

**Leeward Community College
Comprehensive Review and Evaluation
Information and Computer Sciences**

Program/Unit/Area Name: Information and Computer Sciences

Assessment Period: August 2012 to May 2015

College Mission:

At Leeward Community College, we work together to nurture and inspire all students. We help them attain their goals through high-quality liberal arts and career and technical education. We foster students to become responsible global citizens locally, nationally, and internationally. We advance the educational goals of all students with a special commitment to Native Hawaiians.

Information and Computer Sciences Program Mission:

To support the mission of Leeward Community College, the Information and Computer Science program is committed to providing an intellectually challenging curriculum that prepares graduates to understand the fundamental concepts in computer science and the practices, values and demands of the related professions.

Part I. Executive Summary of Program Status

Demand Indicators

Nationwide

The ICS program is rated as “Unhealthy.” The Classification of Instructional Programs does not include the need for cybersecurity, networking and big data professionals. Being limited by the CIP codes provides an inaccurate description of the needs of the Hawaiian Islands with respect to computer technologies and cybersecurity. In addition this does not include the AS-NS Degree numbers which are not reported as part of the AS Degree in ICS.

The number of ICS majors continues to increase slowly. Student-semester hours for majors and non-majors continues to increase.. In the last few years there has been an increase in money available for grants to train students in cybersecurity and big data. (Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage,

transfer, visualization, and information privacy) Both disciplines fall under Information and Computer sciences however there is no CIP code for either.

Cybersecurity helps data stay safe. Even TV commercials advertise cybersecurity companies. Hawaii is no exception. As a result the University of Hawaii has formed a cybersecurity group. Dr Polo is part of this group. They meet to discuss how all campuses will move forward implementing cybersecurity education programs to cover the vast demand both in civilian and military worlds.

In 2014 the Community Colleges was awarded a C3T4 grant to implement a new Certificate of Achievement in cybersecurity and to better train students to perform as professionals.

An example of available grants for the cybersecurity can be found following the se links

- <https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55>
- <https://search.usa.gov/search?utf8=%E2%9C%93&affiliate=nsf&query=cybersecurity&commit=Search>
- <http://csrc.nist.gov/nice/>

International

This article clearly describes what is going outside our country:

China Unable To Recruit Hackers Fast Enough To Keep Up With Vulnerabilities In U.S. Security Systems

Despite devoting countless resources toward rectifying the issue, Chinese government officials announced Monday that the country has struggled to recruit hackers fast enough to keep pace with vulnerabilities in U.S. security systems. “With new weaknesses in U.S. networks popping up every day, we simply don’t have the manpower to effectively exploit every single loophole in their security protocols,” said security minister Liu Xiang, who confirmed that the thousands of Chinese computer experts employed to expose flaws in American data systems are just no match for the United States’ increasingly ineffective digital safeguards.

<http://www.theonion.com/article/china-unable-recruit-hackers-fast-enough-keep-vuln-51719>

Efficiency Indicators

In order to help maintain efficiency, the ICS department has continued to offer the final two courses of our most popular specialization in 8-week intensive course packages, In Spring 2014, ICS 172/283 (Network Design and Administration, and Advanced Network Routing and Administration), along with ICS 281/282 (Ethical Hacking, and Computer Forensics) was offered. In 2013 there were 15 under-enrolled classes, in 2014 there were only 5. This year the number is down to 2. This is the lowest number of under-enrolled classes yet. As soon as classes open, they fill up.

Effectiveness Indicators

The ICS faculty believes that Maka’ala is a great tool to keep track of how students do during the first weeks of school and to help improve retention. The computer science faculty work closely with the ICS counselor Amy Amper, as well as with the AS-NS counselor Heather Takamatsu.

Five new certificates of competence were created to target students who may not want to get an AS degree but need to bring their skills up to date to better their opportunities at work. These certificates became effective in the spring of 2014, and the number of certificates awarded has greatly increased—from 17 to 43, (153%). In 2015 42 certificates were awarded. (still 99.3%). The new curriculum prepares students to obtain industry certifications should they decide to do so. Descriptions of the courses that prepare students for certifications are listed above.

The result of Last Year's Plan

The Need for Cybersecurity Professionals

Part of goals of the C3T4 grant is to increase enrollment as well as to improve curriculum. Plans to do this began by increasing the number of ICS distance education (DE) courses. Course offerings in days/times that were more convenient for our students were planned. The basic idea continues to be, to make education more accessible to those that want a computer science education.

The number of majors in the program continues to slowly but steadily increase. More students are being served with the same amount of courses from 2014 to 2015. The demand indicators show that the program is producing more majors than available jobs. However the number of cybersecurity and big data grants available via NSF (national science foundation), the DHS (department of homeland security) and the DOL (department of labor), among others, continue to increase showing cybersecurity continues to be an area where more and more people are needed. This is evident when visiting the website for NICE (National Initiative for Cybersecurity Education), NIST (National Institute of Standards and Technology), NSA (National Security Agency), NICCS (National Institute for Cybersecurity Career and Studies) and others. Clearly the demand for these professionals cannot be measured by available jobs only in Hawaii.

Reaching out to accommodate students' Schedules

Mr Gross successfully recorded ICS172 (Network Design and Administration) for cable TV. This coupled with a new virtual laboratory equipment NetLab (<https://www.netdevgroup.com/products/>) allows the program to offer this course online. Mr Albritton recorded ICS 212 (Program Structure) for cable TV. In the Spring 2015, Mr Albritton. Mr Gross. Mr Bauer and Dr Polo finished recording ICS100 (Intro to Computing Literacy). This course aired for the first time in the Fall 2015. There are currently 112 students taking this course, 37 of which are taking the course online with the Cable TV component.

It was expected to offer more ICS100 class sections. However, with the demand for other ICS program courses resources have been diverted to address this demand. Hybrid versions of ICS125 (Personal Computer Maintenance and Repair) was offered. The ICS faculty are now offering open-labs as a complement to distance education and cable courses in order to better support students that feel that they need to see the instructor on a regular basis.

Reaching Out to High Schools

Mr Bauer taught ICS101 online to Leilehua HS students in the Spring 2014, and will do it again in 2015. Mr Gross taught ICS110 face-to-face in Waipahu HS. We continue to have requests from both Waipahu HS and Leilehua HS to offer ICS courses for them.

C3T4 Grant Update

Mr Gross has worked tirelessly to bring the helpdesk to life, while Dr Polo has hired the student career specialist and already selected the new helpdesk manager with the help of the respective hiring committees. The following is a short excerpt of the latest C3T4 grant status report.

"Hiring:

Melissa De Leon has been hired as the 1.0 FTE Student Career Specialist and will begin 11/16/2015. Her work will focus on recruitment of students for cybersecurity programs, as well as enhancing Leeward CC's presence at community events.

The 1.0 FTE Lab Manager position is yet to be filled. A candidate has been selected.

Procurement:

A modified budget was sent to the Project Director, Georgina Kawamura on August 24, 2015. The new budget is aligned to more efficiently meet the goals and objectives of the grant.

Pete Gross has been involving his students in the set up of the Help Desk. The students are experiencing hands-on learning by researching and pricing appropriate supplies for the Help Desk.

Curriculum Approval, Curriculum Development:

The Information Security CA has been approved by the Curriculum Committee, the Faculty Senate and the Dean. It is waiting on the Vice Chancellor for approval.

Employer/Industry Partners:

State of Hawaii Office of Enterprise Technology Services (OETS)"

Part II. Program Description

History

The computer science program was designed to prepare students to understand the fundamental concepts in computer science and the practices, values and demands of the related professions. Today graduates are educated in the core values of computer science, algorithms, ethics, networking and project management, all of this with emphasis on cybersecurity.

The computer science program began as both an AA degree and as an AS degree to enable students to transfer to four year programs and/or to fill local needs for entry level technicians.. In the late 1970s the focus was changed to a data processing program only and the AA degree was dropped. The program has evolved alongside technology and innovation and today the program both fills the needs for an AS in Natural Sciences with an emphasis on ICS and an AS in Computer Science. The program continues to evolve to meet the demands for computer

science professionals. The program continues to focus on both transfer to a four year institution and providing entry level needs of the workforce.

Associate in Science degree

- The curriculum leading to an Associate in Science degree in Information and Computer Science is designed to prepare individuals for employment as technical assistants to professional and administrative personnel using computers or to transfer to a four-year university. Leeward community college currently has articulation agreements with UH Manoa, UH Hilo and UH West Oahu as well as with Capella University online. The following table contains information about student transfers.
- Students in the AS in ICS may choose one of five areas of specialty: Network Support Specialist, Database Support Specialist, Information Security Specialist, Mobile Developer Specialist and Software Developer Specialist. Skills in writing, speech, economics and mathematics complete the preparation for employment.
- The core program requirements are designed to facilitate transfer to the baccalaureate programs in Information and Computer Sciences. Current curriculum changes will allow students to transfer to UH West Oahu with junior status after obtaining their AS in ICS.
- The ICS Program has been articulated by Program Coordinating Council (Fall 2014). Core courses remain aligned across the University of Hawaii System, as well as with the Association for Computing Machinery (ACM).

Program goals/Occupations for which this program prepares students

Hawaii lacks certified technicians for the current and future workforce. A study conducted by Linda Johnsrud in 2007--"The Second Decade Project"-- specified areas of Hawaii's workforce that need immediate attention. Based on the projected population increase in Hawaii from 2000 to 2020, Ewa was identified as having a 105% population increase, which is four times the state average. Nearly half of the projected 28,266 job openings by 2012 will require education beyond high school and skills only provided by postsecondary education and training.

(<http://dspace.lib.hawaii.edu/bitstream/handle/10790/182/seconddecade.pdf?sequence=1>)

Furthermore, according to employment projections for 2012–2022 by the United States Department of Labor Bureau of Labor Statistics (http://www.bls.gov/emp/ep_table_102.htm), job demand for computer specialists will continue to increase in the immediate future. The numbers for most of these job openings are increasing at a rate greater than the average for all occupations. For example, "Computer support specialists" openings are increasing at a rate of 1.7% annually over ten years, while the national average for all jobs is 1.08%. By 2022, Computer Support Specialists will have grown 17.0% while, overall, openings will have increased about 10.8%

In the State of Hawaii, according to the HAWAII Workforce Infonet (<https://www.hiwi.org/>) of the Hawaii Department of Labor, job demand for computer specialists will continue to increase in

the immediate future. Most of these jobs are increasing at rates similar to the national, which are better than the average for all occupations in Hawaii (1.2%). For example, “Computer Support Specialist” openings are increasing at a rate of 1.6% annually.

Hawaii Employment Projections for 2010-2020 by Hawaii State DLIR, Research & Statistics Office				
Occupation Title	Employment		Average Annual Growth	Average Annual Replacement Openings
	Number Actual & Projected			
	2010	2020		
Total, all occupations	651,290	727,390	1.2%	15.720
Computer Specialists	9,520	11,030	1.6%	160
Computer and information scientists, research	80	90	7.1%	**
Computer programmers	820	850	3.4%	20
Computer software engineers, applications	760	970	2.7%	20
Computer software engineers, systems software	540	750	4.0%	20
Computer support specialists	1,950	2,260	1.6%	50
Computer systems analysts	890	1,050	1.9%	20
Database administrators	250	330	3.1%	**
Network and computer systems administrators	1,350	1,670	2.4%	20
Information Security Analysts, Web Developers, and Computer Network Architects	1,180	1,460	2.4%	20
Computer specialists, All Other	1,700	1,600	-0.6%	30
** The number of openings are greater than zero, but less than ten.				

Based on the above information, we believe that more students will enroll in our program. However day to day it becomes more evident that many employers look for people with a bachelors degree. This is the main reason why, even when our students may be able to land a job with an AS degree, we encourage them to pursue a 4-yr degree.

Program Student Learning Outcomes (PLOs)

1. Describe the functions and interrelationships of the building blocks of an operating system.
2. Solve problems, develop algorithms, and write object-oriented computer programs in at least two programming languages.
3. Apply the mathematics used in computing science to solve computing problems.
4. Effectively communicate in written and oral form, a system solution its documentation, and its implementation.
5. Use project management tools to manage information systems development projects.
6. Work effectively as part of a group/team.
7. Design a relational database with proper documentation.
8. Demonstrate proficiency in computer maintenance and networking.
Based on selection of an area of specialty, the student will further be able to:
9. Database Support Specialist: Write object-oriented computer programs for online access and manipulation of databases.
10. Mobile Developer Specialist: Design, develop and implement applications and policies for mobile devices.
11. Software Developer Specialist: Develop a foundation in computer science to succeed in upper-division courses.
12. Network Support Specialist: Apply computer networking principles to build and troubleshoot networks.
13. Information Security Specialist: Apply the tools and techniques of information security to secure physical and digital information.

Admission requirements

There are no admission requirements at Leeward Community College as well as for the ICS program.

Credentials, licensures offered

- ICS Associate in Science Degree
- Certificate of Achievement in ICS
- Certificate of Achievement in Information Security
- Certificates of Competence
 - Basic Logic and Programming 1
 - Basic Logic and Programming 2
 - Web Programming
 - Help Desk
 - Web Science
 - Database support
 - Information security
 - Mobile developer
 - Network support
 - Software developer

Faculty and staff

- Mike Bauer, Associate Professor
- Vincent Lee, Assistant Professor
- Alejandro Ramos, Assistant Professor
- Blanca Polo, Associate Professor and ICS program coordinator
- William Albritton, Assistant Professor
- Petersen Gross, Instructor
- Dorothy Sunio, Lecturer
- Edward Meyer, Lecturer
- Tiffany Akiyama, Lecturer
- Melissa De Leon Student Career Specialist (temporary during C3T4 grant period)
- Help desk manager (temporary during C3T4 grant period)

Resources

List C3T4 grant resources

- Two SonicWall Firewalls
 - One for the NetLab virtual environment.
 - One for the Help Desk area.
- Juniper Layer 3 Switch (used with NetLab equipment)
- IP KVM & Rack Mountable Console Drawer (used with Netlab & Dell Servers)
- Help Desk Equipment:
 - iPad Mini

- MacBook Air
- Android Tablet
- Microsoft Surface
- Multimeter
- Take a number system
- Miscellaneous tools for computer repair
- Carts to use while repairing computers
- Power Supply tester
- UPS
- Printer
- Office Supplies

Articulation agreements

There is an articulation agreement that is valid across all the UH campuses was signed in October 2014. This articulation agreement is located here:

<http://www.hawaii.edu/offices/aa/aapp/articulation/ICS-Oct2014.pdf> However, there are special agreements with UHWO to transfer our graduates with junior status in their BAS-IA program, as well as with UHM to accept our students as juniors in the BA-ICS.

Transfers Students from the AS-ICS		
	UHM	UHWO
Fall 2012	5	2
Spring 2013	2	1
Fall 2013	4	5
Spring 2014	4	3
Fall 2014	8	7
Spring 2015	3	4

Bachelor of Applied Science, Information Security and Assurance (ICS-LCC Articulation Agreement and Similar Programs / BAS-ISA UHWO)

The goal of academic advising is to further enhance the educational mission of the university, and create quality, accessible advising partnerships with all students in a positive environment that supports student success. This advising sheet is for tracking purposes toward degree completion. Students also may track their academic progress via STAR Degree Check through MyUH at myuh.hawaii.edu. Academic Advising appointments may be scheduled by calling 808-689-2689 or toll-free from neighbor islands at 866-299-8656.

Graduation Requirements (see the current catalog for any additional graduation requirements):

- | | | |
|--|---|--|
| <input type="checkbox"/> 45 Upper Division Credits Minimum | <input type="checkbox"/> 3 classes of Upper Division Writing Intensive+ | <input type="checkbox"/> 2.0 OVERALL GPA |
| <input type="checkbox"/> 120 Total Credits Minimum | <input type="checkbox"/> Focus Requirements (OC, HAP, ETH)* | <input type="checkbox"/> 2.0 UHWO GPA |
| <input type="checkbox"/> 30 UHWO Credits | | <input type="checkbox"/> 2.0 CONCENTRATION GPA |

NOTE: UHWO requires 3 courses of upper-division Writing Intensive for graduation, with no more than three credits from the capstone course (APSC 486/490)

Faculty contact: Dr. Matthew Chapman (mchapman@hawaii.edu)

General Education Requirements: 31 – 28 credits

Credits	Course Alpha/Number/Title	WI or Focus	Semester Completed	Grade
3	Foundations Written Communication (FW) ENG 100 Composition			
3	Foundations Symbolic Reasoning (FS) MATH 103, MATH 135, MATH 140 or higher			
3	Foundations Multicultural Perspectives (FG): 6 credits from two different groups (A, B, C): *Group A: Primarily before 1500 CE (e.g.; HIST 151 or ANTH 151) *Group B: Primarily after 1500 CE (e.g.; HIST 152 or ANTH 152) *Group C: Pre-history to present			
3	Foundations Multicultural Perspectives (FG): Group different from above			
3	Diversification Arts, Humanities & Literature (DA, DH, DL): 6 credits from two different areas (Recommended HWST107 or other DH or DL course with HAP focus)			
3	Diversification Arts, Humanities & Literature (DA, DH, DL): Different from area above			
3	Diversification Social Sciences (DS): 6 credits from two different areas (SSCI 301 credits counted in core below)			
3	Diversification Social Sciences (DS): Different area from above. (Recommend ECON 130/131)			
3	Diversification Natural Sciences (DB, DP, DY) 3 credits from the biological sciences (DB)			
3	3 credits from the physical sciences (DP) and 1 credit from Lab (DY)			
1	1 credit from a laboratory (DY)			

ICS Lower Level Core Requirements: 27 credits

Students that completed an AS/AAS degree in a related field and approved by the faculty advisor meet ICS Core and Specialization requirements.

Credits	Course Alpha/Number/Title	WI or Focus	Semester Completed	Grade
3	ICS 100/101 Computing Literacy & Apps or Digital Tools for Info World			
3	ICS 110 Introduction to Programming			
3	ICS 111 Introduction to Computer Science I			
3	ICS 113 Database Fundamentals			
3	ICS 125 Personal Computer Maintenance and Repair			
3	ICS 184 Introduction to Networking			
3	ICS 240 Operating Systems			
3	ICS 270 Systems Analysis			
3	ICS 293D Cooperative Education			

ICS Lower Level Specialization Requirements: 9 credits

Students that completed an AS/AAS degree in a related field and approved by the faculty advisor meet ICS Core and Specialization requirements.

Select one specialization below: 9 credits				
Network Support Specialist -OR-				
Credits	Course Alpha/Number/Title	WI or Focus	Semester Completed	Grade
3	ICS 171 Introduction to Computer Security			
3	ICS 172 Network Design and Administration			
3	ICS 283 Advanced Network Design and Administration			
Database Support Specialist -OR-				

Student Advising Sheet for LCC Articulation Signed March 2015; As of August 2015, includes similar programs as stated in 15-16 General Catalog					
3	ICS 151	Structured Database Programming			
3	DMED 120	NetPrep Web Development			
3	ICS 251	Advanced Database Programming			
Information Security Specialist -OR-					
3	ICS 171	Introduction to Computer Security			
3	ICS 281	Ethical Hacking			
3	ICS 282	Computer Forensics			
Mobile Developer Specialist -OR-					
3	ICS 136	Introduction to Mobile Device Application Developer			
3	ICS 251/DMED 120	Advanced Database Programming or NetPrep Web Dev.			
3	ICS 236	Mobile Device Management and Programming			
Software Developer Specialist -OR-					
3	ICS 211	Introduction to Computer Science II			
3	ICS 212 or ICS 215	Program Structure/Introduction to Scripting			
3	ICS 241	Discrete Mathematics for Computer Science II			
General Lower Level Degree Requirements: 9-12 credits					
<i>Students that completed an AS/AAS degree in a related field and approved by the faculty advisor may substitute 9 other lower level degree credits if not used to meet requirements elsewhere. Student is still required to meet oral communication (OC) requirement. Math requirement is covered under GE.</i>					
(3)	MATH 103	(MATH 103 meets FS) or ICS 141 College Algebra/Discrete Math			
3	ENG 225	Technical Writing			
3	ICS 170	Ethics for the Digital World			
3	SP 151	Personal and Public Speech	OC		
BAS Core Requirements: 12-15 credits (12 UD)					
Credits	Course Alpha/Number/Title		WI or Focus	Semester Completed	Grade
3	ENG 200* Composition II (or equivalent), ENG 209, ENG 210, or ENG 215 *UHWO WRITING SKILLS REQUIREMENT				
3	Select one course from the following: PUBA/BUSA 481 Ethics and Administration; or PUBA 477 Ethics and Health Care Administration; or MGT 301 Business Ethics; or another 300-400 level course with an ETH designation		ETH		
(3)	SSCI 301 Methods & Techniques in Social Science Research *Can apply as DS under Gen Ed				
3	Select one course from the following: (Check prerequisites) PUBA 341 Statistics for Decision-Making in Public Administration BUSA 320 Statistics for Decision-Making				
3	CAPSTONE: WI APSC 486S or WI APSC 490S Senior Practicum		WI		
ISA Concentration Upper Division Requirements: 33 credits					
Credits	Course Alpha/Number/Title		WI or Focus	Semester Completed	Grade
3	ISA 320 Fundamentals of Secure Software Programming				
3	ISA 330 Introduction to Proactive System Security				
3	ISA 340 Introduction to Digital Forensics				
3	ISA 400 Management of Information Security				
3	ISA 450 Modern Cyber Conflicts				
3	CENT/ITS 410 IT Project Management		WI		
Upper Division UHWO Electives: 9 credits					
3	300 or higher level Business Area* or PUBA courses not used to meet any other requirement				
3	300 or higher level Business Area* or PUBA courses not used to meet any other requirement				
3	300 or higher level Business Area* or PUBA courses not used to meet any other requirement				
Upper Division Restricted Electives: 6 credits					
3	300 or higher level Business Area*, CENT, ISA, or PUBA courses not used to meet any other requirement				
3	300 or higher level Business Area*, CENT, ISA, or PUBA courses not used to meet any other requirement				
*Business Area is meant to reflect any course in core or concentration areas within the BA in Business Administration Programs like ACC, BUSA, FIN, MGT, or MKT					

a



University of Hawai'i at Mānoa

Department of Information and Computer Sciences
1680 East-West Road • Honolulu, Hawaii 96822

MEMORANDUM

November 14, 2012

TO: Blanca Polo
Assistant Professor of Computer Science
Math and Sciences Division
Leeward Community College

FROM: David Chin, Professor and Chair
Department of Information and Computer Sciences
University of Hawaii at Mānoa

A handwritten signature in black ink, appearing to read "David Chin".

RE: ICS Courses Sequencing

There is no requirement that ICS students take any 300 level ICS courses during the first two years of study. The Sample Schedules in the ICS Academic Plan document (www.ics.hawaii.edu/academics/undergraduate/ICS-Major-Minor-Guide.pdf) do recommend to incoming 4-year students that they should take ICS 111 and ICS 141 in the first semester followed by ICS 211 and ICS 241 the second semester. In the second year we recommend that they take ICS 212 or ICS 215 and an ICS 300-level course the first semester followed by another two ICS 300-level courses. This schedule is recommended, because it allows students to spread out their ICS courses throughout their 4 years of study at UH Mānoa. Incoming transfer students do not follow this schedule. Instead they can and many do take all of their 300 and 400 level ICS courses required for the B.A./B.S. degrees during their 2 years of study at UH Mānoa. This is possible because transfer students with an Associate degree have already completed the general education requirements such as proficiency in a foreign language up to the 202 level, four foundation courses, and seven diversity courses. For the B.S. degree, students also need to also take two semesters of calculus, at the 200 level or higher, two semesters of physics at the 151/152 level or high along with the corresponding labs, and two semesters of chemistry at the 161/162 level or higher along with its labs. In the Sample Schedules, these general requirements and B.S. requirements are spread out evenly across the 4 years of study. A transfer student with an Associate of Science degree will have completed all of these requirements, so will have much more room in their schedules for ICS courses during their two years of study at UH Mānoa.

Also note that both ICS 111 and ICS 141 at Mānoa do not have any prerequisites, which allows students to immediately start in the ICS program. But ICS 111 and ICS 141 at Leeward do have prerequisites.

Community connections, advisory committees, internships, Coops, DOE connections

- **Advisory Committee**

- **Jackson Cho**, Federal Government
- **Shawn Goodson**, Facchina Global Systems
- **Scott Higashino**, Bank of Hawai'i
- **Bennet Ito**, Northrup Grumman, Los Angeles
- **Aaron Kagawa**, Referentia Systems, Inc.
- **Bob Kile**, National Association of Communication Systems Engineers
- **Ian Kitajima**, Oceanit Laboratories, Inc.
- **Greg Nakanishi**, Motorola, Los Angeles
- **Randy Pacheco**, Oceanic
- **Julio Polo**, University of Hawai'i
- **Ken Tomi**, Private Consultant
- **Jason Toth**, NetEnterprise
- **Jonathan Wright**, Honolulu Police Department
- **Jason Yatogo**, United Airlines

- **Internship Locations**

For many years, maybe more than ten, Mr Vince Lee has been in charge of our ICS293D which is the internship class. He has carefully placed our students in different companies according to their strengths and to company requirements. These are some of the places where our ICS students have been placed for Internships.

- **PacXa**
Pacxa is a locally owned technology services group dedicated to bringing comprehensive and diverse IT solutions to organizations throughout Hawaii and the Pacific.
<http://www.pacxa.com>
- **State of Hawaii ICSD**
Over the years, there have been tremendous advances in technology and an increased reliance on telecommunications and computers in the workplace. The ICSD has met the challenges of the information industry and is leading the way in implementing cost-effective and efficient information and communication services. The proper application and installation of these technologies continues to be a key component towards the accomplishment of the business operations and services of State government.
<http://ags.hawaii.gov/icsd/about/>

- **Hawaiian Airlines**
Relax and experience authentic Hawaiian hospitality with island-inspired cuisine, state-of-the-art entertainment and duty-free shopping!
<https://www.hawaiianairlines.com/>

- **NetEnterprise**
NetEnterprise is the leading provider of network integration, managed services, hosting and high speed internet access in Hawaii.
<http://www.netenterprise.com/>

- **Makapana**
Makapana extends Symantec services in the island of Oahu. Symantec Corporation (Symantec) is a global provider of security, storage, and systems management solutions that help businesses and consumers secure and manage their information.
<http://hawaiicompanies.us/makapana-llc.222580.company>

- **Aloha United Way**
The Aloha United Way workplace campaign provides those who are willing and able, a safe and transparent way to support their favorite nonprofit organizations and our community.
<https://www.auw.org/>

- **State of Hawaii Department of Education**
The Hawai'i State Department of Education is the only statewide public education system in the United States.
<http://www.hawaiipublicschools.org/Pages/Home.aspx>

- **Cowabunga**
Affordable computer repair - Honolulu HI. Fast, friendly, affordable solutions for your home, business and everything in between.
<http://smartcows.com/>

- **Hawaii Air Guard**
The Hawaii Air National Guard (HIANG) has two missions. In performing its state mission, the HIANG provides organized, trained units to protect Hawaii's citizens and property, preserve peace, and ensure public safety in response to natural or human-caused disasters. Its federal mission is to provide operationally-ready combat units, combat support units and qualified personnel for active duty in the U.S. Air Force in time of war, national emergency, or operational contingency.
<http://dod.hawaii.gov/hiang/>

DOE high schools served by ICS Program

- **Leilehua High School**

Leilehua HS has an early college program funded by a grant. This program is called iReady!. iReady was initially headed by Sandi Maruyama and is not coordinated by James Cabralda.

The ICS program has taught ICS101 (Tools for the Information World) twice for this institution. Leilehua HS officials have expressed interest in providing more ICS classes for their students in the near future.

- **Waipahu High School**

At Waipahu HS our contact is Mark Silliman, former LeewardCC Chancellor. He currently serves as the director of Waipahu High School's Early College Program.

The ICS program has taught ICS110M (Introduction to Programming using mobile technology) in the past and will offer ICS111 (Introduction to Computer Science) for Waipahu HS in the Spring 2016.

ICS Distance Education Courses

FALL 2015

ICS	100	Computing Literacy & Application	56234	TBA	Online	8/24/15	12/18/15
ICS	100	Computing Literacy & Application	55186	Dorothy Sunio	Online	8/24/15	12/18/15
ICS	100	Computing Literacy & Application	55183, 55184	Alejandro Ramos	Cable TV	8/24/15	12/18/15
ICS	100	Computing Literacy & Application	55187	TBA	Online	8/24/15	12/18/15
ICS	101	Digital Tools for the Information World	55854	Michael Bauer	Online	8/24/15	12/18/15
ICS	110M	Introduction to Programming	56264	Petersen Gross	Online	8/24/15	12/18/15
ICS	111	Introduction to Computer Science	55192	Blanca Polo	Cable TV	8/24/15	12/18/15
ICS	141	Discrete Math for Computer Science	55665, 55994	Michael Bauer	Cable TV	8/24/15	12/18/15
ICS	170	Ethics for the Digital World	55666	Michael Bauer	Online	8/24/15	12/18/15
ICS	170	Ethics for the Digital World	56237	Dorothy Sunio	Online	8/24/15	12/18/15
ICS	184	Introduction to Networking	55505	Petersen Gross	Cable TV	8/24/15	12/11/14
ICS	211	Introduction to Computer Science II	55509	William M Albritton	Cable TV	8/24/15	12/11/15
ICS	236	Mobile Device Mgt and Program	55857	TBA	Online	8/24/15	12/18/15
ICS	240	Operating Systems	55462	Petersen Gross	Online	8/24/15	12/11/14

Spring 2015

ICS	100	Computing Literacy & Application	54510, 55349	Michael Bauer	Online	1/12/15	5/15/15
ICS	101	Digital Tools for the Information World	54034, 55248	Alejandro Ramos	Online	1/12/15	5/15/15
ICS	111	Introduction to Computer Science	54037	Blanca Polo	Cable TV	1/12/15	5/6/15
ICS	170	Ethics for the Digital World	54933	Vincent Lee	Online	1/12/15	5/15/15
ICS	171	Introduction to Computer Security	54657	Vincent Lee	Cable TV	1/12/15	5/6/15
ICS	211	Introduction to Computer Science II	54719	William M Albritton	Cable TV	1/12/15	5/6/15
ICS	241	Discrete Math for Computer Science II	54935	William Albritton	Cable TV	1/12/15	5/6/15
ICS	270	Systems Analysis	54040	Michael Bauer	Online	1/12/15	5/15/15
ICS	293D	Cooperative Education	54936	Vincent Lee	Online	1/12/15	5/15/15

Fall 2014

ICS	100	Computing Literacy & Application	50201	Vincent Lee	Online	8/25/14	12/19/14
ICS	100	Computing Literacy & Application	50200	Michael Bauer	Online	8/25/14	12/19/14
ICS	100	Computing Literacy and Applications	50202	Alejandro Ramos	Online	8/25/14	12/19/14
ICS	101	Digital Tools for the Information World	50206	Michael Bauer	Online	8/25/14	12/19/14
ICS	101	Digital Tools for the Information World	51087	Alejandro Ramos	Online	8/25/14	12/19/14
ICS	111	Introduction to Computer Science	50210	Blanca Polo	Cable TV	8/25/14	12/19/14
ICS	141	Discrete Math for Computer Science	50777	Michael Bauer	Cable TV	8/25/14	12/19/14
ICS	170	Ethics for the Digital World	50778	Michael Bauer	Online	8/25/14	12/19/14
ICS	171	Introduction to Computer Security	50589	Vincent Lee	Cable TV	8/25/14	12/11/14
ICS	184	Introduction to Networking	50587	Blanca Polo	Cable TV	8/25/14	12/11/14
ICS	211	Introduction to Computer Science II	50593	William M Albritton	Cable TV	8/25/14	12/11/14
ICS	236	Mobile Device Mgt and Program	51090	Blanca Polo	Online	8/25/14	12/19/14

2014

Spring

ICS	100	Computing Literacy & Application	52612	Michael Bauer	Online	1/13/14	5/16/14
ICS	100	Computing Literacy & Application	52610	Tiffany Akiyama	Online	1/13/14	5/16/14
ICS	100	Computing Literacy & Application	52610	TBA	Online	1/13/14	5/16/14
ICS	100	Computing Literacy & Application	53271, 53272	Vincent Lee	Online	1/13/14	5/16/14
ICS	100	Computing Literacy & Application	52613	Alejandro Ramos	Online	1/13/14	5/16/14
ICS	101	Digital Tools for the Information World	52036	Alejandro Ramos	Online	1/13/14	5/16/14
ICS	101	Digital Tools for the Information World	52594	Leanne Riseley	Online	1/13/14	5/16/14
ICS	110	Introduction to Programming	53277	Blanca Polo	ITV	1/13/14	5/7/14
ICS	111	Introduction to Computer Science	52039	Blanca Polo	Cable TV	1/13/14	5/7/14
ICS	136	Introduction to Mobile Device Application Development	53279	Blanca Polo	ITV	1/13/14	5/7/14
ICS	171	Introduction to Computer Security	52809	Vincent Lee	Cable TV	1/13/14	5/7/14
ICS	211	Introduction to Computer Science II	52916	William M Albritton	Cable TV	1/13/14	5/7/14
ICS	212	Program Structure	52618	Blanca Polo	ITV	1/13/14	5/7/14
ICS	241	Discrete Math for Computer Science II	52617	Michael Bauer	Cable TV	1/13/14	5/7/14

Fall 2013

ICS	100	Computing Literacy & Application	53251, 53252	Vincent Lee	Online	8/26/13	12/12/13
ICS	100	Computing Literacy and Applications	53253, 53254	Alejandro Ramos	Online	8/26/13	12/12/13
ICS	100	Computing Literacy & Application	53249, 53250	Michael Bauer	Online	8/26/13	12/12/13
ICS	101	Digital Tools for the Information World	53257	Leanne Chun Riseley	Online	8/26/13	12/12/13
ICS	111	Introduction to Computer Science	53835, 54358	Blanca Polo	Cable TV	8/26/13	12/12/13
ICS	141	Discrete Math for Computer Science	54358	Michael Bauer	Cable TV	8/26/13	12/12/13
ICS	170	Ethics for the Digital World	54359	Michael J Bauer	Online	8/26/13	12/12/13
ICS	171	Introduction to Computer Security	54053	Vincent Lee	Cable TV	8/26/13	12/12/13
ICS	184	Introduction to Networking	54051, 54360	Blanca Polo	Online	8/26/13	12/12/13
ICS	211	Introduction to Computer Science II	54065	William M Albritton	Cable TV	8/26/13	12/12/13
ICS	293D	Cooperative Education	53873	Vincent Lee	Online	8/26/13	12/12/13

Spring 2013

ICS	100	Computing Literacy & Application	56774	Vincent Lee	Online	1/7/13	5/1/13
ICS	100	Computing Literacy & Application	56773	Michael Bauer	Online	1/7/13	5/1/13
ICS	100	Computing Literacy & Application	56772	Alejandro Ramos	Online	1/7/13	5/1/13
ICS	100	Computing Literacy and Applications	56776	Petersen Gross	Online	1/7/13	5/1/13
ICS	101	Digital Tools for the Information World	56740	Leanne Chun	Online	1/7/13	5/1/13
ICS	101	Digital Tools for the Information World	56067	Tiffany Akiyama	Online	1/7/13	5/1/13
ICS	111	Introduction to Computer Science	56070	Blanca Polo	Cable TV	1/7/13	5/1/13
ICS	141	Discrete Math for Computer Science	56781	Michael Bauer	Cable TV	1/7/13	5/1/13
ICS	171	Introduction to Computer Security	57133	Petersen Gross	Online	1/7/13	5/1/13
ICS	172	Network Design and Administration	57329	Petersen Gross	Online	1/7/13	5/1/13
ICS	184	Introduction to Networking	57134	Blanca Polo	Online	1/7/13	5/1/13
ICS	186	Introduction to Wide Area Networks	56073	Blanca Polo	Cable TV	1/7/13	5/1/13
ICS	187	TCP/IP Network Architectures	56074	Vincent Lee	Cable TV	1/7/13	5/1/13
ICS	211	Introduction to Computer Science II	57328	William M Albritton	Cable TV	1/7/13	05/01/201

On October 30th 2013, NPR's Bytemarks café presented the "Learn to Program" episode. In this episode they emphasize that there are many available jobs that required programming skills in the islands. <http://www.bytemarkscafe.org/2013/10/30/episode-272-learn-to-program-october-30-2013/>

The ICS curriculum was completely revised and implemented in 2012. For a while we were still offering courses from the old curriculum for students who had begun the program under the old curriculum. That is one of the main reasons for the large (23%) increase in the number of classes.

During our last PCC meeting in October 2013, all community colleges agreed to gather data to show that students who do not take courses like ICS100 or ICS101 are not really computing literate and therefore need to take a course to overcome this deficiency. This project is backed up by the ACCJC accreditation standards, which includes a statement about kinds of skills needed by learners:

A capability to be a productive individual and life-long learner: skills include oral and written communication, information competency, **computer literacy**, scientific and quantitative reasoning, critical analysis/logical thinking, and the ability to acquire knowledge through a variety of means

http://www.accjc.org/wp-content/uploads/2012/11/Accreditation-Standards_Edited-Nov-2012.pdf

In the Fall 2012 is when our ICS program began to change into the curriculum that we currently offer. The number of non-majors in classes was going down because ICS100 is no longer considered a diversification-other (DO) course. However, we are now offering ICS170, Ethics in the Digital World, which is part of the core of our new program. This course comes under the diversification humanities (DH) category, and has brought in more students. The number of non-majors continues to increase.

Parts III Quantitative Indicators and IV Analysis are parts of the ARPD template.

Leeward Community College

2015 Annual Report of Instructional Program Data

Information & Computer Science



The last comprehensive review for this program was on **2013**, and can be viewed at:

<http://documents.leeward.hawaii.edu:8080/docushare/dsweb/View/Collection-2965>

Program Description

ICS Associate in Science Degree

The curriculum leading to an Associate in Science degree in Information and Computer Science is designed to prepare individuals for employment as technical assistants to professional and administrative personnel using computers or to transfer to a four-year university. Leeward community college currently has articulation agreements with UH Manoa, UH Hilo and UH West Oahu as well as with Capella University online. The following table contains information about student transfers.

Students in the AS in ICS may choose one of five areas of specialty: Network Support Specialist, Database Support Specialist, Information Security Specialist, Mobile Developer Specialist and Software Developer Specialist. Skills in writing, speech, economics and mathematics complete the preparation for employment.

The core program requirements are designed to facilitate transfer to the baccalaureate programs in Information and Computer Sciences. We are currently undergoing some curriculum changes that will allow students to transfer to UH West Oahu with junior status after obtaining their AS in ICS.

The ICS Program has been articulated by Program Coordinating Council (Fall 2014). Core courses remain aligned across the University of Hawaii System, as well as with the Association for Computing Machinery (ACM).

Information and Computer Sciences Program Mission:

To support the mission of Leeward Community College, the Information and Computer Science program is committed to providing an intellectually challenging curriculum that prepares graduates to understand the fundamental concepts in computer science and the practices, values and demands of the related professions.

Part I. Quantitative Indicators

Overall Program Health: **Cautionary**

Majors Included: ICS Program CIP: 11.1003

Demand Indicators		Program Year			Demand Health Call
		12-13	13-14	14-15	
1	New & Replacement Positions (State)	137	104	92	Unhealthy
2	*New & Replacement Positions (County Prorated)	57	56	55	
3	*Number of Majors	156	160	169	
3a	Number of Majors Native Hawaiian	30	36	38	
3b	Fall Full-Time	54%	46%	51%	
3c	Fall Part-Time	46%	54%	49%	
3d	Fall Part-Time who are Full-Time in System	1%	2%	1%	
3e	Spring Full-Time	57%	48%	52%	
3f	Spring Part-Time	43%	52%	48%	
3g	Spring Part-Time who are Full-Time in System	1%	2%	2%	
4	SSH Program Majors in Program Classes	879	1,233	1,425	
5	SSH Non-Majors in Program Classes	1,962	1,989	2,025	
6	SSH in All Program Classes	2,841	3,222	3,450	
7	FTE Enrollment in Program Classes	95	107	115	
8	Total Number of Classes Taught	64	62	62	

Efficiency Indicators		Program Year			Efficiency Health Call
		12-13	13-14	14-15	
9	Average Class Size	14.8	17.3	18.5	Healthy
10	*Fill Rate	75.3%	86.6%	93.8%	
11	FTE BOR Appointed Faculty	6	6	3	
12	*Majors to FTE BOR Appointed Faculty	25.9	26.5	56.3	
13	Majors to Analytic FTE Faculty	22.3	23.5	24.5	
13a	Analytic FTE Faculty	7.0	6.8	6.9	
14	Overall Program Budget Allocation	\$430,305	\$471,786	\$520,056	
14a	General Funded Budget Allocation	\$430,305	\$367,500	\$462,591	
14b	Special/Federal Budget Allocation	\$0	\$0	\$0	
14c	Tuition and Fees	\$0	\$104,286	\$57,465	
15	Cost per SSH	\$151	\$146	\$151	
16	Number of Low-Enrolled (<10) Classes	15	5	2	

*Data element used in health call calculation

Last Updated: October 7, 2015

Effectiveness Indicators		Program Year			Effectiveness Health Call
		12-13	13-14	14-15	
17	Successful Completion (Equivalent C or Higher)	79%	77%	77%	Healthy

18	Withdrawals (Grade = W)	50	45	62
19	*Persistence Fall to Spring	66.4%	60.4%	66.6%
19a	Persistence Fall to Fall	47.5%	43%	48.4%
20	*Unduplicated Degrees/Certificates Awarded	15	31	45
20a	Degrees Awarded	6	9	12
20b	Certificates of Achievement Awarded	4	1	17
20c	Advanced Professional Certificates Awarded	0	0	0
20d	Other Certificates Awarded	17	43	42
21	External Licensing Exams Passed	Not Reported	Not Reported	Not Reported
22	Transfers to UH 4-yr	8	10	15
22a	Transfers with credential from program	0	1	0
22b	Transfers without credential from program	8	9	15

Distance Education: Completely On-line Classes		Program Year		
		12-13	13-14	14-15
23	Number of Distance Education Classes Taught	16	16	17
24	Enrollments Distance Education Classes	300	278	299
25	Fill Rate	94%	87%	92%
26	Successful Completion (Equivalent C or Higher)	76%	81%	86%
27	Withdrawals (Grade = W)	13	5	9
28	Persistence (Fall to Spring Not Limited to Distance Education)	64%	56%	58%

Perkins IV Core Indicators 2013-2014		Goal	Actual	Met
29	1P1 Technical Skills Attainment	91.00	90.32	Not Met
30	2P1 Completion	47.00	32.26	Not Met
31	3P1 Student Retention or Transfer	75.21	80.77	Met
32	4P1 Student Placement	68.92	50.00	Not Met
33	5P1 Nontraditional Participation	17.50	14.56	Not Met
34	5P2 Nontraditional Completion	16.00	9.09	Not Met

Performance Funding		Program Year		
		12-13	13-14	14-15
35	Number of Degrees and Certificates	10	10	29
36	Number of Degrees and Certificates Native Hawaiian	0	1	5
37	Number of Degrees and Certificates STEM	10	10	29
38	Number of Pell Recipients	39	47	60
39	Number of Transfers to UH 4-yr	8	10	15

*Data element used in health call calculation

Last Updated: October 7, 2015

[Glossary](#) | [Health Call Scoring Rubric](#)

Part II. Analysis of the Program

ICS Associate in Science Degree

The curriculum leading to an Associate in Science degree in Information and Computer Science is designed to prepare individuals for employment as technical assistants to professional and administrative personnel using computers or to transfer to a four-year university. Leeward community college currently has articulation agreements with UH Manoa, UH Hilo and UH West Oahu as well as with Capella University online. The following table contains information about student transfers.

Students in the AS in ICS may choose one of five areas of specialty: Network Support Specialist, Database Support Specialist, Information Security Specialist, Mobile Developer Specialist and Software Developer Specialist. Skills in writing, speech, economics and mathematics complete the preparation for employment.

The core program requirements are designed to facilitate transfer to the baccalaureate programs in Information and Computer Sciences. We are currently undergoing some curriculum changes that will allow students to transfer to UH West Oahu with junior status after obtaining their AS in ICS.

The ICS Program has been articulated by Program Coordinating Council (Fall 2014). Core courses remain aligned across the University of Hawaii System, as well as with the Association for Computing Machinery (ACM).

The ICS Program Mission Statement

To support the mission of Leeward Community College, the Information and Computer Science program is committed to providing an intellectually challenging curriculum that prepares graduates to understand the fundamental concepts in computer science and the practices, values and demands of the related professions.

ICS Program Outcomes

In addition to acquiring the competencies required for Associate in Science degrees, upon successful completion of this program graduates will be able to:

Demonstrate computing literacy.

Describe the functions and interrelationships of the building blocks of an operating system.

Solve problems, develop algorithms, and write object-oriented computer programs in at least two programming languages.

Apply the mathematics used in computing science to solve computing problems.

Effectively communicate in written and oral form, a system solution its documentation, and its implementation.

Use project management tools to manage information systems development projects.

Work effectively as part of a group/team.

Design a relational database with proper documentation.

Demonstrate proficiency in computer maintenance and networking.

Based on selection of an area of specialty, the student will further be able to:

Database Support Specialist: Write object-oriented computer programs for online access and manipulation of databases.

Mobile Developer Specialist: Design, develop and implement applications and policies for mobile devices.

Software Developer Specialist: Develop a foundation in computer science to succeed in upper-division courses.

Network Support Specialist: Apply computer-networking principles to build and troubleshoot networks.

Information Security Specialist: Apply the tools and techniques of information security to secure physical and digital information.

Certificates of Achievement

The ICS program also provides students with the opportunity to earn program certificates. IT specialists looking to gain new skills represent the targeted population for these certificates. Students must earn a GPA of 2.0 or better for all courses required in these certificates. Students pursuing a Certificate of Achievement may choose from the following:

Certificate of Achievement in ICS

The Certificate of Achievement in Information and Computer Science is designed to provide the student with entry-level skills or job upgrading for positions under direct supervision in computer support, cabling and basic networking, office application support, and database management.

Learning Outcomes: Certificate of Achievement in ICS

Upon completion of the certificate, the student will be able to:

Demonstrate computing literacy.

Solve problems, develop algorithms and write object-oriented computer programs in a programming language.

Design and a relational database with proper documentation.

Demonstrate proficiency in computer maintenance and networking.

Certificate of Achievement in Information Security

The ICS program is participating in the C3T4 grant (Community College Career and Technical Training -4th round) which resulted in the creation of a Certificate of Achievement in Information Security. This certificate is designed to provide the student with the preparation needed to take the exam for industry certifications.

Actual industry certifications must be taken in specialized testing centers. The ICS department is exploring the possibility of making LeewardCC a CompTIA testing center. <http://home.pearsonvue.com/For-test-centers.aspx>

- **Network+**

CompTIA Network+ is a vendor neutral networking certification that is trusted around the world. It validates the essential knowledge and skills needed to confidently design, configure, manage and troubleshoot any wired and wireless devices.

CompTIA Network+ certified individuals are in-demand worldwide.

<https://certification.comptia.org/certifications/network>

- **Security +**

CompTIA Security+ is the certification globally trusted to validate foundational, vendor-neutral IT security knowledge and skills. As a benchmark for best practices in IT security, this certification covers the essential principles for network security and risk management – making it an important stepping stone of an IT security career.

<https://certification.comptia.org/certifications/security>

- **Linux+**

CompTIA Linux+ Powered by LPI certifies foundational skills and knowledge of Linux. With Linux being the central operating system for much of the world's IT infrastructure, Linux+ is an essential credential for individuals working in IT, especially those on the path of a Web and software development career.

<https://certification.comptia.org/certifications/linux>

- **A+**

IT success stories start with CompTIA A+ certification. It validates understanding of the most common hardware and software technologies in business and certifies the skills necessary to support complex IT infrastructures. CompTIA A+ is a powerful credential that helps IT professionals worldwide ignite their IT career.

<https://certification.comptia.org/certifications/a>

- **CEH**

This course will significantly benefit security officers, auditors, security professionals, site administrators, and anyone who is concerned about the integrity of the network infrastructure.

<http://www.globalknowledge.com/training/course.asp?pageid=9&courseid=20241&catid=191&country=United+States>

- **EnCE**

The EnCase® Certified Examiner (EnCE®) program certifies both public and private sector professionals in the use of Guidance Software's EnCase® computer forensic software. EnCE® certification acknowledges that professionals have mastered computer investigation methodology as well as the use of EnCase® software during complex computer examinations. Recognized by both the law enforcement and corporate communities as a symbol of in-depth computer forensics knowledge, EnCE certification illustrates that an investigator is a skilled computer examiner.

<https://www.guidancesoftware.com/training/Pages/ence-certification-program.aspx>

Learning Outcomes: Certificate of Achievement in Information Security

Upon completion of the certificate, the student will be able to:

- Solve problems, develop algorithms and write object-oriented computer programs in a programming language.
- Design a relational database with proper documentation.
- Demonstrate proficiency in computer maintenance and networking.
- Demonstrate an understanding of the functioning of a computer's operating system.

- Apply the tools and techniques of information security to secure physical and digital information.

Curriculum organization for the Certificate of Achievement in Information Security :

First Semester Requirements		
Courses	Credits	Prepares for Certification
ICS 111 Introduction to Computer Science I	3	
ICS 170 Ethics for the Digital World	3	
ICS 171 Introduction to Computer Security	3	Security+
ICS 184 Introduction to Networking	3	Networks+
ICS 240 Operating Systems	3	Linux
Second Semester Requirements		
Courses	Credits	Prepares for Certification
ICS 113 Database Fundamentals	3	
ICS 125 Personal Computer Maintenance and Repair	3	A+
ICS 215 Introduction to Scripting	3	
ICS 281 Ethical Hacking	3	CEH*
ICS 282 Computer Forensics	3	EnCE**

Certificates of Competence

This Certificate of Competence provides an entry point to a career in the computer industry in the State of Hawaii. According to the HAWAII Workforce Infonet (<https://www.hiwi.org/>) of the Hawaii Department of Labor, job demand for computer specialists will continue to increase for the immediate future. Most of these jobs are increasing at a rate greater than the average for all occupations. The following are the Certificates of Competence currently offered:

- Basic Logic and Programming 1 last modified Sp 2011

The Certificate of Competence in Basic Logic and Programming Level 1 provides students an overview of the fundamentals of computer programming. Students will learn the fundamentals of problem solving, algorithm development, implementation, and

debugging/testing using an object-oriented programming language. They will also learn the fundamentals of the mathematics behind computer operations.

- **Basic Logic and Programming 2** last modified Fall 2011

The Certificate of Competence in Basic Logic and Programming Level 2 provides students with the second semester of computer programming and the mathematics of computers. Students will learn the fundamentals of data structures, searching and sorting algorithms, recursion, polymorphism, inheritance, and encapsulation using an object-oriented programming language. They will also learn the mathematical concepts behind computer operations, such as graphs, trees, Boolean algebra, finite-state machines, formal languages, program correctness, and solving recurrence relations.

- **Web Programming** last modified Fall 2011

The Certificate of Competence in Web Programming provides students with the two basic skills needed to design the "back-end" part of interactive web pages: computer programming and database design. Students will learn the basics of structured programming, object-oriented programming, and error control. They will also learn the basics of relational databases, normalization, and Structured Query Language. Finally, they will put these two skills together by creating database-driven web-based applications. This certificate has been designed to prepare students for entry-level employment as a Web Programmer.

- **Help Desk** last modified Fall 2014

Program prepares students for entry-level positions as Help Desk Specialists.

- ~~Web Science~~ last modified Fall 2011

The Certificate of Competence in Web Science is intended to provide students with an Internet-based approach to the principles of designing, programming, and developing web database sites. Students will learn to integrate client-side web pages with server-side databases to design and develop real-world web-based applications.

- **Database support** last modified Fall 2015

Students will develop dynamic web applications using a programming language and a database. They will also strengthen problem-solving skills using more advanced features of programming languages and algorithms such as recursion, pointers, and memory management with an emphasis on the use of data structures such as arrays, lists, stacks, and queues.

- **Information security** last modified Fall 2013

Students will be introduced to the essentials of computer security. They will perform basic ethical (white hat) hacking, learn about the moral and legal issues that are involved while performing the learned techniques. Students will learn how to perform basic computer forensics such as operating system diagnostics, as well as to use a forensic tool kit to examine and validate computer activity. Students will acquire knowledge about the proper techniques for data collection, examination and preservation of forensic data.

- **Mobile developer** last modified Fall 2015

Students will learn to create web pages optimized for mobile devices. Usability, documentation and testing for mobile applications and mobile websites will be covered. They will manage and secure mobile devices using programming tools for at least two different mobile devices. They will also develop dynamic web applications using a programming language and a database with a focus on open source.

- **Network support** last modified Fall 2013

This certificate provides students with the essentials of computer security, the fundamentals of network design, and the advanced components of network design. This includes using encryption, activity monitoring, intrusion detection, security policies, security administration, basic switching and routing, wired and wireless networking, wide area networking, Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) routing, and route optimization.

- **Software developer** last modified Fall 2015

Students will develop applications in at least two object-oriented languages using data structures, recursion and graphical-user interfaces. Students will analyze and select appropriate algorithms for sorting and searching. Students will use mathematical models, which have implications for computer science. Students will be prepared for upper-division ICS courses.

ICS Program Strengths

The Strategic Directions for the University of Hawaii Community College system identify several principles for success. While all are considered for program success, three of these are specific driving forces for the strength of the ICS Program.

- “The quality of the educational programs as measured by student success in subsequent courses, in the workplace, and in the community must be maintained”. The success rate continues to be 77%.
- “UH Community Colleges are an integral component of the workforce development in the state and a leader in identifying workforce needs and developing and delivering training programs to enable students to gain employment.”
 - Faculty membership in local and national organizations bring valuable insight to local and national needs.
 - The ICS Program collaborates with other UH Manoa, West Oahu and all other Community Colleges in the UH System. Notable was the creation of the cybersecurity C3T4 grant which was a collaboration between the community colleges.
 - A career specialist for students was hired to promote the program, recruit new students and organize computer science events
 - A student-run help desk was proposed. Hiring of a help-desk manager is in progress. This help-desk will serve as an internship within the campus. Students will be able to get real-world experience in our institution.
- “Students can be successful in these quality programs when provided with the right system of support and guidance.” The ICS faculty provide this system of support and guidance.
- ◦ **Dr. Blanca Polo**
Professional activities include:
 - ◦ ◦ **National Center for Women in Technology (NCWIT)**
Dr. Polo, once again attended the NCWIT summit. Expenses for this summit were provided by the NCWIT Academic Alliance. Dr Polo co-leads the NCWIT student seed fund, which was previously funded by Symantec, but in the year 2015 will be funded by Microsoft Research. <http://www.ncwit.org/programs-campaigns/ncwit-awards/ncwit-student-seed-fund>.
 - ◦ ◦ **Association for Computing Machinery (ACM)**
Dr Polo created and is the adviser for the "Ada" women in computing club, a chapter of ACM-W (Association of Computing Machinery - Women)
 - ◦ ◦ **Grace Hopper The Grace Hopper Celebration of Women in Computing is the World's Largest Gathering of Women Technologists.** It is produced by the Anita Borg Institute and presented in partnership with ACM.. Dr. Polo was a speaker in the Grace Hopper Conference in Houston Texas in October 2015. “Bringing your whole self to work as an underrepresented woman in computing

College Activities include:

- ○ ■ Faculty Senate
- ○ ■ Department Personnel Committee
- ○ ■ Strategic Planning Committee
- ○ ■ NSO (*new student orientation*)
- ○ ■ Brought the “Hour of Code” to Leeward
- ○ ■ Teach Zumba and zumba toning for the wellness committee.
- ○ ■ Geek day presentation on how to make android apps using app inventor

- ○ **Peterson Gross**
- ○ Professional activities include:
- ○ ■ *Hawaii Strategy Institute*
- ○ ■ PCATT IT Symposium
- ○ ■ TK20 User Group Conference
- ○ ■ *KSCM (Kuali Student Curriculum Management), the new system to manage curriculum system-wide*

College Activities include:

- ○ ■
 - *Geek day events*
 - *NSO (new student orientation)*
 - *Discovery squares*
 - *Robofest*
 - *Hawaii State Science Olympiad*
 - *Leeward Oahu Science and Engineering Fair Judge*
 - *“Hour of Code” event for Maili Elementary*
 - *Made a streaming device presentation for HBEA*
 - *App Inventor Workshop for UH Library and Information Science Alumni Group.*

Community Activities include:

- ○ ■
 - *PHP issues with Mililani Community Church*
 - *Assisted Palm Villas 2 Office Manager with technology troubles..*

• ○ **William Albritton**

Professional activities include:

- ○ ■ *Organized and conducted the October 2014 ICS System-wide Articulation Agreement Meeting*
- ○ ■ *Faculty Senate*
- ○ ■ *Curriculum Chair*
- ○ ■ *Wo Learning Champions - Generation X*
- ○ ■ *Kilo É»Äï½ina Professional Learning Committee Member*
- ○ ■ *IT Standing Committee Chair*
- ○ ■ *Filmed ICS 100 with 3 other ICS faculty*
- ○ ■ *Geek Day presentation on “Computer Security Basics”*

Community Activities include:

- ○ ■ *Access Surf Volunteer - an organization that provides access to the beach and ocean for people with disabilities and their families Schedules surfers and participants*

• ○ **Vincent Lee**

Professional activities include:

- ○ ■ *Armed Forces Communications and Electronics Association (AFCEA) Guam 2014 Keynote speaker on Insider Threat*

- AFCEA Alaska 2014 Keynote speaker on Insider Threat
- First ever cyber challenge between the US and Japan at AFCEA Tokyo 2015
- Keynote Speaker AFCEA Tokyo 2015 Cyber Educations in the 21st Century

College Activities include:

- ○ ▪ 2014 and 2015 Hawaii State Science Fair judge

- ○ **Michael Bauer**
Professional activities include:
- ○ ▪ ACM-SIGCSE
- ○ ▪ NCWIT

ICS Program Weaknesses

Lack of funds to attend conferences and training

Members of the computer science faculty are aware that technology moves at a very fast pace. This requires training to be up-to-date with the latest in technology. Maintaining an up-to-date knowledge base serves to increase recruitment, and retention. ICS faculty members are always looking for sufficient funds to attend national conferences and training programs. Training in the latest technology will also help improve teaching efficiency. As previously reported the ICS program needs more aggressive and better marketing to attract new students. Action has been taken to improve this weakness by the hiring of a career specialist for retention, graduation and transfer of students.

ICS faculty need training in techniques to promote retention, graduation and transfer of students.

Demand Indicators

Nationwide

The ICS program is rated as “Unhealthy.” The Classification of Instructional Programs does not include the need for cybersecurity, networking and big data professionals. Being limited by the CIP codes provides an inaccurate description of the needs of the Hawaiian Islands with respect to computer technologies and cybersecurity.

The number of ICS majors continues to increase slowly. Student-semester hours for majors and nonmajors continues to increase.. In the last few years there has been an increase in money available for grants to train students in cybersecurity and big data. (Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage, transfer, visualization, and information privacy) Both disciplines fall under Information and Computer sciences however there is no CIP code for either.

Cybersecurity helps data stay safe. Even TV commercials advertise cybersecurity companies. Hawaii is no exception. As a result the University of Hawaii has formed a cybersecurity group. Dr Polo is part of this group. They meet to discuss how all campuses will move forward implementing cybersecurity education programs to cover the vast demand both in civilian and military worlds.

In 2014 the Community Colleges was awarded a C3T4 grant to implement a new Certificate of Achievement in cybersecurity and to better train students to perform as professionals.

An example of available grants for the cybersecurity are:

<https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55>

<https://search.usa.gov/search?utf8=%E2%9C%93&affiliate=nsf&query=cybersecurity&commit=Search>

<http://csrc.nist.gov/nice/>

International

This article clearly describes what is going outside our country:

China Unable To Recruit Hackers Fast Enough To Keep Up With Vulnerabilities In U.S. Security Systems

Despite devoting countless resources toward rectifying the issue, Chinese government officials announced Monday that the country has struggled to recruit hackers fast enough to keep pace with vulnerabilities in U.S. security systems. "With new weaknesses in U.S. networks popping up every day, we simply don't have the manpower to effectively exploit every single loophole in their security protocols," said security minister Liu Xiang, who confirmed that the thousands of Chinese computer experts employed to expose flaws in American data systems are just no match for the United States' increasingly ineffective digital safeguards.

<http://www.theonion.com/article/china-unable-recruit-hackers-fast-enough-keep-vuln-51719>

Efficiency Indicators

In order to help maintain efficiency, the ICS department has continued to offer the final two courses of our most popular specialization in 8-week intensive course packages, In Spring 2014, ICS 172/283 (Network Design and Administration, and Advanced Network Routing and Administration), along with ICS 281/282 (Ethical Hacking, and Computer Forensics) was offered. In 2013 there were 15 under-enrolled classes, in 2014 there were only 5. This year the number is down to 2. This is the lowest number of under-enrolled classes yet. As soon as classes open, they fill up.

Effectiveness Indicators

The ICS faculty believes that Maka'ala is a great tool to keep track of how students do during the first weeks of school and to help improve retention. The computer science faculty work closely with the ICS counselor Amy Amper, as well as with the AS-NS counselor Heather Takamatsu.

Five new certificates of competence were created to target students who may not want to get an AS degree but need to bring their skills up to date to better their opportunities at work. These certificates became effective in the spring of 2014, and the number of certificates awarded has greatly increased—from 17 to 43, (153%). In 2015 42 certificates were awarded. (still 99.3%). The new curriculum prepares students to obtain industry certifications should they decide to do so. Descriptions of the courses that prepare students for certifications are listed above.

The result of Last Year's Plan

The Need for Cybersecurity Professionals

Part of goals of the C3T4 grant is to increase enrollment as well as to improve curriculum. Plans to do this began by increasing the number of ICS distance education (DE) courses. Course offerings in days/times that were more convenient for our students were planned. The basic idea continues to be, to make education more accessible to those that want a computer science education.

The number of majors in the program continues to slowly but steadily increase. More students are being served with the same amount of courses from 2014 to 2015. The demand indicators show that the program is producing more majors than available jobs. However the number of cybersecurity and big data grants available via NSF (national science foundation), the DHS (department of homeland security) and the DOL (department of labor) among others. Cybersecurity continues to be an area where more and more people are needed. This is evident when visiting the website for NICE (National Initiative for Cybersecurity Education), NIST (National Institute of Standards and Technology), NSA (National Security Agency), NICCS (National Institute for Cybersecurity Career and Studies) and others. Clearly the demand for these professionals cannot be measured by available jobs only in Hawaii.

Reaching out to accommodate students' Schedules

Mr Gross successfully recorded ICS172 (Network Design and Administration) for cable TV. This coupled with a new virtual laboratory equipment NetLab (<https://www.netdevgroup.com/products/>) allows the program to offer this course online. Mr Albritton recorded ICS 212 (Program Structure) for cable TV. In the Spring 2015, Mr Albritton, Mr Gross, Mr Bauer and Dr Polo finished recording ICS100 (Intro to Computing Literacy). This course aired for the first time in the Fall 2015. There are currently 112 students taking this course, 37 of which are taking the course online with the Cable TV component.

It was expected to offer more ICS100 class sections. However, with the demand for other ICS program courses therefore, resources have been diverted to address the demand.

Hybrid versions of ICS125 (Personal Computer Maintenance and Repair) was offered. The ICS faculty are now offering open-labs as a complement to distance education and cable courses in order to better support students that feel that they need to see the instructor on a regular basis.

Reaching Out to High Schools

Mr Bauer taught ICS101 online to Leilehua HS students in the Spring 2014, and will do it again in 2015. Mr Gross taught ICS110 face-to-face in Waipahu HS. We continue to have requests from both Waipahu HS and Leilehua HS to offer ICS courses for them.

C3T4 Grant Update

Mr Gross has worked tirelessly to bring the helpdesk to life, while Dr Polo has hired the student career specialist and already selected the new helpdesk manager with the help of the respective hiring committees. Mr Gross expects to leave the helpdesk in the hands of the helpdesk manager as soon as the hiring procedures take place.

Articulation in Action

Transfers Students from the AS-ICS

	UHM	UHWO
Fall 2012	5	2
Spring 2013	2	1
Fall 2013	4	5
Spring 2014	4	3
Fall 2014	8	7
Spring 2015	3	4

Perkins Core Indicators

Last year, the ICS program met four out of the six Perkins Core indicators.

- technical skills attainment
- student retention/transfer*
- Non-traditional participation
- Non-traditional completion

This year only the student retention/transfer was met, which is attributed in great part to the articulation agreement with UHWO.

Resources

As far as classroom equipment for students, ICS program counts with up-to-date equipment and personnel to help students succeed. This is due to the C3T4 grant which has provided equipment as well as resources to hire personnel to help recruit and better prepare and educate students.

In order to promote our program, recruit and retain students we need to be more visible. We are requesting an extra large computer monitor that we would be able to bring with us in recruiting events and fairs in which we participate. It is embarrassing that being the computer science department we do not count with technology to show our student's software projects, pictures or videos as well as other resources from our discipline.

Part III. Action Plan

We did not meet but one of the Perkins core indicators. However, we believe that with the new CA in Cybersecurity as well as new resources, we will be able to meet more of the core indicators next year. All of the Perkins core indicators relate to the C3T4 grant that funds us. The new equipment and NetLab+ will help students improve their technical skills attainment. We are very close, only 0.64% to meet that indicator.

In regards to Completion, NetLab+ will also help because more students will be able to work from home in courses that used to require physical equipment and in-class instruction. NetLab+ is helping more of our classes

to be taught using virtual environments. On the same hand, and due to the same reasons, we expect to increase our non-traditional participation and completion.

As part of the C3T4 grant we need to keep an accurate count of the unduplicated number of students that are using our virtual environment as well as other resoruces made possible by the grant. The same information will provide insight as to the impact of the virtual equipment.

The ICS faculty plans to attend conference with the C3T4 grant money. This will help get faculty acquainted with the latest technology and cybersecurity treats; which in turn will result in better education for our students.

Part IV. Resource Implications

For the next two years, resources will be provided by the C3T4 grant. Mobile devices are part of the few things that are not covered for the ICS faculty. These devices are used to teach mobile development and security. We are anticipating that at least half of the android tablets will need replacement next year.

Program Student Learning Outcomes

For the 2014-2015 program year, some or all of the following P-SLOs were reviewed by the program:

Assessed this year?		Program Student Learning Outcomes
1	<input checked="" type="checkbox"/> Yes	Describe the functions and interrelationships of the building blocks of an operating system.
2	<input checked="" type="checkbox"/> Yes	Solve problems, develop algorithms, and write object-oriented computer programs in at least two programming languages.
3	<input checked="" type="checkbox"/> Yes	Apply the mathematics used in computing science to solve computing problems.
4	<input checked="" type="checkbox"/> Yes	Effectively communicate in written and oral form, a system solution its documentation, and its implementation.

Assessed this year?		Program Student Learning Outcomes
5	<input type="checkbox"/> No	Use project management tools to manage information systems development projects.
6	<input checked="" type="checkbox"/> Yes	Work effectively as part of a group/team
7	<input checked="" type="checkbox"/> Yes	Design a relational database with proper documentation.
8	<input checked="" type="checkbox"/> Yes	Demonstrate proficiency in computer maintenance and networking.

A) Evidence of Industry Validation

Hawaii lacks certified technicians for the current and future workforce. A study conducted by Linda Johnsrud in 2007--“The Second Decade Project”-- specified areas of Hawaii’s workforce that need immediate attention. Based on the projected population increase in Hawaii from 2000 to 2020, Ewa was identified as having a 105% population increase, which is four times the state average. Nearly half of the projected 28,266 job openings by 2012 will require education beyond high school and skills only provided by postsecondary education and training. (<http://dspace.lib.hawaii.edu/bitstream/handle/10790/182/seconddecade.pdf?sequence=1>)

Furthermore, according to employment projections for 2012–2022 by the United States Department of Labor Bureau of Labor Statistics (http://www.bls.gov/emp/ep_table_102.htm), job demand for computer specialists will continue to increase in the immediate future. The numbers for most of these job openings are increasing at a rate greater than the average for all occupations. For example, “Computer support specialists” openings are increasing at a rate of 1.7% annually over ten years, while the national average for all jobs is 1.08%. By 2022, Computer Support Specialists will have grown 17.0% while, overall, openings will have increased about 10.8%

In the State of Hawaii, according to the HAWAII Workforce Infonet (<https://www.hiwi.org/>) of the Hawaii Department of Labor, job demand for computer specialists will continue to increase in the immediate future. Most of these jobs are increasing at rates similar to the national, which are better than the average for all occupations in Hawaii (1.2%). For example, “Computer Support Specialist” openings are increasing at a rate of 1.6% annually.

Hawaii Employment Projections for 2010-2020 by Hawaii State DLIR, Research & Statistics Office
--

Occupation Title	Employment		Average Annual Growth	Average Annual Replacement Openings
	Number Actual & Projected			
	2010	2020		
Total, all occupations	651,290	727,390	1.2%	15.720
Computer Specialists	9,520	11,030	1.6%	160
Computer and information scientists, research	80	90	7.1%	**
Computer programmers	820	850	3.4%	20
Computer software engineers, applications	760	970	2.7%	20
Computer software engineers, systems software	540	750	4.0%	20
Computer support specialists	1,950	2,260	1.6%	50
Computer systems analysts	890	1,050	1.9%	20
Database administrators	250	330	3.1%	**
Network and computer systems administrators	1,350	1,670	2.4%	20
Information Security Analysts, Web Developers, and Computer Network Architects	1,180	1,460	2.4%	20
Computer specialists, All Other	1,700	1,600	-0.6%	30
** The number of openings are greater than zero, but less than ten.				

Based on the above information, we believe that more students will enroll in our program. However day to day it becomes more evident that many employers look for people with a bachelors degree. This is the main reason why, even when our students may be able to land a job with an AS degree, we encourage them to pursue a 4-yr degree.

B) Expected Level Achievement

Information and computer science courses as well as the program are evaluated with the expectations that at least 70% of the students achieve the level of 70% or more. In technology industries it is important to stay up to date in the field. Students able to achieve this much should be able to keep up with changes in technology and the computer industry.

C) Courses Assessed

The following courses were assessed during the past five academic years and do not need to be assessed again yet. Data for this assessments is already in TK20.

- ICS100 Introduction to Computing Literacy
- ICS101 Digital Tools for the Information World
- ICS113 Database Fundamentals
- ICS125 Personal Computer Maintenance
- ICS141 Discrete Math for Computer Science I
- ICS151 Structured Database Programming
- ICS170 Ethics for the Digital World
- ICS172 Network Design and Administration
- ICS184 Introduction to Networking
- ICS211 Introduction to Computer Science II (partial)
- ICS212 Program Structure
- ICS240 Operating Systems
- ICS241 Discrete Math for Computer Science II
- ICS251 Advanced Database Programming
- ICS283 Advanced Network Design and Administration(partial)

Current plans are to assess the following courses in the fall 2015:

ICS111, ICS135, ICS171, ICS236, ICS270, ICS 281 and ICS282.

Once this is done the ICS faculty will begin the assessment cycle again.

D) Assessment Strategy/Instrument

Assessment instruments are varied and they depend on course being assessed. In Ethics for the Digital World (ICS170) for example, assessment is performed in written documents as well as with in-class discussion. On the other hand, in Introduction to computer science I (ICS111) assessment will be performed using student submitted programming assignments which cover the SLO requirements. More specific description for each of the assessed courses may be found in TK20.

E) Results of Program Assessment

Based on the course learning outcomes and their mapping to program learning outcomes there is only one learning outcome that is yet to be assessed. This is part of a capstone course ICS270 (Systems Analysis) which is taught only by Michael Bauer. Mr Bauer will be teaching ICS270 in the Spring of 2016 and once he is done we will have assessed all the ICS program learning outcomes and we will begin the cycle once again.

F) Other Comments

No content.

G) Next Steps

Dr Polo, the program coordinator assigned faculty members to teach all the sections of a given course during the Fall 2015. This was with the purpose of getting all courses offered in this semester assessed. In a few weeks we will find out if this method worked to increase course assessment when needed.

The ICS faculty will continue to work together recruiting and retaining students, now with the help of our new student career specialist Melissa de Leon. We also expect that more students will take advantage of the helpdesk internship in our own Leeward student helpdesk.

Part V. Curriculum Revision and Review (if required)

Minimum of 20% of existing courses is to be reviewed each year so that within the timeframe of the comprehensive program review, all courses have been reviewed and revised as appropriate. The following is a list of all the ICS courses offered at LeewardCC. The courses marked in brown will be assessed in the 2015-2016 year, while the ones marked in pink are overdue and they will be assessed in the Fall 2015 semester.

ICS course	last revised	ICS course	last revised
100	2015-16 AY	212	2014-15 AY
101	2015-16 AY	215	2014-15 AY
111	2014-15 AY	236	2015-16 AY
113	2010-11 AY	240	2015-16 AY
125	2011-12 AY	241	2013-14 AY
136	2011-12 AY	251	2011-12 AY
141	2013-14 AY	270	2013-14 AY
151	2011-12 AY	281	2011-12 AY
170	2011-12 AY	282	2011-12 AY
171	2015-16 AY	283	2011-12 AY
172	2011-12 AY	110M	2014-15 AY
184	2015-16 AY	293D	2003-04 AY
211	2014-15 AY		

Part VI. Survey Results

The student satisfaction survey is located at:

https://docs.google.com/a/hawaii.edu/forms/d/1cDc2138MU_c2xLIf7I7iF4EDvxCPDw4PH8u87J1zjVw/viewform

The student satisfaction responses are located at:

<https://docs.google.com/a/hawaii.edu/spreadsheets/d/1DGyXsWKp1IPCHAOREhxxhv4CDo-hpIQVcLif70fomOwQ/edit?usp=sharing>

Forty four ICS students took the student satisfaction survey, that is 26% of the total ICS students.

- 91% believe that ICS faculty care about the students
- 95% believe that the courses within the ICS major is valuable
- 98% say that they have experienced intellectual growth while enrolled in the ICS program.
- 91% feel that there is a commitment to academic excellence by the ICS faculty
- 90% feel that the quality of instruction students receive in most of the ICS courses is excellent.
- 95% feel that ICS faculty are usually available after class and during office hours.
- 98% feel that nearly all of the ICS faculty are knowledgeable in their field.
- 95% believe that there is a good variety of courses provided on the ICS field.
- 88% feel that ICS faculty are approachable to students.
- 95% say that ICS counselors are approachable.
- 93% say that ICS Academic counselors help students set goals to work toward.
- 85% believe that ICS Academic counselors are knowledgeable about requirements for majors within their area. While the remaining 15% are unsure “maybe yes”
- 49% Consider that the ICS program is much better than they expected. 31% considered it quite a bit better than they expected and 20% considered it simply better than they expected while for only 20% of them report that the program was what they were expecting. Only one student reported that the program was worse than s/he expected.
- 95% of the students feel that they would enroll in the ICS program again. While 5% say “maybe yes”.
- 85% feel that they are learning enough relevant material to get a job in the Islands
- 33% say that they are always able to register for any ICS course that they need. 39% say that they probably could register while, 27% said that maybe they could.
- 64% of the students visited their counselor this semester, 20% last semester while 16% have not visited the counselor in over a year.

- **Occupational placement in jobs (for CTE programs)**

Technical Skills Attainment and Completion

From 2012 to 2013 we were awarded a grant for the department to buy Macbooks and a charging cart to complete the planned modification one of our classrooms to become our Problem-Based Learning classroom. This classroom allows students to reposition the furniture as well as the hardware to work in teams and to mimic the appearance of a real-world workplace. This classroom has been particularly useful for classes that require students to move around during the class period, as well as for teamwork.

- **Employer satisfaction (for CTE programs)**

There is no data for this question.

- **Graduate/Leaver (if appropriate)**

The following graph shows that ICS students completion rate has been relatively steady even when the withdrawal rate has increased. The number of certificates awarded has significantly increased as well as transfers to other institutions.

Since we articulated with UHWO we are expecting more student to transfer after completing our AS-ICS program

Effectiveness Indicators		Program Year			Effectiveness Health Call
		12-13	13-14	14-15	
17	Successful Completion (Equivalent C or Higher)	79%	77%	77%	Healthy
18	Withdrawals (Grade = W)	50	45	62	
19	*Persistence Fall to Spring	66.4%	60.4%	66.6%	
19a	Persistence Fall to Fall	47.5%	43%	48.4%	
20	*Unduplicated Degrees/Certificates Awarded	15	31	45	
20a	Degrees Awarded	6	9	12	
20b	Certificates of Achievement Awarded	4	1	17	
20c	Advanced Professional Certificates Awarded	0	0	0	
20d	Other Certificates Awarded	17	43	42	
21	External Licensing Exams Passed	Not Reported	Not Reported	N/A	
22	Transfers to UH 4-yr	8	10	15	
22a	Transfers with credential from program	0	1	0	
22b	Transfers without credential from program	8	9	15	

Part VII. Overview Analysis of Program

Alignment with mission

The ICS mission statement matches the LeewardCC mission statement. While LeewardCC intends to help student attain their goals, the ICS mission statements wants to help students be the best computer science professionals. Since these students are studying computer science, it is understood that their goal is to be a computer scientist or technician, this will depend on the path they pursue after graduation which may be to work or to transfer to a four-year institution.

Strengths and weaknesses based on analysis of data

ICS Program Strengths

Our strengths are our faculty members and their desire become better at their jobs. As members of the computer science faculty, we are aware that technology moves at a very fast pace. That is why our faculty constantly requires training to be up to date with the latest in technology. The main strength of the ICS program are their faculty members.

In the **2012-2013** period, four out of the six ICS faculty members got training and were funded by sources external to Leeward Community College. To keep their skills up to date:

- Mr. Lee, Petersen Gross and Mike Bauer attended MPICT (Mid Pacific Information and Communication Technologies) workshop in Coastal community college. Expenses for this workshop were covered by a grant from MPICT and a grant from the City College of San Francisco. Training received in these workshops varied and addressed many different parts of our curriculum.
- Dr. Polo attended the NCWIT summit (National Center for Women in Information Technology). Expenses for this summit were provided by the NCWIT Community College Alliance. Leeward CC is now part of this alliance as evidenced by our website. Training received at NCWIT should help us recruit and retain more women in computer science. Blanca is now a member of the NCWIT Community College Academic Alliance. <http://www.ncwit.org/alliances/members/45/L>
- Mr. Bauer attended Oracle database and Java training for two consecutive years. He partially funded his own travel expenses. He was partially funded by a Leeward CC travel grant and by the Math and Sciences Travel Committee. Mike attends the SIGCSE conference (Special Interest Group in Computer Science Education) on a yearly basis, many times covering his own expenses.

- During Summer 2014, the ICS faculty worked together under Dr. Polo's leadership and alongside the rest of the community colleges to write a cybersecurity C3T4 grant. Dr. Polo and Mr. Aaron Tanaka (Honolulu community college) were the leaders of this project. The UH community colleges got the grant and now Mr Vince Lee has been assigned to work on this since he is the person with the most experience in computer security.
- During the **2013-2014** period Dr Polo attended the NCWIT summit (National Center for Women in Information Technology). Expenses for this summit were provided by the NCWIT Academic Alliance. Leeward CC is now part of this alliance as evidenced by our website. Training received at NCWIT has helped us recruit and retain more women in computer science. That same year Dr Polo created and is now the adviser for the "Ada" women in computing club, a chapter of ACM-W (Association of Computing Machinery - Women), which is a very important organization in the field of computer science.
- Dr Polo is also a member of the NCWIT Community College Academic Alliance., <http://www.ncwit.org/alliances/members/45/L>. She co-leads the NCWIT student seed fund, funded by Symantec until 2014 and in 2015 by Microsoft. <https://sites.google.com/site/ncwitaaprojects/AcademicAlliance/student-organization-seed-fund?pli=1>
- During the summer 2014, Dr.Polo was selected to be part of the UH "President's Emerging Leaders Program" -PELP. Among the many applicants, only two persons from Leeward community college were selected to participate in this program.
- Mr Bauer attends the SIGCSE conference (Special Interest Group in Computer Science Education) on a yearly basis, many times covering his own expenses.
- Mr. Gross has only been with us as full-time faculty for two years. He teaches the greatest variety of courses within the department. The last school year alone he taught nine different courses, including an ICS299, which is a directed study. Mr Gross has been assigned release time to help Leeward faculty with Curriculum Central issues. Mr Gross attended the TK20 Conference (Austin, TX, June 10-11, 2014). He attended the PCATT IT Summit on May 23, 2014 and participated in preconference sessions as well.
- Mr. Albritton is the curriculum committee chair. He also earned the title of Wo Champion. He attended the PCATT IT Summit with Peterson Gross. He went to the Association of American Colleges and Universities (AAC&U) conference (Portland, Oregon, February 27-March 1, 2014). He also attended the TK20 Conference (Austin, TX, June 10-11, 2014) - OPPA paid for it. He also attended 2014 HSI Gone WILD (Windward Committee College, March 7 & 8, 2014).

Listed below are some of the activities of the ICS faculty during **2014-2015**

Dr. Blanca Polo

Professional activities include:

- National Center for Women in Technology (NCWIT)
Dr. Polo, once again attended the NCWIT summit. Expenses for this summit were provided by the NCWIT Academic Alliance. Dr Polo co-leads the NCWIT student seed fund, which was previously funded by Symantec, but in the year 2015 will be funded by Microsoft Research. <http://www.ncwit.org/programs-campaigns/ncwit-awards/ncwit-student-seed-fund>.
- Association for Computing Machinery (ACM)
Dr Polo created and is the adviser for the "Ada" women in computing club, a chapter of ACM-W (Association of Computing Machinery - Women)
- Grace Hopper The Grace Hopper Celebration of Women in Computing is the World's Largest Gathering of Women Technologists. It is produced by the Anita Borg Institute and presented in partnership with ACM.. Dr. Polo was a speaker in the Grace Hopper Conference in Houston Texas in October 2015. "Bringing your whole self to work as an underrepresented woman in computing

College Activities include:

- Faculty Senate
- Department Personnel Committee
- Strategic Planning Committee
- *NSO (new student orientation)*
- Brought the "Hour of Code" to Leeward
- Teach Zumba and zumba toning for the wellness committee.
- Geek day presentation on how to make android apps using app inventor

Mr. Peterson Gross

Professional activities include:

- *Hawaii Strategy Institute*
- PCATT IT Symposium
- TK20 User Group Conference
- *KSCM (Kuali Student Curriculum Management), the new system to manage curriculum system-wide*

College Activities include:

- *Geek day events*
- *NSO (new student orientation)*
- *Discovery squares*
- *Robofest*
- *Hawaii State Science Olympiad*

- *Leeward Oahu Science and Engineering Fair Judge*
 - *“Hour of Code” event for Maili Elementary*
 - *Made a streaming device presentation for HBEA*
 - *App Inventor Workshop for UH Library and Information Science Alumni Group.*
- Community Activities include:
- *PHP issues with Mililani Community Church*
 - *Assisted Palm Villas 2 Office Manager with technology troubles..*

Mr. William Albritton

Professional activities include:

- *Organized and conducted the October 2014 ICS System-wide Articulation*

Agreement Meeting

- *Faculty Senate*
- *Curriculum Chair*
- *Wo Learning Champions - Generation X*
- *Kilo ‘Āina Professional Learning Committee Member*
- *IT Standing Committee Chair*
- *Filmed ICS 100 with 3 other ICS faculty*
- *Geek Day presentation on “Computer Security Basics”*

Community Activities include:

- *Access Surf Volunteer - an organization that provides access to the beach and ocean for people with disabilities and their families Schedules surfers and participants*

Mr. Vincent Lee

Professional activities include:

- *Armed Forces Communications and Electronics Association (AFCEA) Guam 2014 Keynote speaker on Insider Threat*

- *AFCEA Alaska 2014 Keynote speaker on Insider Threat*
- *First ever cyber challenge between the US and Japan at AFCEA Tokyo 2015*
- *Keynote Speaker AFCEA Tokyo 2015 Cyber Educations in the 21st Century*

College Activities include:

- *2014 and 2015 Hawaii State Science Fair judge*

The active participation of the ICS faculty in such activities show how committed we are to this program as well as the college and the community.

ICS Program Weaknesses

After careful review of the ICS program we have identified three main weaknesses in our program;

- The ICS program needs more aggressive and better marketing to attract new students,

- ICS faculty need to figure out how to retain and graduate or transfer more students. Action has been taken to improve this weakness by the hiring of a career specialist for retention, graduation and transfer of students. This is thanks to the C3T4 grant funds.
- Lack of funds to attend conferences and training

The ICS Department and its Partnerships

The ICS Program is now associated with the following local and national organizations.

Associating with others is a great way to make our program more visible to the world. As of this semester, the ICS program is associated with the following national organizations.

- The Oracle Academy (our representative: Mike Bauer) <https://academy.oracle.com/oa-web-overview.html>
- The Linux Professional Institute (our representative: Pete Gross) <http://www.lpi.org/>
- National Center for Women in Information Technology (our representative: Blanca Polo) <http://www.ncwit.org/alliances/members/45/IL>
- Microsoft Academic Alliance (Dreamspark) (administrator: Blanca Polo) <https://www.dreamspark.com/>

UH Cybersecurity Education Group

The ICS program is also part of the University of Hawaii System Cybersecurity Education Group (our representatives: Pete Gross and Blanca Polo). This group meets at UH Manoa at least once every semester, and it includes not just the community colleges but also the four-year institutions.

The UH Cybersecurity Education Group has several goals, all of which may help boost enrollment and employment of our students enrolled in the networking and security specialization.

- Articulating industry/DoD needs with the education/experience of graduates specializing in cyber security and/or information assurance;
- Discussing the future of Centers of Academic Excellence (CAE) across the UH;
- Mapping UH curriculum student learning objectives against industry requirements and conducting gap analyses.

The AS-NS with a specialization in ICS was approved in 2014. This degree allows students to transfer to the UH Manoa BS in ICS. The articulation with Capella University supports the transfer of students wishing to continue their studies online. The most recent articulation with UH-West Oahu, helps students get a BAS in Information Assurance, which is one of the most sought after degrees given the great need for cybersecurity professionals.

Resource sufficiency

The following are the resources that we have purchased as part of the C3T4 Grant.

- Two SonicWall Firewalls
 - One for the netlab
 - One for the Help Desk area
- Juniper Layer 3 Switch (used with NetLab equipment)
- IP KVM & Rack Mountable Console Drawer (used with Netlab & Dell Servers)
- Help Desk Equipment:
 - iPad Mini
 - MacBook Air
 - Android Tablet
 - Microsoft Surface
 - Multimeter
 - Take a number system
 - Miscellaneous tools for computer repair
 - Carts to use while repairing computers
 - Power Supply tester
 - UPS (Uninterrupted Power Supply)
 - Printer
 - Office Supplies as needed to run the help desk.

Recommendations for improving outcomes

Distance Education

In an effort to attract and retain more students as well as to help those who cannot physically attend school due to scheduling issues, the department is trying to offer both face-to-face and online versions of most of our courses. Faculty take full advantage of the services offered by the Educational Media Center and cable TV broadcasting to better serve students.

The department is currently pursuing more hybrid classes to reduce the time that students need to be on campus and therefore making taking ICS classes more convenient. Most of the ICS hybrid offerings flip the classroom, which has students studying material at home; then when they come to campus, they ask questions and engage in activities that promote learning. For example, Mr. Ramos is offering a hybrid version of ICS125, the course that trains students to become A+ certified. This course in particular is hard to offer online because it involves a large amount of hands-on activities. However, due to student demand, he is now offering a hybrid version of this course, where students learn the theory on their own and meet at Leeward to practice.

PCC Meetings

Program Campus Council meetings for articulation improve the chances for students to succeed because they can transfer work from one campus to another. A meeting was held in 2011, and another PCC meeting was held in October 2013 at Kapi'olani Community College. All community colleges are now working together to further articulation, which may include the change of program alphas to facilitate course identification and transfer.

Resource Implications

Research suggests that the use of App Inventor for CS0 courses (the equivalent to ICS110 according to the ACM) helps recruit and retain students in computer science. This is why in the Spring of 2014, Dr. Polo taught ICS110 using this tool. During Spring 2014, android tablets were purchased to provide students with the best possible learning environment.

C3T4 Grant

As mentioned before, LeewardCC was awarded over \$500,000 to enhance the cybersecurity curriculum, update equipment and create a student-operated help desk. All these tasks have been taken care of by Mr. Gross, Dr. Polo, Mr. Albritton and Mr. Lee with different levels of responsibility. The implementation of the student help desk project should improve the college and quasi-industry experience of our students.

The help desk from students to students aims to help ICS students to become good computer technicians while providing a service for the LeewardCC campus students.

One of the greatest endeavors for the ICS program has been for four faculty members to record ICS100; Mr. Albritton. Mr. Gross. Mr. Bauer and Dr. Polo. This effort began in the fall 2014 and it ended in the Spring 2015. It was a daunting task to coordinate four faculty members to agree to the same dates and times, but it was possible to do it because of the great disposition of the faculty and the great support provided by the media center staff.

Over time, students have shown great preference for online offerings of this particular course. In the past, online offerings were based on the book and material posted in the class management system. However, with the cable TV recording it is now possible to better support online students.

As it has been pointed out year after year, there remains a need to promote, to recruit and retain students. However currently it is not possible to have access to modify the webpage to showcase any ongoing events. An extra large computer monitor is needed to bring for recruiting events and fairs in which the department participates. It is embarrassing being the computer science department is not able to count on technology to show student's software projects, pictures or videos as well as other resources from the discipline.

Since technology changes rapidly, there is a need for money for at least three of the ICS faculty members to attend the SIGCSE conference in 2016. SIGCSE stands for special interest group in computer science education. This conference is the "go to" conference for computer science educators.

The Perkins core indicators show that all but one was met.. However, it is believed that with the new CA in Cybersecurity as well as new resources, more of the core indicators will be met next year. All of the Perkins core indicators relate to the C3T4 grant that funds us. The new equipment and NetLab+ will help students improve their technical skills attainment. Only 0.64% is required to meet that indicator.

With regards to completion, NetLab+ will also help because more students will be able to work from home in courses that used to require physical equipment and in-class instruction. NetLab+ is helping more classes to be taught using virtual environments. Due to the same reasons, an increase in non-traditional participation and completion is anticipated.

As part of the C3T4 grant there is a need to keep an accurate count of the unduplicated number of students that are using virtual environment as well as other resources made possible by the grant. The same information will provide insight as to the impact of the virtual equipment.