

Proposal for New Instructional Program

Frederick Community College  
Frederick, Maryland 21702

Game Programming Certificate (Career)

HEGIS CODE:  
CIP CODE:

Department in which Program will be located: Computing and Business Technology

Name of Department Head: Karen A. Wilson, Ph.D.

Award to be offered: Certificate

President/Chief Executive Approval:

  
Elizabeth Burmaster, President

Date of President/Chief Executive Approval: \_\_\_\_\_

Date Endorsed by Board of Trustees

1/20/2016

Date Received by Secretary of Higher Education \_\_\_\_\_

## 1. Rationale and Need for the Program

### A. Describe the extent to which this program is central to the institutional mission, the planning priorities of the campus, and the relationship to the instructional program emphasis.

The Game Programming Certificate proposed by Frederick Community College (FCC) falls under A.A.S., Game and Simulation Development. It prepares students to develop interactive computer games on the Internet, mobile computers, and personal computers by requiring students to complete five (5) programming courses relevant to the development of computer games. This certificate targets students who wish to obtain the skills necessary to develop computer games using programming languages such as Java, C++, C#, and Python.

This new certificate program directly supports the mission of Frederick Community College (FCC) and prepares students for workforce preparation and career development. This new certificate contributes to one of FCC's goals – To provide learning opportunities based on students goals, needs for lifelong learning and participation in society. This certificate trains students to become proficient in current programming languages used in developing computer gaming software. Course delivery will be in flexible forms, including traditional face-to-face, hybrid, and online. It meets FCC's primary instructional objective – "To deliver flexible programs and services".

### B. Describe how this program meets a critical and compelling regional or statewide need as described in the Maryland state plan.

Bureau of Labor Statics (BLS, <http://www.bls.gov/>) of U.S. Department of Labor, reports the following facts, relevant to careers as computer programmers or software developers.

Quick Facts: Computer Programmers	
2012 Median Pay	\$74,280 per year \$35.71 per hour
Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2012	343,700
Job Outlook, 2012-22	8% (As fast as average)
Employment Change, 2012-22	28,400

Quick Facts: Software Developers	
2012 Median Pay	\$93,350 per year \$44.88 per hour
Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2012	1,018,000
Job Outlook, 2012-22	22% (Much faster than average)
Employment Change, 2012-22	222,600

C. State the specific local, state, and/or national needs for graduates of the proposed program. Describe job opportunities that are available to persons who complete the program. Provide evidence of market demand through supporting data including results of a survey which has recently been conducted. Present data showing the current and projected supply of graduates from existing programs in the state, if any.

Shown below are search results from indeed.com ([www.indeed.com](http://www.indeed.com)) on Maryland job opportunities that Game and Simulation Development graduates are prepared for.

Software Engineer	Maryland	Find Jobs
		Jobs 1 to 10 of 533
Simulation Engineer	Maryland	Find Jobs
▲ Upload your resume. Let employers find you.		Jobs 1 to 10 of 546
Software Developer	Maryland	Find Jobs
		Jobs 1 to 10 of 571

Application Developer	Maryland	<a href="#">Find Jobs</a>
<small>10 Jobs Available in Maryland</small>		<small>JOB LIST 10 of 3 987</small>

The table below summarizes the search results:

Job Title Available in Maryland	# of Hits
Software Engineer	6,383
Simulation Engineer	545
Software Developer	5,571
Application Developer	3,987

**D. Provide evidence of student interest in the program. What are the projections of program majors full-time and part-time for each of the first five years of the program?**

The Computer and Information Sciences (CIS) program manager has been receiving inquiries on a regular basis from current and perspective students about the necessary training to practice in software and/or game development field. These inquiries are shared by full-time and part-time students in the ratio of 50/50.

**E. Project the number of graduates for the first five years of the program following the first year of awarding the degree/certificate.**

The proposed program is expected to have an average of 15 graduates annually, following the initial year of implementation. Students are expect to complete this certificate in two (2) semesters.

**F. If a similar program exists in the state, describe the similarities or differences in the degree/certificate to be awarded, the areas of specialization, and the specific academic content of the program or course of study.**

Currently, the only similar program offered by community colleges in Maryland is the **Internet Games and Simulation Certificate** by Montgomery College. This certificate is an interdepartmental program that requires the completion of 35 to 39 credits and introduces students to the web game development area. FCC's 17-credit Game Programming Certificate prepares students for all areas of computer game development, including web game development.

**2. Course of Study Leading to the Proposed Degree/Certificate**

**A. State the educational objectives of the program.**

This certificate requires students to complete five (5) courses, seventeen (17) credits in two (2) semesters. After completing the required courses, students will be able to:

- List the key components of game development life cycle
- Become proficient in current programming languages, such as C++, C#, Java, and Python, that are used in developing computer games
- Select appropriate language and operating environment for the defined game design specification
- Turn game ideas into working applications
- Implement game design specifications into applications to run on the defined game platforms

**B. Describe the program as it would appear in a catalog, including each area of concentration.**

Prepares students to develop interactive computer games on the Internet, mobile computers, and personal computers. This certificate targets students who wish to obtain the skills necessary to develop computer games using programming language, such as Java, C++, C#, and Python.

**C. List the course (title, number, semester credit hours, and catalog description) that would constitute the requirements and other components of the proposed program. Indicate which are currently offered and which will be the new (indicate new courses with an X).**

Course #	Course Title	Credit
CIS 106	Object Design & Programming	3
CIS 226	Game Scripting	3
CIS 227	Game Programming	4
CIS 228	Simulation & Game Development	4
CIS 208 OR	C++ Programming OR	3
CIS 225C	Mobile App Development	
	Total	17

**Catalog Description of Supporting Courses:**

**CIS 106 Object Design and Programming (3)**

Covers college-level communications skills, critical thinking skills, basics of object-oriented programming, fundamentals of computer information systems, impact of information technology on the economic, political and cultural development of society as well as the ethical, societal, and legal aspects of information technology. This course introduces object-oriented design and programming skills using a language that supports the object-oriented paradigm. This course emphasizes software engineering principles and best practices. Students will design, implement, document, and debug object-oriented programs to solve problems by utilizing various data types and algorithms, control structures, encapsulation, and inheritance. Students will practice critical thinking and communications skills by

participating in structured walkthroughs and discussions, creating Unified Modeling Language (UML) diagrams in designing solutions, and debugging errors within the designed solutions. This course requires no prior programming knowledge or experience.

### **CIS 208 C++ Programming (3)**

Emphasizes object-oriented programming in C++. This course provides a comprehensive coverage of C++ features, including arrays, strings, pointers, references, classes, inheritance, polymorphism, function overloading, function overriding, virtual function, and template. Students learn to design and implement object-oriented programs in C++ programming language.

### **CIS 225C Computer Programming Language: Mobile Applet Programming (3)**

Introduces applet programming for mobile devices using the Android operating system.

### **CIS 226 Game Scripting (3)**

Introduces the development of computer games using a scripting language. A modern scripting language will be covered and used to develop game programs. Students learn to design and develop cross-platform computer games.

### **CIS 227 Game Programming (4)**

Covers the development of computer games using a high-level programming language. It introduces the game development aspects and techniques through creation of computer programs. This course also surveys the modern game engines. Students learn to develop computer game programs for specific game engines and platforms.

### **CIS 228 Simulation and Game Development (4)**

Covers the development of digital interactive contents used in computer games and computerized simulations. This course introduces students to the current game engines and simulation software used to build comprehensive and interactive computer games and simulations.

**D. If applicable, describe any selective admissions policy or specific criteria for students selecting their major field of study.**

None.

**E. Describe expected student learning outcomes for the proposed program and directly relate these to the general curricular requirements of the program.**

Upon completion of this certificate, graduates will be able to:

- Develop computer games using programming languages, such as C++, C#, Java, and Python
- Implement game design specifications into applications to run on the defined game platforms
- Test play computer games on multiple operating system environments
- Work with various of game engines in designing and developing computer games
- Identify the most effective way to write computer gaming software
- Work as professional software practitioners, engaging in the life cycle of software application development

### 3. Faculty

**A. Provide a list of current faculty (and areas of expertise) who will teach in the program.**

Current College faculty from the specific department discipline will teach the required general education courses, in accordance with COMAR 13B.02.02.17. Current CIS (Computer and Information Sciences) faculty will be able to teach courses required by this new certificate program. One additional adjunct faculty member may be hired, as needed.

**B. List faculty by rank required for full implementation of the program. Indicate which additional faculty are to be hired and describe their qualifications.**

Name	Qualification	Course
Brian Groover	M.S.	CIS226, CIS227
Lisa Hawkins	Ph.D.	CIS106
Susan Johnson	M.S.	CIS106, CIS228
Frank Seidel	M.S.	CIS106, CIS208, CIS225C, CIS226
Walter Martynenko	M.S.	CIS106, CIS208
Andy Yao	Ph.D.	CIS106, CIS208, CIS225C, CIS226, CIS227, CIS228

### 4. Accreditation

**A. Does the institution intend to seek accreditation for this program by one of the specialized accrediting bodies recognized by the U.S. Department of Education?**

No outside agency accreditation is required for this program.

**B. Does the institution intend to seek any State licensure or certification requirements, which may be necessary for graduates to be employed in this field of study?**

No.

**C. Describe any additional resources, including facilities, required to gain accreditation or licensure.**

FCC has sufficient space to accommodate the courses required by this new certificate.

### 5. Cooperative Agreements

**A. Describe cooperative agreements with other institutions and organizations that may be used to offer this program. Specify the nature of such agreements and attach any formal statements of agreement that have been developed.**

None.

- B. All public institutions shall show evidence of the development and dissemination of Recommended Transfer Programs (RTP's). In cooperation with sending/receiving institutions. All institutions shall also provide evidence that the RTP's are available to students through ARTSYS or in written form. In order to foster articulation with K-12, community colleges will also identify parallel curricula in secondary schools.**

Transfer information will be made available to participants in this program in a variety of methods including hard copy, ARTSYS (articulation information) via the Internet, and other web-based resources.

## **6. Library Requirements**

- A. Provide a brief shelf analysis of existing resources to support the proposed program. Indicate the need for additional on-site resources and over what time period do you expect that they will be required. Discuss additional provisions for access to library holdings---e.g. inter-library loans, local library holdings, the UMS integrated library system, and/or other computerized systems that allow access to library resources housed at other institutions. Attach letters of agreement if appropriate.**

No significant library holdings will need to be purchased for this program. Current library loan mechanisms and electronic data retrieval methods can be utilized. The library exceeds state and national standards for community, junior, and technical college learning resources programs.

## **7. Facilities and Equipment**

- A. How will the proposed program impact on the use of existing facilities and equipment?**

Courses required by this new certificate will be offered in existing classrooms.

- B. Describe additional facilities, faculty modifications, and equipment which will be required for use in the proposed program. Indicate the status of the facility and equipment requested to support your needs.**

No additional facilities and equipment will be needed. One additional adjunct faculty member may be hired, if needed.

## **8. Minority Student Achievement**

- A. Identify specific actions and strategies which will be utilized in the recruitment and retention of other-race students.**

Frederick Community College has long been committed to the recruitment and retention of minority students and will expand its policies to include this program. The DFRS agencies involved have an aggressive recruitment strategy to encourage diversity amongst its applicants.

## 9. Low-Productivity Programs

- A. Those low-productivity programs directly related to the proposed program should be addressed. Careful review should consider the fiscal resources (faculty, administration, library resources, and general operating expenses) currently devoted to the low-productivity programs and how those resources can be redistributed to help fund the proposed program.

Currently there are no low-productivity programs at Frederick Community College which can be redirected.

## 10. Finance

- A. This information is requested to permit the Secretary to assess the adequacy of resources requested to support this program. Complete Tables 1 and 2. Please provide a narrative rationale for each of the resource requirements.

### FINANCE DATA

Finance data for the first five years of program implementation should be entered in Table 1 – Resources and Table 2 – Expenditures. Figures should be presented for five years and then totaled by category for each year. As an attachment, narrative explanation should accompany each table.

#### *Narrative Table 1: Resources*

### Tuition and Fee Revenue

Tuition and fee revenue is based upon the in-county combined tuition/fee rate of \$189 per credit hour for part-time students and an annual tuition/fee rate of \$3,568 for full-time students with an annual average increase of 2.6% for both part-time and full-time students. Full-time students are taking, on average, 13 credits per semester and part-time students are taking, on average, 6 credits per semester. Enrollment projections are based on anticipated enrollment figures for the fall 2016 with a projected 20% increase each year in full-time enrollment and 25% increase in part-time enrollment.

<b>Table 1 RESOURCES</b>					
Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Relocation Fund	\$0	\$0	\$0	\$0	\$0
2. Tuition/Fee Revenue (c+f below)	\$44,420	\$46,184	\$46,764	\$47,968	\$49,188
a. # F/T Students	8	8	8	8	8
b. Annual Tuition/Fee Rate	\$3,568	\$3,661	\$3,756	\$3,854	\$3,954
c. Total F/T Revenue (a*b)	\$28,544	\$29,288	\$30,048	\$30,832	\$31,632
d. # P/T Students	7	7	7	7	7
e. Credit Hr. Rate	\$189	\$194	\$199	\$204	\$209
f. Annual Credit Hrs.	12	12	12	12	12
g. Total/T Revenue (d*c*f)	\$15,876	\$16,296	\$16,716	\$17,136	\$17,556

c. Total Benefits	\$0	\$0	\$0	\$0	\$0
3. Grants, Contracts, & Other External Sources	\$0	\$0	\$0	\$0	\$0
4. Other Sources	\$0	\$0	\$0	\$0	\$0
5. Total (Add 1-4)	\$44,420	\$46,184	\$46,764	\$47,968	\$49,188

### Grants and Contracts

None.

### Other Sources

No other sources will be used to finance the program.

### *Narrative Table 2: Expenditures*

<b>Table 2 EXPENDITURES</b>					
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	\$15,276	\$15,582	\$15,894	\$15,900	\$16,211
a. # FTE	.5	.5	.5	.5	.5
b.1. FT Salary	\$0	\$0	\$0	\$0	\$0
b.2. PT Salary*	\$14,184	\$14,468	\$14,757	\$14,763	\$15,052
c.1. FT Benefits	\$0	\$0	\$0	\$0	\$0
c.2. PT Benefits	\$1,092	\$1,114	\$1,136	\$1,137	\$1,159
2. Admin. Staff (b + c below)	\$0	\$0	\$0	\$0	\$0
a. #FTE	\$0	\$0	\$0	\$0	\$0
b. Total Salary	\$0	\$0	\$0	\$0	\$0
c. Total Benefits	\$0	\$0	\$0	\$0	\$0
3. Support Staff (b + c below)	\$0	\$0	\$0	\$0	\$0
a. #FTE	\$0	\$0	\$0	\$0	\$0
b. Total Salary	\$0	\$0	\$0	\$0	\$0
c. Total Benefits	\$0	\$0	\$0	\$0	\$0
4. Equipment	\$0	\$0	\$0	\$0	\$0
5. Library	\$0	\$0	\$0	\$0	\$0
6. New or Renovated Space	\$0	\$0	\$0	\$0	\$0
7. Other Expenses	\$0	\$0	\$0	\$0	\$0
8. Total (add 1-7)	\$15,276	\$15,582	\$15,894	\$15,900	\$16,211

\* 1 adjunct to teach 9 credits per semester =  $\$788 \times 9 \text{ credits} \times 2 \text{ semesters} = \$14,184$

### **Financial Data Narrative**

#### **Resources**

**Reallocated Funds** – No college funds are being reallocated for this program.

**Tuition/Fee Revenue** – (see table)

**Grants, Contracts, Other External Resources** – none

**Expenditures**

**Faculty** – One adjunct faculty will be needed.

**Administrative Staff** – No additional staff will be needed.

**Support Staff** – No additional support staff will be needed.

**Equipment** – No additional equipment will be required.

**Library** – No additional library costs will be necessary for the program.

**New or Revised Space** – No new or revised space will be needed.

**Other Expenses** – No additional expenses are necessary

