Program Creation Sign-Off

Program Title: Advanced Software Development

Program Units: 24.5 units

Division: PSME **Proposing Faculty name(s):** Anand Venkataraman

Type of Program: xx_____ Transfer or xx_____ Workforce

Type of Award:

xx___ Transcriptable certificate
____ Certificate of Achievement
____ AA/AS Degree

Documentation checklists:

Transfer documentation

_____ Catalog Description
_____ List of Courses
_____ Articulation & transfer data
_____ Identification of existing program(s) at CSU/UCs
_____ Completer Projections
_____ Identification of any additional resources needed to establish program (i.e. faculty, equipment, etc.)

Workforce documentation

xx Catalog Description
xx List of Courses
xx Completer Projections
xx Labor Market information
xx Identification of any similar program(s) in the area
xx Identification of any additional resources needed to establish program (i.e. faculty, equipment, etc.

Transfer/Workforce Work Group: ☐**Recommended** ☐**Not Recommended**
Comments:

Work Group Signature: Date:

Supervising Vice President: ☐**Recommended** ☐**Not Recommended**
Comments:

Vice President Signature: Date:

Planning & Resource Committee: ☐**Recommended** ☐**Not Recommended**
Comments:

PaRC Signature: Date:

Division Curriculum Committee: ☐**Recommended** ☐**Not Recommended**
Comments:

Division CC Signature: Date:

Foothill College

Credit Program Narrative

Certificate of Achievement: _____Advanced Software Development _____

Item 1. Program Goals and Objectives

- Design, document, test and debug programs using Python, C++ or Java
- Use design patterns in application programs
- Learn and use techniques for creating modular reusable code
- Learn and use advanced data structures and algorithms in solving non-trivial application problems.

Students learn software development techniques and methods for creating applications using Python, C++ or Java. They will learn non-trivial data structures (e.g. hash tables, trees, graphs) and advanced techniques for manipulating them to solving complex real-world problems. Students also apply these skills in practical projects. The successful student will be able to use much of the coursework toward a Bachelor's degree in computer science.

Program Learning Outcomes:

- Students are able to design, document, test and debug programs using Python, C++ or Java
- Students use design patterns in application programs
- Students demonstrate techniques for creating modular reusable code

Item 2. Catalog Description

The Advanced Software Development Certificate teaches skills needed by the software engineering industry. It can be completed in one of the major mainstream languages of instruction (Java, C++ or Python). Besides learning intermediate skills relating to syntax, control structures and simple data structures, the program teaches students advanced data structures including hash tables, trees and graphs, and introduces algorithms intended to solve complex problems using such data structures.

Item 3. Program Requirements

Course Number	Title	Units
Required: All three of the following (13.5 units)		
CS 3A or CS 2A or CS 1A	OBJECT ORIENTED PROGRAMMING METHODOLOGIES IN PYTHON, C++ OR JAVA	**4.5**

CS 3B or CS 2B or CS 1B	INTERMEDIATE SOFTWARE DESIGN IN PYTHON, C++ OR JAVA	**4.5**
CS 3C or CS 2C or CS 1C	ADVANCED DATA STRUCTURES AND ALGORITHMS IN PYTHON, C++ OR JAVA	**4.5**
Plus: at least 11 units from the following courses		
CS 10	COMPUTER ARCHITECTURE AND ORGANIZATION	**4.5**
CS 18/ MATH 22	DISCRETE MATHEMATICS	**5**
CS 22A	JAVASCRIPT FOR PROGRAMMERS	**4.5**
CS 30A	INTRODUCTION TO LINUX	**4.5**
CS 31A	INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS	**4.5**
CS 40A	SOFTWARE ENGINEERING METHODOLOGY	**4.5**
CS 50A	SOFTWARE BASICS (CCNA)	**4.5**
MATH 10	ELEMENTARY STATISTICS	**5.0**
MATH 48A	PRECALCULUS I	**5.0**
MATH 48B	PRECALCULUS II	**5.0**
MATH 48C	PRECALCULUS III	**5.0**

Suggested Sequence:

Fall: CS 3A/2A/1A and MATH 48A

Winter: CS 3B/2B/1B and CS 30A

Spring: CS 3C/2C/1C and CS 40A

Total Units = 27.5

Note: Although this document does not specify that students stick to a particular programming language through the sequence of A, B and C courses (e.g. 1A, 2A and 3A), it is strongly recommended that they do, at least for the A and B sections of the sequence.

Item 4. Master Planning

Most of the prospective students of this Certificate of Achievement are from the San Francisco Bay Area, which is a hub of technological innovation in the world. However, the certificate is relevant and useful to any student who wishes to contribute to the area and potentially seek employment with one of the major multinational technology companies. There is a great need within the

software industry for more trained graduates of diverse backgrounds with knowledge of advanced algorithms and data structures, which is a need this certificate seeks to meet. The certificate prepares a student to continue their education at an accredited transfer institution in Computer Science.

Item 5. Enrollment and Completer Projections

Course Number	Title	2016-17	2017-18
Required: (13.5 units)			
CS 3A	OBJECT ORIENTED PROGRAMMING METHODOLOGIES IN PYTHON	**189**	**381**
CS 3B	INTERMEDIATE SOFTWARE DESIGN IN PYTHON	**N/A**	**N/A**
CS 3C	ADVANCED DATA STRUCTURES AND ALGORITHMS IN PYTHON	**N/A**	**N/A**
CS 2A	OBJECT ORIENTED PROGRAMMING METHODOLOGIES IN C++	**587**	**602**
CS 2B	INTERMEDIATE SOFTWARE DESIGN IN C++	**256**	**217**
CS 2C	ADVANCED DATA STRUCTURES AND ALGORITHMS IN C++	**123**	**139**
CS 1A	OBJECT ORIENTED PROGRAMMING METHODOLOGIES IN JAVA	**856**	**916**
CS 1B	INTERMEDIATE SOFTWARE DESIGN IN JAVA	**286**	**337**
CS 1C	ADVANCED DATA STRUCTURES AND ALGORITHMS IN JAVA	**139**	**154**
Plus: at least 11 units from the following courses			

CS 3C	ADVANCED DATA STRUCTURES AND ALGORITHMS IN PYTHON	**N/A**	**N/A**
CS 10	COMPUTER ARCHITECTURE AND ORGANIZATION	**176**	**197**
CS 18/ MATH 22	DISCRETE MATHEMATICS	**230**	**239**
CS 22A	JAVASCRIPT FOR PROGRAMMERS	161	154
CS 30A	INTRODUCTION TO LINUX	231	170
CS 31A	INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS	140	123
CS 40A	SOFTWARE ENGINEERING METHODOLOGY	N/A	17
CS 50A	SOFTWARE BASICS (CCNA)	101	87
MATH 10	ELEMENTARY STATISTICS	1902	2024
MATH 48A	PRECALCULUS I	656	603
MATH 48B	PRECALCULUS II	604	599
MATH 48C	PRECALCULUS III	682	655
MATH 1A	CALCULUS I	757	805

Item 6. Place of Program in Curriculum/Similar Programs

None.

Item 7. Similar Programs at Other Colleges in Service Area

This program is similar to the De Anza College Certificate of Achievement for Programming in Python, C++ or Java. However, the program includes advanced topics in each sequence that are not part of the sequence of corresponding courses at De Anza College. The motivation for such advanced courses is to provide a pathway for students to potentially obtain gainful employment at software organization and/or pursue further studies in CS at an accredited 4-year institution with a solid foundation.

Data shows that there is currently yet unmet demand for graduates in this area.

Several students at Foothill college come here from north of Foothill and will be better served by an offering of this program at our campus. Furthermore, the focus of our program is different from the De Anza offering due to our emphasis on software engineering patterns and principles.

None of the community colleges in the San Mateo Community College district (north of Foothill) offer this program currently.

Additional Information Required for State Submission:

TOP Code: *0707.00

Annual Completers: 400

Net Annual Labor Demand: 9000 new jobs per year (SF Bay Area)

Faculty Workload: No change.

New Faculty Positions: No new positions.

New Equipment: No new equipment.

New/Remodeled Facilities: No new facilities.

Library Acquisitions: None

Gainful Employment: Yes

Program Review Date: TBD

Distance Education: 100% of the core courses are offered online or hybrid.

ATTACH THE FOLLOWING:

1. **Labor Market Information and Analysis**
2. **Advisory Committee Recommendation**
3. **Regional Consortia Approval Meeting Minutes**