BSCS-CS
Bachelor of Science in Computer Science Assessment Plan

University Mission

The University of Cincinnati (UC) serves the people of Ohio, the nation, and the world as a premier, public, urban research university dedicated to undergraduate, graduate, and professional education, experience-based learning, and research. We are committed to excellence and diversity in our students, faculty, staff, and all of our activities. We provide an inclusive environment where innovation and freedom of intellectual inquiry flourish. Through scholarship, service, partnerships, and leadership, we create opportunity, develop educated and engaged citizens, enhance the economy and enrich our university, city, state and global community.

College Mission

The mission of the College of Engineering and Applied Science (CEAS) is to provide:

- *Excellence in Education - provide a world-class education for our students*
- *Excellence in knowledge creation and transfer in support of education and community - provide the best education featuring new breakthroughs in science and technology and be able to transfer that knowledge of science technology both to our students and to our local community*
- *Accessibility - provide a venue where qualified students who want to come, can come; and provide the support necessary to allow them to be successful*

Program Mission

Our mission is to graduate computer scientists who will create innovative algorithms and high-quality software; who will design, develop, maintain, and evaluate successful software solutions within challenging industrial and academic environments; and who will continue to prosper in their professional careers.

Program Educational Objectives

Within a few years of earning the baccalaureate degree in Computer Science at the University of Cincinnati, our graduates are expected to achieve one or more of the following objectives:

- Develop successful careers in Computer Science or closely related fields, demonstrating professional competence via promotions and/or positions of increasing responsibility.
- Successfully complete or pursue graduate education in Computer Science or related fields or participate in professional development and/or industrial training courses.
- Participate in research and development, and other creative and innovative efforts in science, engineering and technology, and/or pursue entrepreneurial endeavors.
- Transition into an education, business, legal, medical, or government career, and demonstrate a commitment to the community and profession through involvement with community and/or professional organizations.

Student Outcomes

Student Outcomes prepare graduates to attain the program educational objectives. There must be a documented and effective process for the periodic review and revision of these student outcomes. The program must enable students to attain, by the time of graduation:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline

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

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

(d) An ability to function effectively on teams to accomplish a common goal

(e) An understanding of professional, ethical, legal, security and social issues and responsibilities

(f) An ability to communicate effectively with a range of audiences

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

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

(i) An ability to use current techniques, skills, and tools necessary for computing practice.

(j) 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

(k) Apply design and development principles in the construction of software systems of varying complexity

(l) Apply mathematical foundations and database principles to model information

(m) Already have experience working in computer-related jobs or in some area of computer science research.

Figure 1. Computer Science Curriculum

COMPUTER SCIENCE (CS)_____ CLASS OF 2017
Name: Last, First, ID Minimum 123 SH

Fall 2012

CHEM	1040	Gen Chemistry I.....	4
CHEM	1040L	Gen Chem Lab I.....	1
ENED	1020	Engrg Foundations..	2
ENED	1090	Engineering Models I	2
ENGL	1001	English Composition	3
MATH	1061	Calculus I.....	4
Total	SH		16

Spr 2013

SCIEN	ELEC*	_____	4
SCIEN	LAB*	_____	1
CS	1021C	Computer Science I	4
ENED	1091	Engineering Models II	2
MATH	1062	Calculus II.....	4
PD	1011	COOP for CEAS.....	1
Total	SH		16

*BIOL1081,CHEM1041, PHYS2001
BIOL1081L,CHEM1041L,PHYS2001L

Fall 2013

BoK	_____	_____	3
CS	1022C	Computer Science II	4
CS	2010C	Intro Comp. Systems	4
MATH	2076	Linear Algebra.....	3
COOP	2011	Practice Eval #	
Total	SH		14

Sum 2014

BoK	_____	_____	3
CS	2028	Data Structures	3
CS	2071	Discrete Structures	3
ENGL	2089	Intermediate Comp.	3
STAT	2037	Prob. & Statistics I	3
COOP	2012	Practice Eval #	
Total	SH		15

Spr 2015

BoK	_____	_____	3
BoK	_____	_____	3
CS	4003	Program. Languages	3
CS	4092	Database Design....	3
EECE	3093	Software Engineering	3
EECE	3093L	Software Engn. Lab	1
COOP	3011	Practice Eval #	
Total	SH		16

Fall 2015

BoK	_____	_____	3
CS	ELEC	_____	3
CS	4071	D&A Algorithms.....	3
EECE	4029	OS & Syst. Prog.....	3
ENGL	4092	Technical Writing...	3
PD	4001	Prof. Development....	1
COOP	4011	Practice Eval #	
Total	SH		16

Fall 2016

BoK	_____	_____	3
CS	ELEC	_____	3
CS	ELEC	_____	3
GEN	ELEC	_____	3
CS	5001	CS Senior Design I	3
COOP	4012	Practice Eval #	
Total	SH		15

Spr 2017

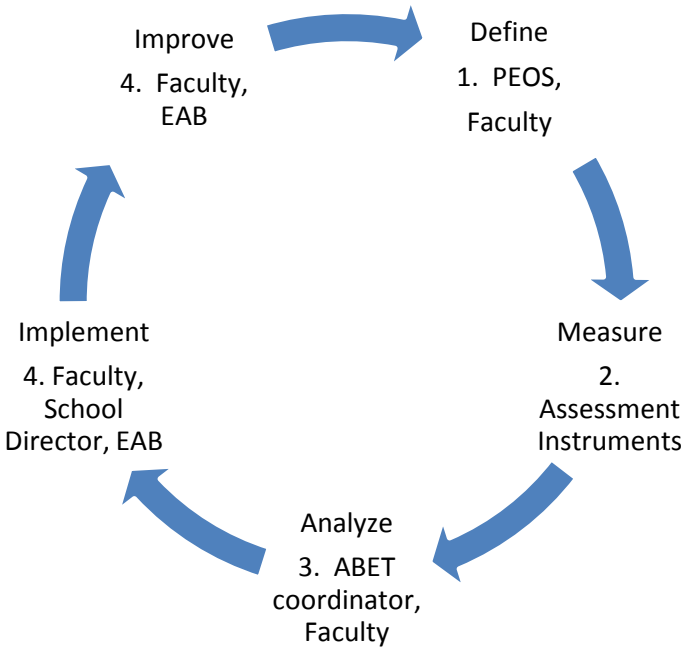
CS	ELEC	_____	3
CS	ELEC	_____	3
CS	ELEC	_____	3
GEN	ELEC	_____	3
CS	5002	CS Senior Design II	3
Total	SH		15

Take one course from each of two categories FA, HP, HU, & SS.				Take one course from each of two categories DC, SE & TI		
FA	HP	HU	SS	DC	SE	TI

rev. 5/11
v. 21 Jan 13

Figure 2. Graphic Description of CI adapted CEAS 2011 and revised by CS May, 2013

Figure 3. CEAS Computer Science Continuous Improvement



Measure

- Alumni/employer survey: PEOs
- Faculty/Instructor Survey: Student Outcomes
- Senior Survey: Student Outcomes
- Co-op survey: Student Outcomes

Analyze

- PEOs: alumni survey
- SOs: faculty/instructor survey, co-op survey, senior survey
  Curriculum Update: faculty/instructor survey, senior survey

Implement/improve

- Revise PEOs and curriculum
- Develop and Implement new
- Educational initiatives
- Feedback to instructors
- Feedback to Professional Practice

Table 3. CI Assessment Schedule of CS Core Courses 2012-2014

	Student Outcomes													
Course / Year	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	Rubric
Year 1														
CS1021C (CS 1)	x	x	x						x	x				R3
Year 2														
CS 1022 (CS 2)	x	x	x						x	x	x	x		R1
CS2011 (Intro to Comp Sys)	x	x	x						x	x	x	x		R1
CS2028 (Data Structures)	x	x	x						x	x	x	x		R1
CS2071 (Discrete Structures)	x									x		x		R5
Co-op #1				x	x	x	x	x					x	S1
Year 3														
CS4003 (Prog Lang)	x	x	x						x	x	x	x		R1, R5
CS4092 (DB Design)	x			x		x				x		x		R4, R2
EE3093 (s/w eng)	x	x	x	x					x	x	x	x		R1, R2
Co-op #2				x	x	x	x	x					x	S1
Co-op #3				x	x	x	x	x					x	S1
Year 4														
CS4071 (D&A Alg)	x	x	x						x	x				R3
EE4029 (OS)	x	x	x						x	x				R3
Co-op #4				x	x	x	x	x					x	S1
Co-op #5				x	x	x	x	x					x	S1
Year 5														
CS5001 (Des 1)	x				x		x		x	x		x		R6
CS5002 (Des 2)	x			x		x				x		x		R2, R4
Senior Survey								x					x	S2

Figure 4. CI Assessment Schedule of CS Core Courses 2012-2014

Academic Year 2012-2013

Fall Semester	Spring Semester
CS 2011 (Purdy)	CS 1021C (Talaga)
CS 2928 (Talaga)	CS 4003 (Franco)
CS 4071 (Berman)	CS 4092 (Davis)
	CS 5002 (Annexstein)

Academic Year 2013-2014

Fall Semester	Spring Semester
CS 1022 (Staff)	
CS 2071 (Berman)	
EECE 3093 (Cheng)	
EECE 4029 (Franco)	
CS 5001 (Annexstein)	

Table 2. Assessment Instruments

Summary of Assessment Tools and Timeline

Assessment tool	Timeline	Focus	Person in charge
Alumni survey	Annual/April	PEOs	ABET coordinator
Senior survey	Annual/April	SOs, curriculum	ABET coordinator
Faculty/Instructor survey	Every semester	SOs, curriculum	Instructors
Co-op survey (employer survey of CS students)	Annual	SOs	Professional Practice

Collection of Assessment Data

Rubrics applied to the CS courses taught during the 2012-2013 academic year, both the 2012 Fall Semester and 2013 Spring Semester.

Rubric 1 – Course Design Project

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Tech Knowledge (a,j)	Student clearly lacked the requisite knowledge. The project was either not completed or was completed only with an unreasonable amount of outside assistance.	Student demonstrated a low level of requisite knowledge; the student did require some technical assistance from the instructor or others in order to complete the project.	Student demonstrated an acceptable level of requisite knowledge; however, the student required little technical assistance from the instructor or others in order to complete the project.	Student readily applied requisite knowledge and required little or no outside assistance to complete the project.	Student not only applied requisite knowledge, but also applied additional technical knowledge.
Tech Design (b,c,k)	Technical skills from requisite knowledge not evident in design or apply incorrectly. Poorly designed. Little to no evidence of programming skill.	Some technical skills from requisite knowledge evident and applied. Workable design. Some programming skill evident.	An acceptable amount of technical skills from requisite knowledge evident and applied. Average programming skill, brute force solution, no design creativity.	All relevant technical skill from requisite knowledge evident and applied correctly. Good programming skills, elegant solutions, some design creativity.	All relevant technical skills from requisite knowledge evident and applied correctly. Applied outside research/design to solution. Excellent programming skills, elegant solutions, well commented.
Use of Tools (i)	Could not find or use the tools necessary.	Found and used tools in a rudimentary manner.	Found and used tools in an effective but limited way.	Found, used, demonstrated mastery of 'standard' tools taught here.	Found and used the best tools effectively. Used tools not taught.

Rubric 2 – Team Project

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Contribution (d)	Student does not collect and share relevant information and/or useful ideas with team members. Student only participates in discussion when prodded by other team members.	Student does what is asked of him/her in terms of collecting information but nothing extra. Student does offer ideas and suggestions but relies on others to develop the ideas.	Student does a good job of collecting information relevant to the project and readily offers good, well-developed ideas.	Student collects a great deal of relevant information for the project and offers many well-developed, excellent ideas, but does not divide responsibility.	Student collects a great deal of relevant information for the project and offers many well-developed, excellent ideas. Student encourages the participation of all team members and takes a leadership role in an attempt to divide responsibilities evenly.
Responsibility (d)	Student fails to perform many of the assigned tasks on time, misses or shows up late to meetings, and does not participate in any constructive discussion.	Student does complete the assigned tasks but does not really do his/her share of the work – volunteers for very little. Student attends meetings but doesn't contribute a whole lot to the discussion.	Student readily takes on tasks and completes all assignments on time. Does bare minimum.	Student readily takes on tasks and completes all assignments, assists others, but does not take on a leadership role.	Student readily takes on tasks and completes all assignments on time. Student attends all meetings and participates effectively in discussion. Student takes a leadership role in making sure everyone is informed of meeting times, and assignments and deadlines.
Others' Viewpoints (d)	Student is unwilling to listen to alternate approaches, argues with, interrupts, and sometimes insults other team members, and wants things done his/her way.	Student reluctantly listens to the ideas of others. Student is not rude to other team members but can be patronizing and stubborn about getting his/her way.	Student makes an effort to understand all ideas being offered by members of the team and listens carefully when others are speaking. Does not incorporate other's ideas.	Student makes an effort to understand all ideas being offered by members of the team and listens carefully when others are speaking. When in disagreement about an idea offered by another member of the team, student politely explains the problems he/she anticipates.	Student always listens to others and helps them develop their ideas while giving them full credit. Student takes a leadership role in trying to ensure that all members of the team are given an opportunity to speak and discussion remains polite and on-task.

Rubric 3 – Exam/Tests on Subject Matters

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Software Design (b,c,j)	Cannot devise a feasible solution to a design problem.	Devises a workable solution, but not designed well.	Devises a workable solution using a standard approach.	Devises a good workable solution.	Devises an excellent out-of-the-box workable solution.
Tool Usage (i)	Cannot describe what or how to use a tool in a given situation.	Describes a tool and its use which would work, but not the best tool for the job.	Describes multiple tools and how they may be used to solve the problem.	Describes what and how to use a good tool to solve the problem in a standard way. User, not master.	Describes an innovative use of a tool to solve the problem. Shows mastery.
Understand Design Tradeoffs (j)	Does not understand any tradeoffs exist.	Understand that tradeoffs exist, but cannot clearly identify or solve them.	Understand tradeoffs exist, but can only propose 2 or 3 solutions. Does not fully comprehend all possibilities.	Understands tradeoffs exists, can propose solutions, but can't effectively evaluate them all.	Understands tradeoffs and can devise a handful of solutions and effectively evaluate all.
Tech Knowledge (a,j)	Student clearly lacked the requisite knowledge . The project was either not completed or was completed only with an unreasonable amount of outside assistance.	Student demonstrated a low level of requisite knowledge; the student did require some technical assistance from the instructor or others in order to complete the project.	Student demonstrated an acceptable level of requisite knowledge; however, the student required little technical assistance from the instructor or others in order to complete the project.	Student readily applied requisite knowledge to the project and required little or no outside assistance to complete the project.	Student not only applied requisite knowledge but also applied additional technical knowledge gained through co-op/work experience or through extra research.

Rubric 4 – Oral Presentation

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Subject Knowledge (a, j)	Student does not have a grasp of the technical information and had difficulty answering questions.	Student has a fairly good grasp of the technical information in the presentation but had trouble answering some questions that required detail beyond what was included in the presentation.	Student demonstrated a good grasp of the technical information but had difficulty answering questions.	Student demonstrated a good grasp of the technical information and answered questions with ease.	Student was extremely knowledgeable about the subject, had clearly done a lot of research, and answered all questions with clear, detailed explanations
Organization (f)	Presentation is difficult to understand because there is no clear sequence of information. Student jumps around too much.	Presentation is understandable but could have been better organized.	Information is presented in a logical sequence but difficult to follow	Information is presented in a logical sequence which the audience can easily follow.	Presentation was carefully thought out in terms of presenting the information in a clear, logical, and interesting manner.
Graphics (f)	Student uses superfluous graphics or no graphics.	Student makes very limited use of relevant graphics.	Student uses graphics to illustrate the text and make the presentation clear and interesting.	Student uses graphics that illustrate technical information clearly.	Student makes very effective use of visually appealing graphics that keep the audience interested and illustrate the technical information well.
Mechanics (f)	Slides are not used effectively in the presentation. The slides appear to be put together at the last minute and have numerous mistakes: too much small text on a slide, diagrams that are too small to read, and/or spelling and grammatical errors.	Very little thought was put into creating effective slides. There are no glaring errors but the slides are not interesting to the audience – mostly just a series of text.	Slides are effective in supplementing the presentation. All text and graphics are easily readable, and convey the main points of the presentation well.	Slides are readable, cover mail points and presentation is well organized and flows smoothly.	Very professional slide presentation. Slides are carefully formatted with text that is sized well and graphics that effectively illustrate the main points of the presentation. Careful attention was given to color, background, and font. Slides flow smoothly with the presentation.
Delivery (f)	Student is clearly uncomfortable in giving the presentation, speaks too softly, and stumbles on words or mispronounces technical terms. Student reads the presentation from the power-point slides with no eye contact.	Student is somewhat nervous about the presentation and on occasion speaks too softly or stumbles on words. Student maintains some eye contact but still does a lot of reading from the power-point slides.	Student is at ease giving the presentation. Student speaks in a clear voice which is easily heard and understood by the audience. Student maintains eye contact most of the time but does refer to notes several times – not to read but to check the outline.	Student appears confident and at ease with the audience. Maintains eye contact with audience.	Student gives a very polished, professional presentation and appears to be completely at ease with the audience. Student maintains eye contact with the audience and only uses the slides to point out diagrams or graphs.

Rubric 5 - Mathematics

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Tech Knowledge (a,j)	In assessments and examinations, student clearly lacked the requisite knowledge in mathematics.	In assessments and examinations, student demonstrated low level of requisite knowledge in mathematics.	In assessments and examinations, student demonstrated an acceptable level of requisite knowledge in mathematics.	In assessments and examinations, student readily demonstrated requisite knowledge in mathematics.	In assessments and examinations, student not only applied requisite knowledge but also applied additional technical knowledge.

Rubric 6 – Senior Design Project

	1 Unacceptable	2 Poor	3 Average	4 Good	5 Exemplary
Real-world relevance (g)	Shows no clear relevance to real world concerns.	Shows only minor relevance to real world concerns.	Shows some relevance to real world concerns.	Shows clear relevance to real world concerns.	Shows clear and compelling relevance to real world concerns.
Consideration of legal/security/social implications (e)	Shows no clear consideration of social implications.	Shows only minor consideration of social implications.	Shows some consideration of social implications.	Shows clear consideration of social implications.	Shows clear and compelling considerat ion of social implications.
Choice of Tools (i)	Could not find or use the tools necessary.	Found and used tools in a rudimentary manner.	Found and used tools in an effective but limited way.	Found, used, demonstrated mastery of 'standard' tools taught here.	Found and used the best tools effectively. Used tools not taught.
Tech Knowledge (a,j,l)	Student clearly lacked the requisite knowledge. The project was either not completed or was completed only with an unreasonable amount of outside assistance.	Student demonstrated a low level of requisite knowledge; the student did require some technical assistance from the instructor or others in order to complete the project.	Student demonstrated an acceptable level of requisite knowledge; however, the student required little technical assistance from the instructor or others in order to complete the project.	Student readily applied requisite knowledge and required little or no outside assistance to complete the project.	Student not only applied requisite knowledge, but also applied additional technical knowledge.