

UNIVERSITY OF HAWAI'I
SYSTEM ARTICULATION AGREEMENT

Information and Computer Science(s)
Computer Science

October 2014

**By agreement of faculty in October 2014 of the
ten participating campuses, this agreement is
extended during the review process.**

UNIVERSITY OF HAWAII SYSTEM ARTICULATION AGREEMENT

Information and Computer Science(s) (ICS) Computer Science (CS)

INTRODUCTION

The University of Hawai'i is comprised of ten campuses located on six islands in the State of Hawai'i. While each campus has a unique identity and mission, the ten campuses operate as one system.

During the course of their education, students may decide to transfer from one campus to another in the University of Hawai'i (UH) system. The development of an articulated program of study supports the transfer of earned academic credits within the UH system.

PURPOSE

The primary purpose of this articulation agreement is to facilitate the matriculation of students and the transfer of courses across the university system. Moreover, it is intended to inform students whose program of study requires Information and Computer Science(s) of Computer Science courses as part of their degree requirements of the program opportunities that are available to them throughout the UH system.

AGREEMENT AND PROCEDURES

1. **Scope of Agreement.** This Articulation Agreement applies among the UH Community Colleges, the University of Hawai'i Maui College, the University of Hawai'i at Hilo, the University of Hawai'i at Mānoa, and the University of Hawai'i West O'ahu.
2. **General Guidelines for the Application of Award of Transfer Credits**
 - A. **Student Eligibility:** Students must be currently enrolled at a participating UH campus to be eligible for the award of any transfer credit.
 - B. **Timeline for Application:** Students should apply for transfer credits during their first year of attendance at the receiving campus.
 - C. **Transferability:** Credits awarded within the guidelines established in this Agreement will transfer between and among designated University of Hawai'i campuses. However, students should be informed by both "sending" and "receiving" campuses that transferred credits may **not** be applicable to programs outside this Agreement.

- D. Campus Procedures: Each UH Campus that is a party to this Agreement will be responsible for establishing procedures that detail the timeline and deadlines for application, review requests for award of transfer credit, and the appeals process for such credit.

The table in this document lists all 100 and 200-level Information and Computer Science (ICS at UH Maui College, UH West O'ahu, Hawai'i CC, Kapi'olani CC, Kaua'i CC, Leeward CC, and Windward CC), Information and Computer Sciences (ICS at UH Mānoa) and Computer Science (CS at UH Hilo) courses that are equivalent within the University of Hawai'i system. If a course is unique to a campus and, hence, does not have an equivalent course within the UH system, then it is not listed in the table. Also, the course outline(s) in this document have been approved by the faculty and administrations of all campuses represented in this signed agreement.

This Articulation Agreement will remain in effect until October 2019. It will be subject to review in October 2018, and may be continued, revised, or discontinued with the consent of all faculty members and administration of all campuses represented in this agreement. The Articulation Agreement remains in effect while review continues.

	UHM	UHH	UHMC	UHWO	HawCC	HonCC	KapCC	KauCC	LeeCC	WinCC
Computing Literacy and Applications	N/A	N/A	N/A	N/A	ICS 100 (3)	ICS 100 (3)	ICS 100 (3)	ICS 100 (3)	ICS 100 (3)	ICS 100 (3)
Digital Tools for the Information World	ICS 101 (4)	CS 101 (3)	ICS 101 (3)	ICS 101 (3)	ICS 101 (4)	ICS 101 (3)	ICS 101 (3)	ICS 101 (3)	ICS 101 (3)	ICS 101 (3)
Introduction to Programming	ICS 110 (3)	CS 135 (3)	ICS 110 (3)	N/A	ICS 110 (4)	ICS 110/ CENT 110 (3)	ICS 110 (3)	N/A	ICS 110 (3)	N/A
Introduction to Computer Science I	ICS 111 (4)	CS 150 (3)	ICS 111 (4)	ICS 111 (3)	N/A	ICS 111 (4)	ICS 111 (3)	ICS 111 (4)	ICS 111 (3)	ICS 111 (3)
Discrete Mathematics for Computer Science I	ICS 141 (3)	CS 141 (3)	N/A	N/A	N/A	ICS 141 (3)	ICS 141 (3)	N/A	ICS 141 (3)	ICS 141 (3)
Introduction to Computer Science II	ICS 211 (3)	CS 151 (3)	ICS 211 (3)	ICS 211 (3)	N/A	ICS 211 (3)	ICS 211 (3)	N/A	ICS 211 (3)	ICS 211 (3)
Program Structure	ICS 212 (3)	N/A	N/A	N/A	N/A	N/A	ICS 212 (3)	N/A	ICS 212 (3)	ICS 212 (3)

	UHM	UHH	UHMC	UHWO	HawCC	HonCC	KapCC	KauCC	LeeCC	WinCC
Introduction to Scripting	ICS 215 (3)	N/A	N/A	N/A	N/A	N/A	ICS 215 (3) - fall 2015	N/A	ICS 215 (3) - fall 2015	ICS 215 (3)
Discrete Mathematics for Computer Science II	ICS 241 (3)	CS 241 (3)	N/A	N/A	N/A	ICS 241 (3)	ICS 241 (3)	N/A	ICS 241 (3)	ICS 241 (3)

Note: Course equivalency is not to be confused with approved General Education course designation. Campuses wanting approval for a UH Mānoa General Education designation must send a separate proposal to UH Mānoa to receive approval for a general education designation. Procedures for articulating courses to Mānoa are found at <http://www.hawaii.edu/gened/articulation.htm>. For information on courses approved to meet UH Mānoa's general education requirements, go to http://www.hawaii.edu/ovcaa/academics/articulation_courses.htm.

Note: UH Hilo's CS 141 is equivalent to ICS 141 courses system-wide and CS 241 equivalent to ICS 241 courses system-wide.

Note: Students may transfer from UH Hilo into more advanced courses at UH Mānoa after having two semesters of the same language (CS 150 and CS 151), but not one semester of either.

Note: Students may transfer from UH Mānoa into more advanced courses at UH Hilo after having two semesters of the same language (ICS 111 and ICS 211), but not one semester of either.

Note: In terms of articulation and compatibility between courses, it would be best if transfer students had all three introductory classes in the same language (CS-1, CS-2, and Data Structures). For example, UH Hilo will accept UH Mānoa's ICS 111 for CS 150, ICS 211 for CS 151, and ICS 311 for CS 321. However, it is preferable that students transfer these three courses as one package.

Note: Each campus must meet the agreed upon SLOs, but can add additional outcomes.

ICS 100 Computing Literacy and Applications

Revised 10/3/2014

Effective Fall 2015, each community college campus offering this course has agreed to:

Course alpha and number: ICS 100 (3 credits)

Course title: Computing Literacy and Applications

Course description: An introductory survey of computers and their role in the information world emphasizing computing terminology, hardware, and software. Opportunities for "hands on" experience using applications software may include spreadsheets, word processing, presentations, and communications.

Prerequisites: Vary by campus.

Student Learning Outcomes:

1. Utilize the basic features of computing applications to communicate effectively (major content area).
2. Utilize operating system interfaces to manage computing resources effectively and securely.
3. Utilize online resources for research and communication.
4. Define, explain, and demonstrate proper computing terminology usage in areas such as hardware, software, and communications.
5. Describe ethical and security issues involved in the use of computing technology

Note: ICS 100 Computing Literacy and Applications **is not** equivalent to CS 100 Principles of Computer Science at UH Hilo.

ICS 101 Digital Tools for the Information World

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 101 (3 or 4 credits) or CS 101 (3 credits)

Course title: Digital Tools for the Information World

Course description: Fundamental information technology concepts and computing terminology, productivity software for problem solving, computer technology trends and impact on individuals and society. Emphasizes the utilization of operating systems and the production of professional documents, spreadsheets, presentations, databases, and web pages.

Prerequisites: Vary by campus

Student Learning Outcomes:

1. Utilize the appropriate computing applications to produce professional documents, spreadsheets, presentations, databases, and web pages for effective communication (major content area).
2. Utilize operating system interfaces to manage computing resources effectively and securely.
3. Extract and synthesize information from available Internet resources using intelligent search and discrimination.
4. Define, explain, and demonstrate proper computing terminology usage in areas such as hardware, software, and communications to effectively interact with other computer users and to prepare for higher-level computer courses.
5. Describe ethical and security issues involved in the use of computing technology.

ICS 110(Alpha) Introduction to Programming

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 110(Alpha) (3 or 4 credits) or CS 110(Alpha) (3 credits)

Letter suffix: P - Python, C - C/C++, D - Animation/Java, M - Mobile, R - Robotics, G - Games, S - C#

Course title: Introduction to Programming

Course description: A gentle introduction to coding for anyone. Students use design strategies to create programs. Promotes an understanding of basic programming constructs, including control structure and object-oriented programming. The alpha suffix indicates technology such as: P - Python, C - C/C++, D - Animation/Java, M - Mobile, R - Robotics, G - Games, S - C#.

Prerequisites: Vary by campus

Student Learning Outcomes

1. Create a program using variables, conditional statements, looping, and event handlers.
2. Use critical thinking and problem solving in creating programs.
3. Create programs using the program life cycle.

Note: At UH Hilo, ICS 110(Alpha) is equivalent to CS 138 (R - Robotics), CS 130 (G - Games), CS 140 (P - Python). CS 135 articulates to ICS 110.

Note: In the future, Windward CC may offer ICS 135, which articulates to ICS 110.

Note: Hawai'i CC's ITS 121D articulates with UH Hilo's ICS 135 and ICS 110.

Note: Hawai'i CC's ITS 118 will be converted to ICS 110.

Note: Students can get credit for repeating the course with different ending letters, but not the same letter.

ICS 111 Introduction to Computer Science I

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 111 (3 or 4 credits) or CS 150 (3 credits)

Course title: Introduction to Computer Science I

Course description: An overview of the fundamentals of computer science emphasizing problem solving, algorithm development, implementation, and debugging/testing using an object-oriented programming language is covered.

Prerequisites: Vary by campus

Student Learning Outcomes

1. Use an appropriate programming environment to design, code, compile, run and debug computer programs.
2. Demonstrate basic problem solving skills: analyzing problems, modeling a problem as a system of objects, creating algorithms, and implementing models and algorithms in an object-oriented computing language.
3. Illustrate basic programming concepts such as program flow and syntax of a high-level general purpose language and basic security practices.
4. Demonstrate working with primitive data types, strings and arrays.

Credit by institutional exam: Passing must be 80% or better.

ICS 141 Discrete Mathematics for Computer Science I

Revised 10/3/2014

Effective Fall 2014, each university and community college offering this course has agreed to:

Course alpha and number: ICS 141 (3 credits) or CS 141 (3 credits)

Course title: Discrete Mathematics for Computer Science I

Course description: This course includes logic, sets, functions, matrices, algorithmic concepts, mathematical reasoning, recursion, counting techniques, and probability theory.

Prerequisite: Vary by campus.

Student Learning Outcomes

1. Analyze issues and apply mathematical problem solving skills to plan courses of action in decision-making situations.
2. Solve problems by using basic mathematical formal logic, proofs, recursion, analysis of algorithms, sets, combinatorics, relations, functions, matrices and probability.

ICS 211 Introduction to Computer Science II

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 211 (3 or 4 credits) or CS 151 (3 credits)

Course title: Introduction to Computer Science II

Course description: Reinforce and strengthen problem-solving skills using abstract data types and introduce software development practices. Emphasize the use of searching and sorting algorithms and their complexity, recursion, object-oriented programming, and data structures.

Prerequisite: ICS 111 with a grade of "B" or higher, or instructor consent.

Student Learning Outcomes

1. Use and implement abstract data types such as lists, stacks, queues, and trees.
2. Select the appropriate searching or sorting algorithm based on the algorithm's behavior.
3. Develop recursive algorithms and programs.
4. Use standard libraries or packages as well as advanced object-oriented programming techniques (polymorphism, inheritance, and encapsulation).
5. Produce robust and secure programs using exception handling and extensive program testing.

ICS 212 Program Structure

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 212 (3 credits)

Course title: Program Structure

Course description: Program organization paradigms, programming environments, implementation of a module from specifications, the C and C++ programming languages.

Prerequisite: ICS 211 with a grade of "B" or higher, or instructor consent.

Student Learning Outcomes

1. Develop properly structured multifile programs with automatic compilation.
2. Implement recursion, arrays, pointers, character variables, bitwise operators, structures, and linked data structures in C.
3. Use classes (constructors, destructor, and overloading assignment), operator overloading, inheritance, polymorphism, and linked data structures in C++.
4. Use standard C++ strings and C++ STL library data structures, such as STL lists.

ICS 215 Introduction to Scripting

Revised 10/3/2014

Effective Fall 2015, each university and community college campus offering this course has agreed to:

Course alpha and number: ICS 215 (3 credits)

Course title: Introduction to Scripting

Course description: Introduction to scripting languages for the integration of applications and systems. Scripting in operating systems, web pages, server-side application integration, regular expressions, event handling, input validation, selection, repetition, and parameter passing for languages such as Perl, JavaScript, PHP, Python, and/or shell scripting.

Prerequisite: Minimum of ICS 111 with a "B" or higher or consent of instructor. Additional prerequisites vary by campus.

Student Learning Outcomes:

1. Use regular expressions to solve different problems.
2. Produce robust client and server side scripts in a variety of scripting languages using software engineering techniques such as review and extensive program testing.
3. Handle user and system generated events using various scripting languages.
4. Validate user input using various scripting languages for security purposes.

Note: ICS 215 is an alternative to ICS 212, but students should be careful. ICS 215 is just the prereq to ICS 315 at UHM. ICS 212 is a prereq for ICS 312 and ICS 313 at UHM.

ICS 241 Discrete Mathematics for Computer Science II

Revised 10/3/2014

Effective Fall 2015, each university and community college offering this course has agreed to:

Course alpha and number: ICS 241 (3 credits) or CS 241 (3 credits)

Course title: Discrete Mathematics for Computer Science II

Course description: Includes program correctness, recurrence relations and their solutions, divide and conquer relations, graph theory, trees and their applications, Boolean algebra, introduction to formal languages and automata theory.

Prerequisite: ICS 141 with a grade of "C" or higher, or instructor consent.

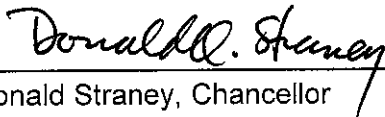
Prerequisite (UHH): CS 141 with a grade of "C" or higher, or instructor consent.

Student Learning Outcomes:

1. Analyze issues and apply complex mathematical problem solving skills to plan courses of actions in high-level decision-making situations.
2. Utilize such tools as graphs, trees, boolean algebra, and recurrence relations.
3. Explain discrete math concepts such as formal languages, finite-state machines, and program correctness.

UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

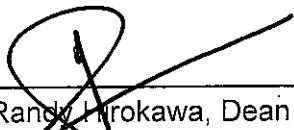
University of Hawai'i at Hilo


Donald Straney, Chancellor


11 Feb 15
Date


Matthew Platz, Vice Chancellor for Academic Affairs

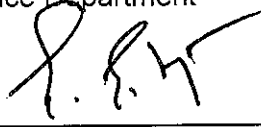
2/9/15
Date


Randy Hirokawa, Dean of College of Arts and Sciences


2/3/15
Date


Harry Keith Edwards, Associate Professor and Chair,
Computer Science Department

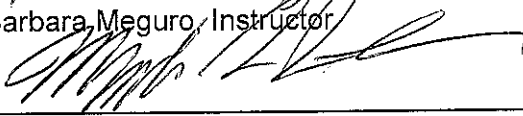
2015/01/31
Date


Sevki Erdogan, Professor

2/21/2015
Date


Barbara Meguro, Instructor

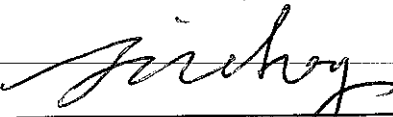
2/2/2015
Date


Michael R. Peterson, Associate Professor

2/2/15
Date


Shawon Rahman, Associate Professor

2/1/2015
Date


Jie Cheng, Associate Professor

2/2/2015
Date

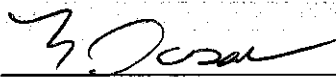
UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

University of Hawai'i at Mānoa



Robert Bley-Vroman, Chancellor

2/5/15
Date



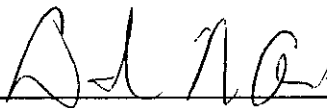
Reed Dasenbrock, Vice Chancellor for Academic Affairs

2/3/15
Date



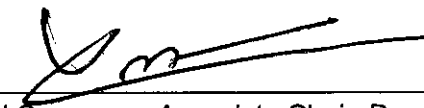
William L. Ditto, Dean, College of Natural Sciences

Date




David N. Chin, Chair, Department of Information and
Computer Sciences

1/29/15
Date



Henri Casanova, Associate Chair, Department of Information
and Computer Sciences

1/29/15
Date

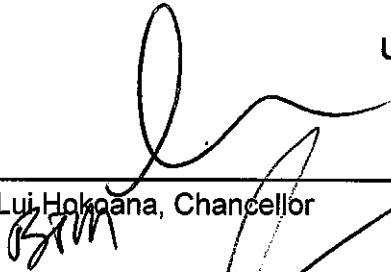


Gerald Lau, Assistant Faculty Specialist

01/29/15
Date

UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

University of Hawai'i Maui College



Lui Hokoana, Chancellor

3-11-15
Date

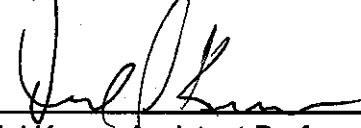
John McKee, Vice Chancellor of Academic Affairs

2-26-15
Date



David Grooms, Interim Assistant Dean of Instruction

2/26/15
Date




Daniel Kruse, Assistant Professor and Chair Academic Senate

2/26/15
Date

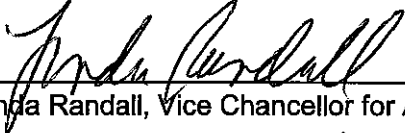
UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

University of Hawai'i - West O'ahu



Rockne Freitas, Chancellor

2/11/15
Date



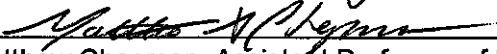
Linda Randall, Vice Chancellor for Academic Affairs

2/10/15
Date



Derrek Choy, Chair of Business Administration

2/5/15
Date



Matthew Chapman, Assistant Professor of Information Technology

2/5/15
Date

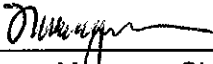


Claire Hitosugi, Assistant Professor of Management Information Systems

2/5/2015
Date

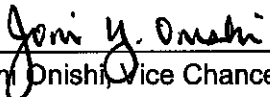
UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

Hawai'i Community College



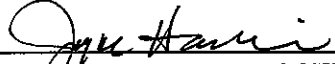
Noreen Yamane, Chancellor

FEB 25 2015
Date



Joni Onishi, Vice Chancellor for Academic Affairs

2-18-2015
Date



Joyce Hamasaki, Dean of CTE

2-15-15
Date



Robert Yamane, Chair, Business Education and Technology Division

2-5-15
Date

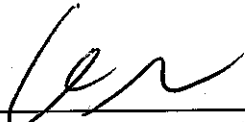


Annie Brown, Professor, IT Program Coordinator

2-5-2015
Date


UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

Honolulu Community College



Erika Lacro, Chancellor

10/23/14
Date



Katy Ho, Vice Chancellor for Academic Affairs

10/23/14
Date



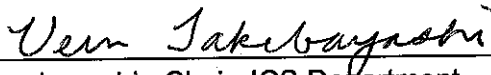
Russell Uyeno, Dean, Communication and Services Division

OCT 22 2014
Date



R. James Poole, Chair, Communications and Services Division

10/13/14
Date



Vern Takeybayashi, Chair, ICS Department

10/16/14
Date

UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

Kapi'olani Community College

Leon Richards 2/2/15
Leon Richards, Chancellor
Date

Louise Pagotto
Louise Pagotto, Vice Chancellor for Academic Affairs
Date 1/30/15

Louise Pagotto
Interim Dean of Hospitality, Business and Legal Education
Date 1/30/15

Trude Pang
Trude Pang, Chair, Business, Legal, and Technology Education Department
Date 1-27-15


Steven A. Singer
Steven A. Singer, Professor, ICS/IT Program
Date 1/27/15

Alfred Seita
Alfred Seita, Professor, ICS/IT Program
Date 1/27/15

Hal Corcoran
Hal Corcoran, Assistant Professor, ICS/IT Program Coordinator
Date 1/27/15

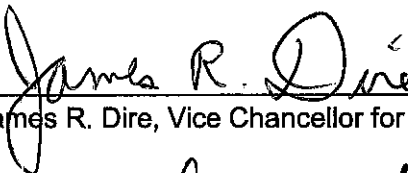
UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

Kaua'i Community College



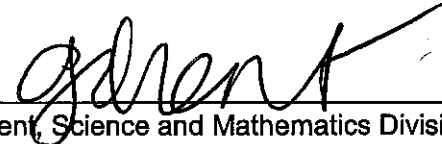
Helen A. Cox, Chancellor

2-10-15
Date



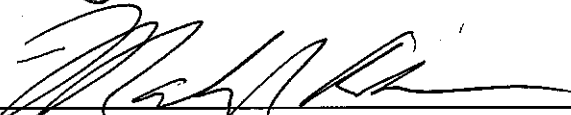
James R. Dire, Vice Chancellor for Academic Affairs

2/9/15
Date



Gigi Drent, Science and Mathematics Division Chair

2-6-15
Date



Mark Anderson, Instructor, Electronics Technology

2-6-15
Date

UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

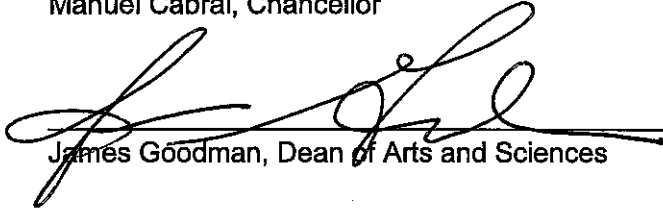
Leeward Community College



Manuel Cabral, Chancellor

3/20/15

Date



James Goodman, Dean of Arts and Sciences

3/20/15

Date



Jennie Thompson, Division Chair, Math and Sciences

3/20/15

Date



Blanca Polo, Associate Professor and ICS Discipline Coordinator

3/18/2015

Date



Michael Bauer, Assistant Professor

3/18/15

Date



Vincent Lee, Assistant Professor

3/18/15

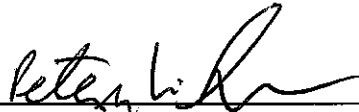
Date



William Albritton, Assistant Professor

3-18-2015

Date



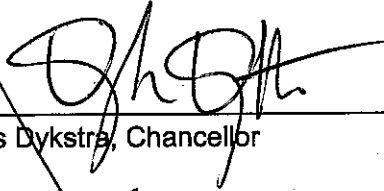
Petersen Gross, Instructor

3-18-2015

Date

UNIVERSITY OF HAWAI'I SYSTEM ARTICULATION AGREEMENT
Information and Computer Science(s) (ICS)
Computer Science (CS)

Windward Community College



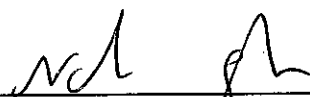
Douglas Dykstra, Chancellor

2/3/15
Date




Ardis Eschenberg, Vice Chancellor for Academic Affairs

2/3/2015
Date




Navtej Singh, Chair, Math and Business Department

2/3/2015
Date



Laura Sue, Instructor

2/2/2015
Date



Vanessa Cole, Instructor

1/30/2015
Date