SOFTWARE DEVELOPMENT, ADVANCED CERTIFICATE

College(s): DA, HW, KK, MX, OH, TR*, WR

Program Code: 0441

In an increasingly digital world, software development is key to the technology we use in our daily lives. There is now a growing need for software developers to create new mobile applications and software services in a variety of businesses and fields. City Colleges' Software Development program teaches students several in-demand programming languages, including Python, C++, Java and JavaScript. Through the courses, students will learn the whole life cycle of software and be ready to meet employer demands.

The Advanced Certificate provides a more advanced level of C++ or Java (data structure), JavaScript/jQuery (frontend website programming language). Students will also build skills with either PHP (backend website programming language) or Android Studio (mobile application development), and have the chance to obtain hands-on experience through a variety of projects.

Program Requirements

Code	Title	Hours
Required Program Core		
MATH 118 or MATH 140	General Education Math [1] College Algebra	4
CIS 101	Computer Science 101	3
CIS 103	Fundamentals of Programming	3
CIS 114 or CIS 281	Mobile Application Development Web Development III/Server Side Programming	3
CIS 142	C++ Object Oriented Programming I	3
CIS 144	Java Object Oriented Programming I	3
CIS 181	Web Development I/Basic Web Technologies	3
CIS 182	Web Development II/Client Side Scripting	3
CIS 242 or CIS 244	C++ Object Oriented Programming II Java Object Oriented Programming II	3
CIS 245 Principles of Software Development		3
NET TEC 101	Client-Server Database I	3
Total Hours		**34**

[1] MATH 140 College Algebra is a prerequisite for MATH 146 Discrete Mathematics, which may be applied to the Software Development Associate in Applied Science Degree. Higher numbered courses can also fulfill this requirement.

Pathway

This is an **example course sequence** for students interested in earning an Advanced Certificate in Software Development. It does not represent a contract, nor does it guarantee course availability. If this pathway is followed as outlined, you will earn a Basic Certificate (BC) and an Advanced Certificate (AC) in Software Development.

Semester-By-Semester Program Plan for Full-Time Students

All plans can be modified to fit the needs of part-time students by adding more semesters.

Semester 1		Hours
MATH 118 or MATH 140	General Education Math [1] or College Algebra	4
CIS 101	Computer Science 101	3
CIS 103	Fundamentals of Programming	3
CIS 181	Web Development I/Basic Web Technologies	3
	Hours	**13**
Semester 2		
CIS 142 or CIS 144	C++ Object Oriented Programming I or Java Object Oriented Programming I	3

CIS 182	Web Development II/Client Side Scripting	3
CIS 245	Principles of Software Development	3
NET TEC 101	Client-Server Database I	3
	Hours	**12**
Semester 3		
CIS 114	Mobile Application Development	3
or CIS 281	or Web Development III/Server Side Programming	
CIS 142	C++ Object Oriented Programming I	3
or CIS 281	or Web Development III/Server Side Programming	
CIS 242	C++ Object Oriented Programming II	3
or CIS 244	or Java Object Oriented Programming II	
	Hours	**9**
	Total Hours	**34**

[1] MATH 140 College Algebra is a prerequisite for MATH 146 Discrete Mathematics, which may be applied to the Software Development Associate in Applied Science Degree. Higher numbered courses can also fulfill this requirement.

Careers

This program can prepare students for the jobs listed below. Click on each one to learn more, including average earnings, annual job openings, and how much education people in that field have. For additional guidance and resources on career options, current City Colleges students and alumni can contact the Career Services Office (https://www.ccc.edu/departments/Pages/Career-Services.aspx).

Computer Programmers
Job Description

Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

Annual Wages
Entry-Level 10th Percentile	$53,206
Median 50th Percentile	$86,676
Senior-Level 90th Percentile	$180,557

Hourly Wages
Entry-Level 10th Percentile	$26
Median 50th Percentile	$42
Senior-Level 90th Percentile	$87

Annual Job Openings

48 annual openings in Cook County

National Education Attainment

Here, you can see the level of education that people in this career complete.

Degree Program	% of Jobs
A high school diploma or less	0.00%
A certificate	0.00%
Some college	2.52%
An Associate degree	8.99%
A Bachelor's degree	88.04%
A Master's or Professional degree	0.45%
A Doctoral degree or more	0.00%

88.49% continue their education beyond an associate degree

Software Developers
Job Description

Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.

Salary Based on Experience Level

Take a look at the average hourly/annual earnings for this career in Cook County

Lightcast earnings figures are based on OES data from the BLS and include base rate, cost of living allowances, guaranteed pay, hazardous-duty pay, incentive pay (including commissions and bonuses), on-call pay, and tips.

Annual Wages
Entry-Level 10th Percentile	$77,550
Median 50th Percentile	$132,852
Senior-Level 90th Percentile	$181,453

Hourly Wages
Entry-Level 10th Percentile	$37
Median 50th Percentile	$64
Senior-Level 90th Percentile	$87

Annual Job Openings

1384 annual openings in Cook County

National Education Attainment

Here, you can see the level of education that people in this career complete.

Degree Program	% of Jobs
A high school diploma or less	0.00%
A certificate	1.41%
Some college	0.00%
An Associate degree	3.23%
A Bachelor's degree	79.73%
A Master's or Professional degree	15.64%
A Doctoral degree or more	0.00%

95.37% continue their education beyond an associate degree