2+2 Articulation Agreement for Community College of Baltimore County and Towson University

Associate's Degree: A.S. in Computer Science
Bachelor's Degree: B.S. in Computer Science
Effective Term: Fall 2021

Section 1: Course Completion Plan for CCBC

This section outlines the courses to take for the Community College of Baltimore County (CCBC) general education and program requirements in order to complete both the CCBC and TU degrees within a total of 4 years and 120 credits. The following tables do not include any nontransferable or prerequisite coursework outside of the curriculum.

Table 1: General Education Courses Applied to TU Core Curriculum

CCBC Requirement	CCBC Course to Take	Credits	Towson University Equivalent Course
English Composition	ENGL 101 College Composition I	3	ENGL 102 Writing for a Liberal Education
Mathematics	MATH 251 Calculus I	4	MATH 273 Calculus I
Arts & Humanities	CMNS 101 Fundamentals of Communication	3	COMM 131 Public Speaking
Arts & Humanities	Any arts & humanities course.	3	Equivalency will vary by course.
Social & Behavioral Sciences	Any social & behavioral science course.	3	Equivalency will vary by course.
Social & Behavioral Sciences	Any social & behavioral science course.	3	Equivalency will vary by course.
Biological & Physical Sciences	**Take two of the following options:** ASTM 101 Astronomy & ASTM 102 Astronomy Laboratory BIOL 110 Biology I: Molecular & Cell BIOL 111 Biology II: Ecology & Evolution CHEM 131 General Chemistry I ERSC 121 Physical Geology & ERSC 122 Physical Geology Lab PHYS 151 General Physics I PHYS 152 General Physics II	8	**Equivalency varies by course:** ASTR 161 The Sky & the Solar System BIOL 200 & BIOL 200L Biology I: Intro to Cell Biology & Genetics Lecture & Lab BIOL 206 & BIOL 206L Biology II: Intro to Ecology & Evolution Lecture & Lab CHEM 131 & CHEM 131L General Chemistry I Lecture & Lab GEOL 121 Physical Geology PHYS 241 General Physics I Calculus-Based PHYS 242 General Physics II Calculus-Based

CCBC Requirement	CCBC Course to Take	Credits	Towson University Equivalent Course
Information Technology	CSIT 111 Logic & OO Design	3	COSC 175 General Computer Science
Program Requirement	MATH 243 Discrete Mathematics	4	MATH 263 Discrete Mathematics

Total general education applied to the TU Core Curriculum: 34 credits

Completing the courses above will satisfy the general education program at CCBC. TU will transfer these courses without a course-by-course match to the Core Curriculum requirements. See section 2 for details.

Table 2: Program Requirements and Electives Applied to TU Degree

CCBC Requirement	CCBC Course to Take	Credits	Towson University Equivalent Course
Program Requirement	CSIT 210 Introduction to Programming	4	COSC 236 Introduction to Computer Science I
Program Requirement	CSIT 211 Advanced Programming	4	COSC 237 Introduction to Computer Science II
Program Requirement	CSIT 214 C++ Programming	4	COSC TLL Computer Science Elective
Program Requirement	MATH 252 Calculus II	4	MATH 274 Calculus II
Program Requirement	MATH 257 Linear Algebra	4	MATH 265 Linear Algebra
Program Electives	Any approved program elective courses.	7-8	Equivalencies will vary by course.

Total program requirements applied to the TU degree: 27-28 credits
Total transferred to TU: 61-62 credits

Students may transfer a maximum of 64 credits. If students do not adhere to the courses outlined above in Tables 1 and 2, they are not guaranteed completion of the bachelor's degree in 2 years. Refer to section 2 for specific course details and transfer planning information.

Section 2: CCBC Course Selection & Transfer Details

This section explains any specific course selections made in section 1 and provides transfer planning guidance specific to this degree plan. Students must follow the course selections outlined in this document. If students do not complete any or all of the courses outlined in this agreement, they will be required to complete outstanding requirements at TU.

GENERAL EDUCATION

Students must note the following general education requirements and information:

- When a course selection is not specified for a general education requirement, students may choose any approved course for that requirement at CCBC. Course selections for general education requirements are specified in this agreement only if they are specified in the CCBC catalog or if they will satisfy a TU major requirement.

- **Arts & Humanities:** Students must take CMNS 101 Fundamentals of Communication as one of their Arts & Humanities courses in order to satisfy the TU major requirement of COMM 131. This course must be complete with a C or higher for the major.

- **Arts & Humanities** or **Social/Behavioral Sciences**: Take an approved **diversity course** in at least one of these general education areas to satisfy CCBC degree requirements.

- **Biological & Physical Sciences**: Students must use the Biological & Physical Sciences requirement to satisfy the lab science requirement in the TU Computer Science major. Any two courses listed in Table 1 may be; students are not required to complete a course sequence. For separate lecture and lab courses, both the lecture and lab must be completed in order to satisfy the major requirement. Lab sciences must be completed with a C or higher to apply to the major.

- **Total General Education Credits**: Though the CCBC degree requires only 30 credits of general education, TU will recognize the program requirement MATH 263 as an additional general education course in order to satisfy the TU Core Curriculum with a core package.

The following information explains the transfer of students' general education courses:

- TU will recognize the courses in Table 1 (see section 1) as a completed general education program. Students will receive a core package that satisfies most of the TU Core Curriculum without the need for course-by-course placement in specific Core Curriculum requirements.

- Students will only need to complete two Core Curriculum requirements at TU: Advanced Writing Seminar (Core 9) and Ethical Perspectives (Core 14). Students will only need to complete two Core Curriculum requirements at TU: Advanced Writing Seminar (Core 9) and Ethical Perspectives (Core 14). Both of these requirements will be satisfied by upper-level courses required by the Information Systems major at TU (see section 3). Students who take an ethics course at CCBC will be required to complete a different Core Curriculum requirement than Core 14 and will still be required to complete the COSC 418 course required for the major at TU.

PROGRAM REQUIREMENTS
Students must note the following information regarding their program requirements at CCBC:

- Both **CSIT 210 Introduction to Programming** and **CSIT 211 Advanced Programming** must be completed with a C or higher in order to transfer as COSC 236 and COSC 237. If students do not complete both courses with a C or higher, they will transfer as elective credit.
- **CSIT 214 C++ Programming** is typically equivalent to COSC 175 at TU. However, since CSIT 111 also transfers as COSC 175, TU will transfer CSIT 214 as a lower-level computer science elective (COSC TLL) for this agreement.

PROGRAM ELECTIVES
Students may take any courses from the list of approved program electives in the CCBC program. At least one course must be taken for 4 credits. Students should refer to the current CCBC catalog for their elective course options.

DEGREE COMPLETION INFORMATION
Students must note the following information about completing their A.S. degree at CCBC:

- CCBC requires any student who is new to college to take ACDV 101 Academic Development: Transitioning to College. Students must provide an official transcript(s) from an accredited institution to document successful completion of college coursework for the ACDV 101 requirement to be waived. This 1-credit course is designed to be taken in the first semester at CCBC. ACDV 101 transfers to TU as a general elective.
- The CCBC computer science program is designed for students who are calculus-ready at the start of their enrollment. MATH 251 Calculus I requires a prerequisite for enrollment which may include completion of additional CCBC courses, passing a placement exam, or department approval. Students who need to complete MATH 165 Pre-calculus II prior to enrolling in MATH 251 may count this course as a program elective.

Section 3: Degree Requirements to Be Completed at TU

This section outlines the degree requirements for students transferring into the Computer Science major. This major is designed to prepare students for careers as computer scientists in government, business, industry and education, or for further study in graduate school. The major offers optional tracks in Cyber Operations or Software Engineering. Refer to section 4 for track information and university-wide degree requirements.

CORE CURRICULUM REQUIREMENTS: 6 UNITS
Core 9 Advanced Writing Seminar – Satisfied by ENGL 317 in the major.
Core 14 Ethical Perspectives – Satisfied by COSC 418 in the major.

MAJOR – REQUIRED COMPUTER SCIENCE COURSES: 26 UNITS
CIS 377 Introduction to Cybersecurity (3 units)
COSC 290 Principles of Computer Organization (4 units)
COSC 336 Data Structures and Algorithm Analysis (4 units)
COSC 350 Data Communications and Networking (3 units)
COSC 412 Software Engineering (3 units)
COSC 439 Operating Systems (3 units)
COSC 455 Programming Languages: Design & Implementation (3 units)
COSC 457 Database Management Systems (3 units)

MAJOR – REQUIRED MATH COURSES: 4 UNITS
MATH 330 Introduction to Statistical Methods (4 units)

MAJOR – COMPUTER SCIENCE ELECTIVES OR TRACK REQUIREMENTS: 12-21 UNITS
Students have the choice to complete the Computer Science major without a track or with a track in Cyber Operations or Software Engineering. Required courses vary by option.

Computer Science Electives (No Track) – 12 units
Select two of the following courses for a total of 6 units:
- COSC 417 Introduction to the Theory of Computing
- COSC 432 Requirements Analysis & Modeling
- COSC 436 Object-Oriented Design & Programming
- COSC 459 Computer Simulation & Modeling
- COSC 461 Artificial Intelligence
- COSC 467 Foundations of Data Mining
- COSC 471 Computer Graphics
- COSC 483 Design & Analysis Algorithms

Select two of the following courses for a total of 6 units:
- COSC 397 Internship in Computer Science or COSC 495 Independent Study
- COSC 431 Selected Topics in Computer Science
- COSC 435 Mobile Application Development
- COSC 440 Operating Systems Security
- COSC 442 Software Quality Assurance and Testing
- COSC 450 Network Security
- COSC 458 Application Software Security
- COSC 465 Robotics
- COSC 484 Web-Based Program

Cyber Operations Track – 21 units
MATH 314 Introduction to Cryptography (3 units)
COSC 340 Systems Programming (3 units)
COSC 440 Operating Systems Security (3 units)
COSC 450 Network Security (3 units)
COSC 458 Application Software Security (3 units)
COSC 481 Case Studies in Computer Security (3 units)
COSC 485 Reverse Engineering and Malware Analysis (3 units)

Software Engineering Track – 18 units
COSC 432 Requirements Analysis & Modeling (3 units)
COSC 436 Object-Oriented Design & Programming (3 units)
COSC 442 Software Quality Assurance and Testing (3 units)
COSC 490 Software Project Practicum (3 units)
Select two the following electives for a total of 6 units:
- COSC 397 Internship in Computer Science
- COSC 435 Mobile Application Development
- COSC 484 Web-Based Program

MAJOR – OTHER REQUIRED COURSES: 0 UNITS
COSC 418 Ethical and Societal Concerns of Computer Scientists (3 units – counted in Core Curriculum requirements)
ENGL 317 Writing for Business and Industry (3 units – counted in Core Curriculum requirements)

GENERAL ELECTIVES: 1-11 UNITS
The total number of required elective units will be determined by the total units transferred and completed within the major.
Electives units can be satisfied by taking additional major electives or courses for personal interests.

Section 4: Additional Requirements & Recommendations for TU Degree Completion

COMPUTER SCIENCE MAJOR TRACK INFORMATION:

- Cyber Operations – This track is recommended for students interested in cybersecurity. Students will learn the latest security theory and applications to prepare themselves for high-demand jobs or graduate study in the cybersecurity field.
- Software Engineering – This track is recommended for students interested in the design, implementation and support of software programs. This track will prepare students for high-demand jobs or graduate study in the field of software engineering and development.

BACHELOR'S DEGREE REQUIREMENTS FOR ALL STUDENTS:

- A C (2.0) or higher is required in all major courses and prerequisites.
- A cumulative grade point average (GPA) of 2.0 is required.
- 32 units of the bachelor's degree must be completed at the upper level (courses numbered 300 or above).

Degree Completion Summary

Total Units Required for B.S. Degree	**120 UNITS**
CCBC A.S. Degree in Computer Science	**61-62**
Completion of Core Curriculum at TU	**6**
Computer Science Major Coursework at TU	**42-51**
General Electives Taken at TU	**1-11**

Update of Agreement

This agreement was originally published under a Memoranda of Understanding (MOU) between CCBC and TU. The MOU signed October 15, 2018 made this agreement effective for five years. This updated agreement reflects a change in TU's transfer policy to allow for the transfer of ACDV 101 as well as changes to course and program titles. This revised agreement has been approved by both CCBC and TU and remains effective through October 2023.