are assessed in that course based on the tests/quizzes, lab assignments, reports, presentations, and the final exam. The program's student outcomes are assessed in courses as specified in the table in Appendix A, and the performance levels are reported using the form also provided in Appendix A.

- C. Graduating seniors complete the Senior Exit Surveys and return them to the chair of the department Assessment Committee. The Senior Exit Survey questionnaire is provided in Appendix H.

The purpose of the Senior Exit Survey is to get the opinions of our graduating students about their performance levels on the program's student outcomes, the quality of our program and the services offered to students in our department.

The following activities are performed every two years (at the end of the 2-year assessment cycle):

- A. The members of the CS program Advisory Board and the members of the CS department faculty review each CS program's educational objectives and provide their comments and/or suggestions using a form that is returned to the chair of the CS department Curriculum Committee. The form that we use to report the review of the CS program educational objectives is provided in Appendix B. These comments and or suggestions are used at the end of our 2-year assessment cycle for the revision of the CS program educational objectives.
- B. At the end of our 2-year program assessment cycle, the course coordination committee members of each course analyze the CCAR data collected for that course in order to identify problems and other issues about each of the following topics and make suggestions for improvements.

- Course prerequisites/co-requisites.
- Course objectives.
- Course learning outcomes.
- Course content.
- If a course is related to a program's student outcome, that student outcome is reviewed to find out whether or not it is consistent with that course coverage and practices. The program's student outcomes are reviewed in the analyses of the CCAR data of the courses as specified in the table in Appendix C.

The reports of the analyses of the CCAR data are returned to the chair of the CS department Curriculum Committee. The CCAR analysis report form is provided in Appendix D.

- C. At the end of the 2-year program assessment cycle, the members of the CS department Curriculum Committee analyze the reports of the reviews of the CS program's educational objectives collected in the 2-year assessment cycle in order to make recommendations about its revision.
- D. At the end of the 2-year program assessment cycle, the members of the CS department Curriculum Committee perform the following tasks:
- Analyze the reviews of each program's student outcome from the reports of the analyses of the CCAR data of all the courses that are related to that program's student outcome in order to make recommendations about dropping or revising it.
 - They also review the set of the program's student outcomes to find out whether or not it is consistent with the current program educational objectives and with the current ABET's student outcomes and then make recommendations to add, drop, or revise some program's student outcomes based on this review.

The process of reviewing/revising the program's student outcomes is provided in Appendix C.

- E. At the end of the 2-year program assessment cycle, the members of the CS department Assessment Committee and the members of the CS department Curriculum Committee subgroups analyze the assessment data of each program's student outcome (from the FCARs and the Senior Exit Survey reports) in order to make sure that the program prepares graduates to attain the program educational objectives and that it enables students to attain the current ABET's student outcomes (specified in the General Criterion 3) and then make suggestions for performance improvements. The process of assessing the program's student outcomes and of analyzing the assessment data in order to make suggestions for students' performance improvements on these student outcomes is provided in Appendix E. The reports of the analyses are provided using the form in Appendix F.

Appendix A

Faculty Course Assessment Reports (FCARs)

- **Every semester**, the tests/quizzes, lab assignments, reports, presentations, and final exams of courses are used to assess the performance levels of students on the CS program's student outcomes as indicated on the following table.

Students Outcomes	• Assessed in the following courses:
S1 Effectively communicate in written and oral forms.	CS 3410, CS 3450, CS 3500, CS3820, CS4800
S2 Demonstrate competence in mathematical skills (discrete structures, differential and integral calculus, and Probability and statistics).	CS 2600, CS 2800, Math Courses
S3 Demonstrate competence in scientific principles and methods.	Science Courses(Bio II, Chem II, Phys II)
S4 Work effectively as part of a team in a software or hardware project.	CS 3410, CS 3500, CS4800
S5 Demonstrate abilities to locate and make effective use of information.	CS 3450, CS 3820, CS 4800
S6 Demonstrate abilities to select appropriate data structures and to design algorithm to solve problems.	CS 3420
S7 Demonstrate an understanding of programming language concepts.	CS 3820
S8 Demonstrate an understanding of the major programming domains and the knowledge of the most appropriate programming language for each domain.	CS 3820
S9 Be able to develop programs in two or more major programming languages on at least two platforms.	CS 3450, CS3820
S10 Demonstrate competence in computer organization and architecture.	CS 2800, CS 3410
S11 Demonstrate an ability to use software engineering principles to analyze and design large software projects.	CS 3500
S12 Demonstrate an understanding of the ethical and legal issues for computing professionals and the impact of computing technology in society.	CS 4800

- How well students have performed for each student outcome that a course is identified to assess is specified by listing the specific source(s) for the assessment (test questions, project report/presentation, observation, etc.) and the results of the evaluation are presented in the following form:

Objective: <write the objective being evaluated>

Data Collected:

Method of Collection:

Performance Levels	Frequency	Percentage
Some Ability (level of performance of D)		
Adequate Ability (level of performance C)		
More than Adequate Ability (level of performance of B)		
High Ability level of performance of A)		

Observation:

The instructor of the course writes his/her observation about the program's student outcome assessment data and also makes his/her recommendations on how students' performance could be improved.

NOTE: Students with a grade of F in the course are removed from the assessment data. The reason being that students fail a course for reasons that are not always academic.

Appendix B

William Paterson University of New Jersey
College of Science and Health - Department of Computer Science
Review of the CS Program Educational Objectives

Reviewer Name: _____

Reviewer Occupation and Title: _____

Date: _____

Please review each of the following CS Program's educational objectives and write your comments and/or suggestions in the space provided. Your comments and/or suggestions will be used at the end of our 2-year assessment cycle for the revision of the CS program educational objectives.

Objective 01:

To create an environment conducive to learning through teaching, research and creative activities.

Suggestions/Comments:

Objective 02:

To promote student success, academic excellence, and community outreach with opportunities for lifelong learning.

Suggestions/Comments

Objective 03:

To actively challenge students to high levels of intellectual and professional accomplishment and personal growth in preparation for careers and advanced studies in computing, and productive citizenship.

Suggestions/Comments

Objective 04:

To provide students with a sound foundation in mathematics, science, computer science, and the application of this knowledge, which will equip them either to enter careers or pursue advanced studies in computing

Suggestions/Comments

Objective 05: To develop students' ability to communicate well, both orally and in writing.

Suggestions/Comments**Objective 06:**

To develop students' understanding of the ethical and moral issues for computing professionals and the impact of computing technology in society.

Suggestions/Comments**Objective 07:**

To develop a curriculum with core materials that provide our graduates with the fundamental knowledge of algorithms, data structures, software design, concepts of programming languages, computer organization and architecture, and advanced course work that provides them with breadth of knowledge, and also builds on the core materials to provide them with some depth of knowledge.

Suggestions/Comments

Objective 08: To emphasize theoretical foundations, problem analysis and solution design throughout the program.

Suggestions/Comments**Additional Suggestions/Comments**

Appendix C

The Process for the periodic review and revision of the program's student outcomes follows:

1. At the end of our 2-year program assessment cycle, the course coordination committee members of each course that is related to a program's student outcome review that course coverage and practices based on the information provided in the Course Coverage Assessment Reports (CCAR) of that course collected in the 2-year program assessment cycle to find out whether or not the student outcome is effectively assessed in the course. The reports of these reviews are returned to the chair of the Curriculum Committee.
2. At the end of the 2-year program assessment cycle, the members of the department Curriculum Committee do the following:
 - a. Review each program's student outcome to make sure that it can be attained based on the reports of the analyses of the CCARs of all the courses related to that program's student outcome and to make recommendations about dropping or revising that student outcome.
 - b. Review the set of the program's student outcomes to find out whether or not it is consistent with the current program educational objectives and to make recommendations to add, drop, or revise some program's student outcomes based on this review.
 - c. Review the set of the program's student outcomes to find out whether or not it is consistent with the current ABET's student outcomes (specified in General Criterion 3) and to make recommendations to add, drop, or revise some program's student outcomes based on this review.

The program's student outcomes are reviewed based on the reports of the analyses of the CCARs of courses as specified in the following table:

Students Outcomes	Reviewed based on the reports of the Analysis of the CCARs of the following Courses::
<p style="text-align: center;">S1</p> <p>Effectively communicate in written and oral forms.</p>	<p>CS 3410, CS 3450, CS 3500, CS3820, CS4800</p>
<p style="text-align: center;">S2</p> <p>Demonstrate competence in mathematical skills (discrete structures, differential and integral calculus, and Probability and statistics).</p>	<p>CS 2600, CS 2800, Math Courses</p>
<p style="text-align: center;">S3</p> <p>Demonstrate competence in scientific principles and methods.</p>	<p>Science Courses(Bio II, Chem II, Phys II)</p>
<p style="text-align: center;">S4</p> <p>Work effectively as part of a team in a software or hardware project.</p>	<p>CS 3410, CS 3500, CS4800</p>
<p style="text-align: center;">S5</p> <p>Demonstrate abilities to locate and make effective use of information.</p>	<p>CS 3450, CS 3820, CS 4800</p>
<p style="text-align: center;">S6</p> <p>Demonstrate abilities to select appropriate data structures and to design algorithm to solve problems.</p>	<p>CS 3420</p>
<p style="text-align: center;">S7</p> <p>Demonstrate an understanding of programming language concepts.</p>	<p>CS 3820</p>
<p style="text-align: center;">S8</p> <p>Demonstrate an understanding of the major programming domains and the knowledge of the most appropriate programming language for each domain.</p>	<p>CS 3820</p>
<p style="text-align: center;">S9</p> <p>Be able to develop programs in two or more major programming languages on at least two platforms.</p>	<p>CS 3450, CS3820</p>
<p style="text-align: center;">S10</p> <p>Demonstrate competence in computer organization and architecture.</p>	<p>CS 2800, CS 3410</p>
<p style="text-align: center;">S11</p> <p>Demonstrate an ability to use software engineering principles to analyze and design large software projects.</p>	<p>CS 3500</p>
<p style="text-align: center;">S12</p> <p>Demonstrate an understanding of the ethical and legal issues for computing professionals and the impact of computing technology in society.</p>	<p>CS 4800</p>

Appendix D

Analysis of the Course Coverage and Assessment Report Data

Course Number: _____

Course Coordination Committee Members: _____

Date: _____

A. Course Prerequisites/Co-requisites

a) **Problems/Issues Identified:**

b) **Suggestions for Improvement**

B. Course Objectives

a) **Problems/Issues Identified:**

b) **Suggestions for Improvement**

C. Course Student Learning Outcomes

a) **Problems/Issues Identified:**

b) **Suggestions for Improvement**

D. Course Content

a) **Problems/Issues Identified:**

b) **Suggestions for Improvement**

E. Assessment of the CS Program's Student Outcomes

Appendix E

The process for the periodic assessment of the program's student outcomes and for the analysis of the assessment data follows:

1. Each program's student outcome is assessed every semester using the Faculty Course Assessment Report (FCAR) of the courses as specified in the table in Appendix A.

How well students have performed for each student outcome that a course is identified to assess is specified by listing the specific source(s) for the assessment (test questions, project report/presentation, observation, etc.) and the results of the evaluation are presented in the form also provided in Appendix A..

2. At the end of the 2-year program assessment cycle, the members of the CS department Assessment Committee and the members of the CS department Curriculum Committee subgroups analyze the assessment data of each program's student outcome (from the FCARs) in order to make sure that the program prepares graduates to attain the program educational objectives and that it enables students to attain the current ABET's student outcomes (specified in the General Criterion 3) and then make suggestions for performance improvements. The analyses of the assessment data are performed as specified in the table that follows, and the reports of the analyses are provided using the form in Appendix F.

Student Outcome	Analysis done by:	Report Based On:	Other Courses
S1	Department Assessment Committee	FCARs of CS 3410, CS 3450, CS 3500, CS3820, and CS4800.	
S2	Department Assessment Committee	FCARs of CS 2600, CS 2800, and Math Courses.	
S3	Department Assessment Committee	FCAR of Science Courses (Bio II, Chem II, Phys II).	
S4	Department Assessment Committee	FCARs of CS3410, CS3500, and CS4800.	
S5	Department Assessment Committee	FCARs of CS3450, CS3820, and CS4800.	
S6	Data structures and algorithms Curriculum Committee Subgroup	FCAR of CS3420.	CS2300, CS2400, and CS2600
S7	Programming languages Curriculum Committee Subgroup	FCAR of CS3820.	CS2300, CS2400, CS2600, and CS3420
S8	Programming languages Curriculum Committee Subgroup	FCAR of CS3820.	
S9	Computer Organization, Systems, and Networks	FCARs of CS3450 and CS3820.	
S10	Computer Organization, Systems and Networks Curriculum Committee Subgroup	FCARs of CS2800 and CS3410.	
S11	Software Analysis Curriculum Committee Subgroup	FCAR of CS3500	CS2400 and CS3420
S12	Department Assessment Committee	FCAR of CS4800	

Appendix F

Analysis of Program's Student Outcome Assessment Data

Curriculum Committee Subgroup Name: _____

Members: _____

Date: _____

Updated On: _____

Learning Outcome: *<state the program's student outcome>*

ABET's Related Student Outcomes: *<List the ABET related student outcomes>*

A. Analysis of the Assessment Data

B. Suggestions for Improvement

C. Improvements Implemented:

D. List all the "performance level/frequency/percentage" tables and their sources.

Appendix G

Course: _____

Instructor: _____

Semester: _____

I. Course Coverage

A. Complete a table with the following headings as follows:

1. List all the topics covered in the course.
2. List the course learning outcomes that are related to a topic.
3. Specify how each topic is covered in the course.
4. Specify how the knowledge about a topic and or the corresponding learning outcomes is assessed.
5. Write comment(s) or suggestion(s) about the topic and or learning outcomes.

Topics ¹	Course Learning Outcome ²	How is topic Covered? ³			How is Knowledge assessed? ⁴			Comments/Suggestions About Learning Outcome and/or Topics (please use additional sheets if necessary) ⁵
		Lecture	Hands-On	HW	Test	Lab	Project	

B. Comments/Suggestions about course Prerequisites and Co-requisites

C. Comments/Suggestions about course objectives

D. Comments/Suggestions about Learning Outcome

E. Comments/Suggestions about course content

F. General Comments/Suggestions about the Course

II. Course Learning Outcomes Assessment

A. Complete the following table as follows:

1. List all the course learning outcomes.
2. Specify where or how each learning outcome is assessed.
3. Specify the percentage of students in the class who have received a score of a least 70% on the question(s) used to assess each learning outcome.

Learning Outcomes ¹	Where Measured ²	Percentage of Satisfactory Results ³
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B. Analyze the course learning outcomes assessment data and make suggestions for addressing deficiencies.

Appendix H

William Paterson University of New Jersey College of Science and Health - Department of Computer Science Senior Exit Survey

The department of Computer Science at William Paterson University of New Jersey is committed to continuously assessing and improving its undergraduate curriculum leading to the BS degree in computer science. As a student soon to graduate, your input will be valuable in this process. Would you please help us by answering the following survey? Your answers are confidential and will only be used as summary information. There are no identifying questions on this survey so please express your self freely.

Please use a pen or a pencil and fill in the appropriate circle with your response.

Part I. Personal Information

1. When you declared computer science as your major, were you:

- A first-time college student
- A major from another department
- A transfer student from a two-year institution
- A transfer student from a four-year institution

2. Knowing what you know now, how well prepared were you for basic science and math courses when you declared your major?

- Not at all
- Lightly
- Moderately
- Very well prepared

3. As an undergraduate, were you enrolled primarily as a:

- Full-time student
- Part-time student

4. As an undergraduate were you primarily:

- Not employed
- Employed on campus part-time while taking classes
- Employed off campus part-time while taking classes
- Employed full time while taking classes

5. As an undergraduate, how active have you been in a student chapter of a professional society or computing organization?

- Not at all
- Somewhat
- Moderately
- Highly

6. Are you currently employed or did you get a job offer?

- Yes
- No

7. If you answered Yes to the previous question, please tell us about your salary range:

- Below \$30 k
- \$ 30 k - \$40 k
- \$40 k - \$50 k
- More than \$50 k

8. Are you planning to attend graduate school?

- Yes
- No

Part II Assessment of the Computer Science Program’s Student Outcomes

9. Thinking about your in-class and out-of-class experiences, please tell us how these courses helped your ability to do the following:

Student Outcomes	No Ability	Some Ability	Adequate Ability	More than Adequate Ability	High Ability
Effectively communicate in written and oral forms.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate abilities to apply knowledge of mathematics to the discipline of computer science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work effectively as part of a team in a software or hardware project.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate abilities to locate and make effective use of information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate abilities to select appropriate data structures and to design algorithm to solve problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate an understanding of programming language concepts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate an understanding of the major programming domains and the knowledge of the most appropriate language for each domain.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate an understanding of computer systems and their networking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate an ability to use software engineering principles to analyze and design large software projects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Demonstrate an understanding of the ethical and legal issues for computing professionals and the impact of computing technology in society.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment on the strengths and weaknesses of our program in providing the opportunity to learn or develop each of the above student outcomes (if you need more spaces, feel free to add extra pages):

Strengths:

Weaknesses:

Part III Assignments, Learning Activities, and Advisement

10. How often did the following occur in the courses you took in this department?

	Almost Never	Occasionally	Often	Almost Always
Assignments and class activities were clearly explained.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructors made clear what was expected of students in the way of activities and effort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worked cooperatively with other students on course assignments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I interacted with other students in the course outside of class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We did things that require students to be active participants in the teaching and learning process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructors gave me frequent feedback on my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I interacted with the instructors as part of the course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I interacted with the instructors outside of class (including office hours, advising, socializing, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment on your experiences with assignments, learning activities and advisement in your department:

Part IV Computing Resources and Hands-On Experience

11. Please indicate the extent to which you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I had adequate and reasonable access to the systems needed for each course.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was exposed to a variety of programming languages and systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Documentation for hardware and software was readily accessible to students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were adequate support personnel to install and maintain the computing facilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sufficient instructional assistance was provided for the laboratories and the computing facilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Please let us know the approximate length of the longest program that you have designed and implemented as a computer science major.

- 200 line or less
- 201 - 500 lines
- 501 – 1000 lines
- More than 1000 lines

13. What is the number of oral presentations, if any, that you have given as part of the requirements of your CS courses.

- None
- One
- 2 – 5
- 6 or more

14. Approximately, what number of written reports, publications, or other documents were required as part of your CS course work (excluding programs)?

-
- None
- One
- 2 – 5
- 6 or more

15. What is the number of team projects that you have participated in as part of your CS course work?

- None
- One
- 2 – 5
- 6 or more

16. How many, if any, Colloquium/Conference presentations did you attend while you were a CS major?

- None
- One
- 2 – 5
- 6 or more

As a computer science major, please comment on your experiences using the computing resources at WPUNJ:

Hands-on experiences are part of the computer science course work here at WPUNJ. Did you find them helpful; if so how? Or if you did not find them helpful what could we do to improve these experiences?

Finally, please feel free to comment on your personal experiences as a computer science major at WPUNJ: (if you need more spaces, feel free to add extra pages):

Thank you very much for your help. Good luck in your future endeavors!