University of Hawai'i, Board of Regents, 2444 Dole Street, Bachman 209, Honolulu, HI 96822
Telephone No. (808) 956-8213; Fax No. (808) 956-5156

Notice of Meeting

UNIVERSITY OF HAWAI'I
BOARD OF REGENTS COMMITTEE ON ACADEMIC AND STUDENT AFFAIRS
Members: Regents Tagorda (Chair), Higa (Vice-Chair), Bal, Kudo, and Sullivan

Date: Thursday, November 1, 2018

Time: 10:30 a.m.

Place: University of Hawai'i at Mānoa
Information Technology Building
1st Floor Conference Room 105A/B
2520 Correa Road
Honolulu, Hawai'i 96822

AGENDA

I. Call Meeting to Order

II. Approval of Minutes of the September 6, 2018 Meeting

III. Public Comment Period: All written testimony on agenda items received after posting of this agenda and up to 24 hours in advance of the meeting will be distributed to the board. Late testimony on agenda items will be distributed to the board within 24 hours of receipt. Written testimony may be submitted via US mail, email at bor@hawaii.edu, or facsimile at 956-5156. Individuals submitting written testimony are not automatically signed up for oral testimony. Registration for oral testimony on agenda items will be provided at the meeting location 15 minutes prior to the meeting and closed once the meeting begins. Oral testimony is limited to three (3) minutes. All written testimony submitted are public documents. Therefore, any testimony that is submitted verbally or in writing, electronically or in person, for use in the public meeting process is public information and will be posted on the board's website.

IV. Agenda Items

A. For Information and Discussion

1. Update on Systemwide Enrollment Management and Enrollment Management Reports
2. Academic Planning Update

B. For Review and Recommend Board Approval

1. Establishment of a New Provisional Bachelor of Science Degree in Aeronautical Sciences at the University of Hawai'i at Hilo
2. Establishment of a New Provisional Bachelor of Science Degree in Engineering Science at the University of Hawai'i at Mānoa

V. Adjournment

Accommodation required by law for Persons with Disabilities requires at least (5) five days prior notice to the board office at 956-8213 or bor@hawaii.edu.

DRAFT

DISCLAIMER – THE FOLLOWING ARE DRAFT MINUTES FROM THE COMMITTEE ON ACADEMIC & STUDENTS AFFAIRS AND ARE SUBJECT TO CHANGE UPON APPROVAL OF THE COMMITTEE ON ACADEMIC & STUDENT AFFAIRS

MINUTES

BOARD OF REGENTS COMMITTEE ON ACADEMIC AND STUDENT AFFAIRS MEETING

SEPTEMBER 6, 2018

I. CALL TO ORDER

Committee Chair Michelle Tagorda called the meeting to order at 9:21 a.m. on Thursday, September 6, 2018, at the University of Hawai'i at Mānoa, Information Technology Building, 1st Floor Conference Room 105A/B, 2520 Correa Road, Honolulu, Hawai'i 96822.

Committee members in attendance: Committee Chair Michelle Tagorda; Committee Vice Chair Brandon Marc Higa; Regent Eugene Bal III; Regent Ben Kudo; Regent Jan Sullivan.

Others in attendance: Board Chair Lee Putnam; Board Vice Chair Wayne Higaki; Board Vice Chair Jeffrey Portnoy; Regent Simeon Acoba; Regent Michael McEnerney; Regent Randy Moore; Regent Ernest Wilson Jr.; Regent Stanford Yuen (ex officio committee members); President/Interim UH-Mānoa (UHM) Chancellor David Lassner; Vice President for Administration Jan Gouveia; Vice President for Community Colleges John Morton; Vice President for Legal Affairs/University General Counsel Carrie Okinaga; Vice President for Academic Planning & Policy Donald Straney; Vice President for Research & Innovation Vassilis Syrmos; Vice President for Information Technology/Chief Information Officer Garret Yoshimi; Vice President for Budget & Finance/Chief Financial Officer Kalbert Young; Interim UH-Hilo (UHH) Chancellor Marcia Sakai; UH-West O'ahu (UHWO) Chancellor Maenette Benham; UH-Maui College (UHMC) Chancellor Lui Hokoana; Interim Leeward Community College (LeeCC) Chancellor Suzette Robinson; UHM Vice Chancellor for Research/Interim Vice Chancellor for Academic Affairs Michael Bruno; Executive Administrator and Secretary of the Board of Regents (Board Secretary) Kendra Oishi; and others as noted.

II. APPROVAL OF MINUTES OF THE MAY 18, 2018 MEETING

Committee Vice Chair Higa moved to approve the minutes of the May 18, 2018, meeting, seconded by Regent Sullivan and the motion carried unanimously.

III. PUBLIC COMMENT PERIOD

Board Secretary Oishi announced that the Board Office received one piece of written testimony from Dr. Jim Shon, Director of the Hawai'i Educational Policy Center (HEPC), offering comments related to the importance of civic education.

The following provided oral testimony:

1. Dr. Jim Shon provided oral testimony summarizing his written testimony regarding the importance of civic education and requesting the committee consider including a review of the UH Mission Statement in terms of student civic education and engagement.

IV. AGENDA ITEMS

A. For Review & Approval

1. Committee Goals and Objectives

The committee was provided with a handout of proposed committee goals and objectives based on the committee's responsibilities as indicated in the bylaws, and reviewed and discussed proposed goals for the 2018-2019 academic year.

A suggestion was to add a goal and objective on the quality and effectiveness of education relative to emerging workforce needs. Regent Sullivan indicated she would like a policy discussion on how UH is preparing students for the future workforce, not just current job markets, as technology will influence future student needs. She did not feel that enough time is spent discussing this topic and it would be helpful to know what other institutions are doing.

Regent Sullivan moved to approve the committee goals and objectives, with the stated amendments, seconded by Committee Vice Chair Higa, and the motion was put to a vote and carried unanimously.

Regent Acoba arrived at 9:31 a.m.

B. For Information & Discussion

1. Aeronautical Sciences, Bachelor of Science Program Update

Interim UHH Chancellor Sakai and Interim Vice Chancellor for Academic Affairs Ken Hon provided an update on the proposed Aeronautical Sciences, Bachelor of Science (B.S.) program that included discussion on concerns previously raised by the board related to program costs, equipment and facilities, and risk management and safety analysis. Under the proposed program, students would attend school for three years on the UHH campus with integrated flight simulator training and then would attend flight training for the fourth year with a mainland-based external flight training provider.

Questions were raised regarding the rationale for locating the program in Hilo instead of Honolulu where most airlines are headquartered. Chancellor Sakai explained that UHH is the appropriate campus for applied programming because of its strength in

science, technology, engineering, and mathematics (STEM) courses needed for the general education portion of the program. In the future, pilots will likely need to move quickly from one technology to another and having a STEM background will facilitate that. UHH has been working on this program for four years and would like to continue.

Questions were raised regarding the rationale for elevating the program from a vocational-type program such as the program formerly at Honolulu Community College (HonCC), not utilizing an existing degree since an aeronautical sciences degree is not required for flight training, and whether students would choose to go to UHH when they could pay less tuition for the same courses at a community college. Chancellor Sakai explained that the purpose of elevating the program to a B.S. is to provide students a career pathway to becoming a pilot with a major airline carrier. VC Hon clarified that although the Federal Aviation Administration (FAA) does not require pilots to have a four-year degree, many major airline carriers require pilots to have four-year degrees or it is a highly desirable qualification. Regional carriers hire pilots without four-year degrees, but the salaries are considerably less than the major airline carriers.

Concerns were reiterated about the Hawai‘i Island location, which is economically depressed, particularly with recent volcanic activity and flooding; various cost impacts to UHH and to students; whether this is the most effective use of limited resources; and whether this program helps the university serve the people of Hawai‘i. Depending on enrollment, this program could negatively affect UHH’s financial situation and lessen its ability to help the majority of students. Alternative solutions for the state to address the commercial pilot shortage could include a grant program to subsidize costs of flight school for students. UHH could also consider utilizing an existing degree program rather than creating a new one. Concern was expressed that this program may not support UHH’s basic mission, although it may appease certain legislators. Additional concerns were raised regarding the location and that it should be somewhere on O‘ahu, such as Barber’s Point.

Concerns were expressed about having to go to a mainland-based flight provider to complete the degree, the associated liability, and the potential impact on students if the external flight provider is no longer able to provide the flight training or increases their pricing. VC Hon explained that UHH administration felt that going with a mainland-based flight training provider was the best way to provide flight training because it will allow students to get through the program faster and at reduced costs, and enable students from the program to go directly into the airline industry and obtain their flight experience. He noted that there are numerous flight training providers that students may choose from and they would not be required to go through ATP Flight School (ATP). VP Hon believes that UHH would not incur liability because students will pay the flight training provider directly. The memorandum of understanding with ATP would only pertain to learning outcomes and assessments.

A question was raised regarding whether administration had looked at what the major airline carriers are doing to address the looming pilot shortage. VC Hon explained that UHH would be reviewing what the major airline carriers were doing in terms of pilot training before bringing forth the final proposal.

A question was raised regarding whether there were any other universities accredited by the Western Association of Schools and Colleges (WASC) with this type of program wherein a third-party flight training provider was utilized. VC Hon explained that he did not believe any other university in the country had this particular arrangement, but there are institutions that will accept pilot licenses and certificates in exchange for academic credit. He noted that ATP provides the flight training for Arizona State University. President Lassner added that the model of separating academics from flight training is not unique, and the suggestion to look into this type of model came from a regent who had a relative that followed a similar program.

Additional concerns were expressed regarding whether students understand the commitment to becoming a pilot is close to six years because it takes approximately two additional years after completing flight training and getting a degree to obtain the required flight hours. VC Hon responded that acquiring flight hours is a challenge for anyone going through licensure and UHH would need to counsel students regarding the challenges of the career path to becoming a pilot.

Questions were raised regarding ATP's success rate for placing students who completed the program and 1,500 flight hours as a pilot with a major carrier, and whether pilots could obtain their degree while flying for a regional airline carrier. VC Hon explained that graduates generally start with regional carriers to attain the required flight hours, with most needing five years before they can fly for a major airline carrier. He added that ATP often hires students as certified flight instructors so they can collect the necessary flight hours for pilot certification.

Committee Vice Chair Higa commented that a Hawai‘i program would have a positive impact on students and that students have expressed the desire for a flight program. Offering such a program would allow students to remain in Hawai‘i. He suggested that administration provide information on whether enrollment would be positively impacted by existing pilots who have military training but do not have a bachelor's degree and if it would be helpful for their career advancement to earn a degree. He also suggested that information be provided on the types of financial aid that may be available for the first three years of school and the fourth year of flight school.

Several regents expressed appreciation for the effort the UHH administration put into responding to the previous feedback on this program proposal.

Regent Bal shared that he achieved certification as a Naval Flight Officer in eight months. Naval Flight Officers are not trained to take physical control of an aircraft as a pilot; they are responsible for all avionics. Fixed wing pilot training normally takes 18 months dependent on aircraft type. The military provides flight training only after an individual has obtained their bachelor's degree. He noted the importance of multi-engine flight time for his peers who wanted to get out of the military into commercial aviation.

A question was raised regarding whether administration had discussions with Hawaiian Airlines to gauge their degree of interest in hiring pilots who have gone through this type of program. Chancellor Sakai indicated there had been initial discussions with

Hawaiian Airlines approximately one year ago regarding this program and would do so again and report back to the committee.

Committee Chair Tagorda noted that it was helpful to have these types of preliminary discussions prior to program proposals coming before the board.

2. Program Proposals: Content and Review

VP Straney provided an update on the program proposal process to address concerns previously raised by the board that proposals come to the board without sufficient context and that the program approval process can be cumbersome and time-consuming. Proposed revisions to the process include providing more context and holistic planning, demonstrating alignment with System plans, Strategic Directions, academic plans, and other priorities; and differentiating the various types of program approvals and appropriate level of approval.

The committee commended administration for the work done so far on revising the program proposal process.

A comment was made regarding the need to clarify whether enrollment in new programs consists of existing students moving to a new program or whether new students that would not otherwise enroll are anticipated.

A question was raised regarding whether existing programs are subject to the same requirements as new programs and periodically reviewed to determine whether they should be eliminated. VP Straney explained existing programs are periodically reviewed at 5 to 7 year intervals, which consist of external reviews by individuals from peer institutions to determine program quality. The campuses have been asked to post executive summaries of these reviews and administration's responses on their websites. These reviews significantly influence the investment in programs and the allocation of resources. Information on program terminations is included in the annual Academic Program Actions Report.

The committee expressed the importance of briefing the board early in the process, and the importance of proposals including the impacts to the university, students, and the community, including the workforce. A suggestion was made that student resources and wrap-around services also be considered.

A comment was made that it was unclear what "rapid response" means as it relates to decisions made by administration in response to unanticipated program needs. It was noted that the board should be notified in a timely manner when such decisions are made.

General support was expressed for a multi-year academic plan. Comments were made regarding providing the board with a reasonable timeframe for creating a new program, and the need for the plan to provide context within the broader campus budget in order to allow the board to address the impact of the program within the context of academic and resource prioritization. VP Straney explained that it would be difficult to provide granular analysis 6 years into the future, but items such as anticipated staffing

needs without monetary amounts could be provided, and estimates could be refined during the program proposal process.

A question was raised regarding the level of consultation that occurred on the proposed new program approval process. VP Straney indicated administration worked with the Council of Chief Academic Officers (CCAO) and envisions taking the proposal to the All Campus Council of Faculty Senate Chairs (ACCFSC) before proceeding with rewriting the related policies. A comment was made regarding encouraging the ACCFSC to seek feedback from faculty regarding the proposal.

V. ADJOURNMENT

There being no further business, Committee Vice Chair Higa moved to adjourn, Regent Sullivan seconded the motion, and with unanimous approval, the meeting was adjourned at 11:19 a.m.

Respectfully Submitted,

Kendra Oishi
Executive Administrator and Secretary
of the Board of Regents

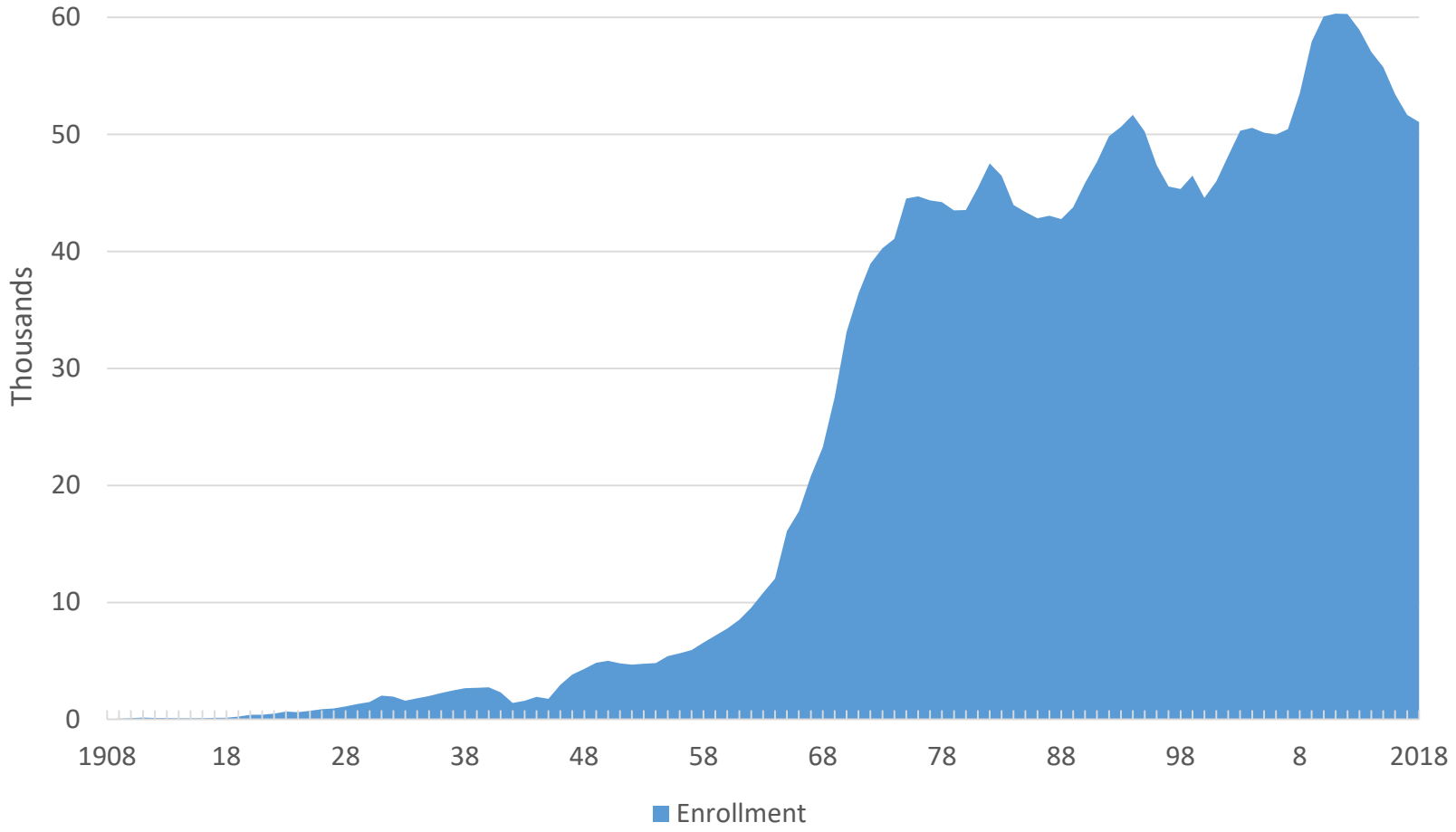
Update on System-wide Enrollment Management

Donald O. Straney, System Academic Planning and Policy

David Lassner, UH Mānoa
Marcia Sakai, UH Hilo
Maenette Benham, UH West Oʻahu
John Morton, UH Community Colleges

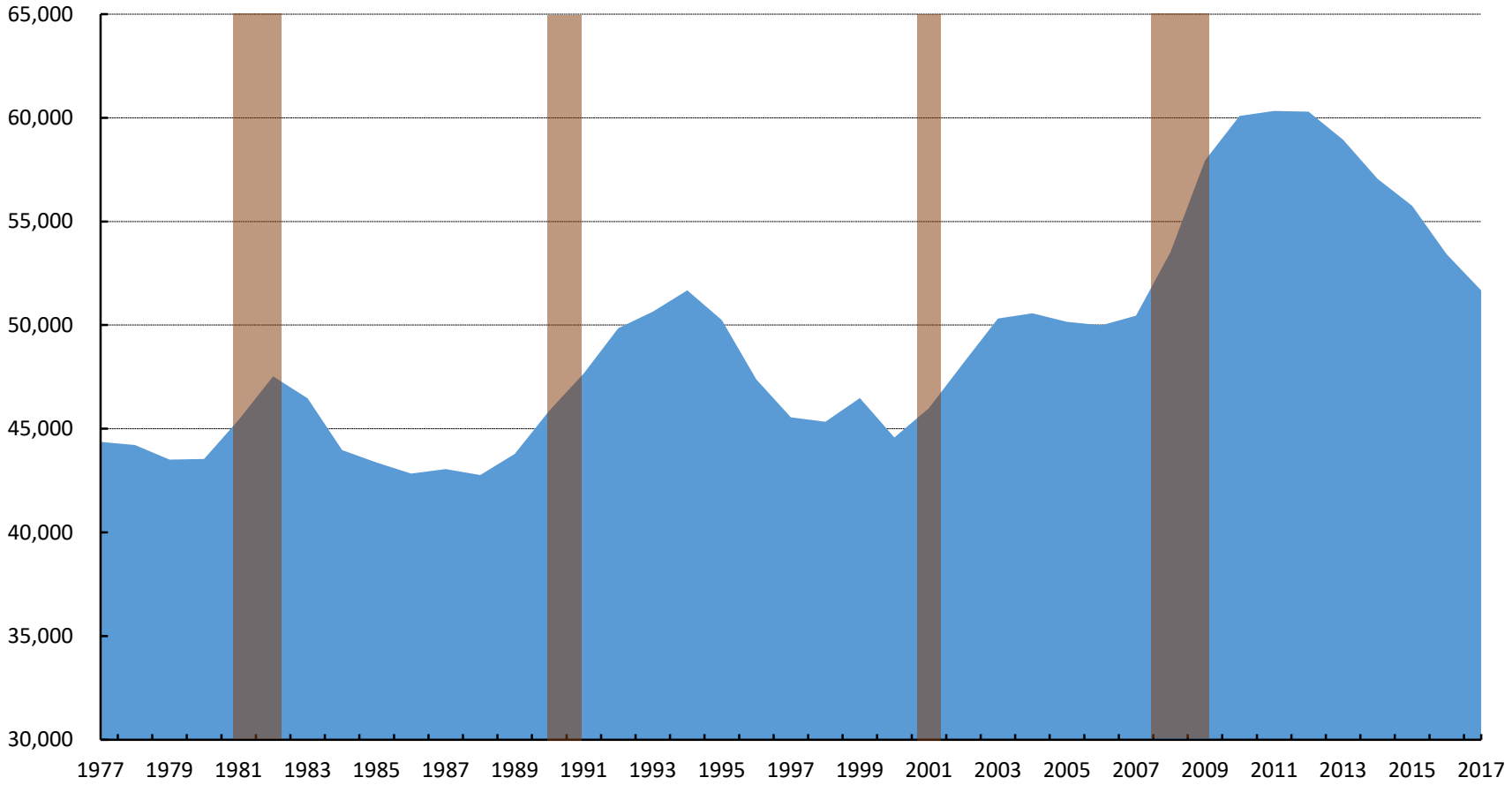
Headcount Enrollment at the University of Hawai‘i

Headcount enrollment at the University of Hawai‘i has fallen from the peak measured during the Great Recession, but is still at a high level historically.



Enrollment Since 1977 with Recessions Plotted

The period since the late 1970s has been one of slow overall growth, punctuated by ups and downs correlated with economic recessions.



Source: The National Bureau of Economic Research

Our Challenge

Meeting education needs of a rapidly changing world:

- Technological changes affect everything including how people learn and how education is delivered.
- Increasing competition puts pressure on the University to improve recruitment, retention and delivery.
- To meet the State's need for an educated workforce, UH must continue to produce more graduates and encourage more of our population to enroll.
- Balancing revenue and affordability is challenging in a state with a high cost of living.
- Public perception about whether or not college is "worth it."

Factors Affecting Enrollment

Some factors are under our control:

- Tuition pricing
- Scholarship and waiver policy
- Course and program offerings
- Student services and academic support
- Advertising and promotion
- Completion and retention rates

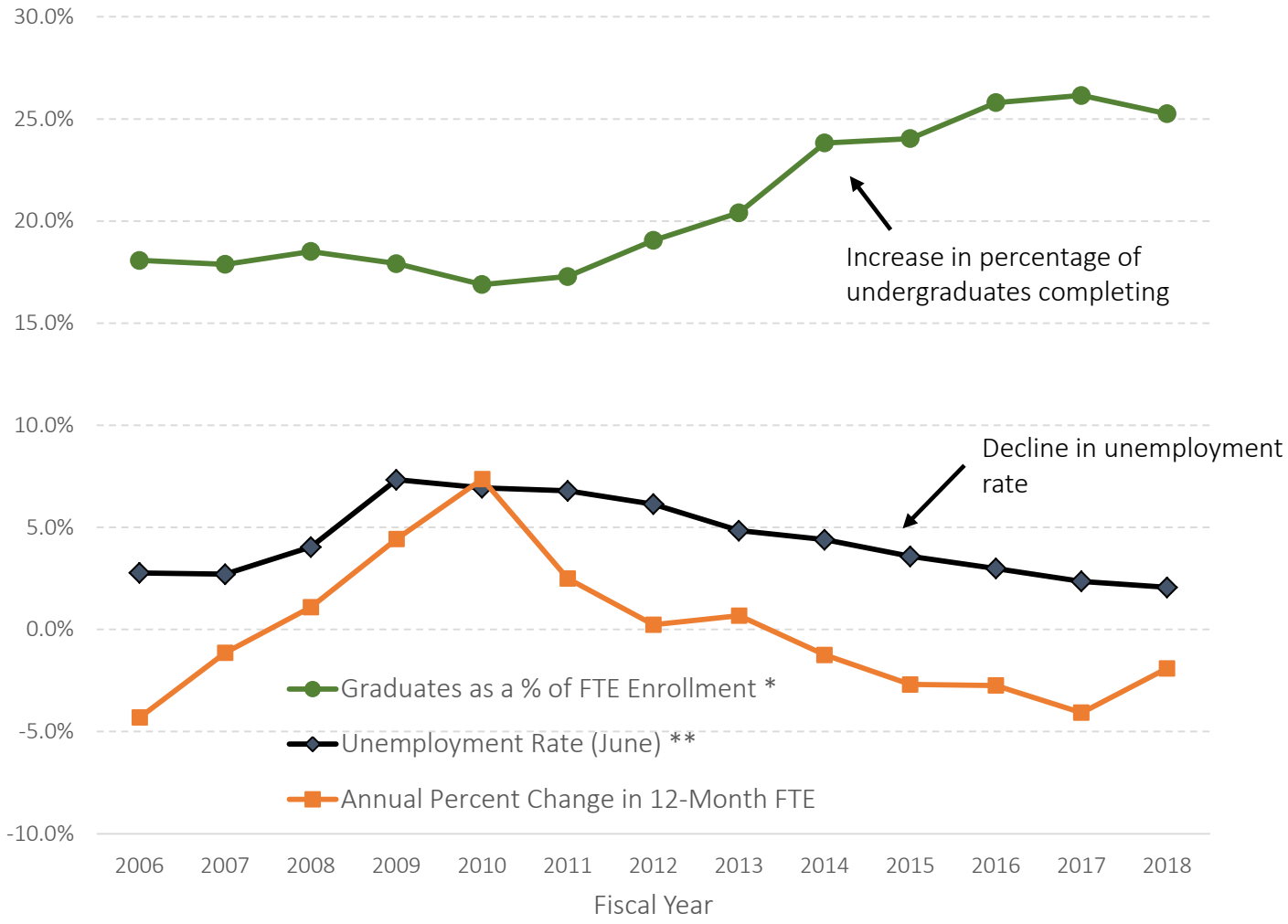
Other factors are not:

- Economy
- Cost of living / housing
- Population trends and demographic changes
- Competition from other higher education institutions
- Public perception of the value of education

Interaction Effects Can be Complex

Continued improvements in completion rates will impact enrollment.

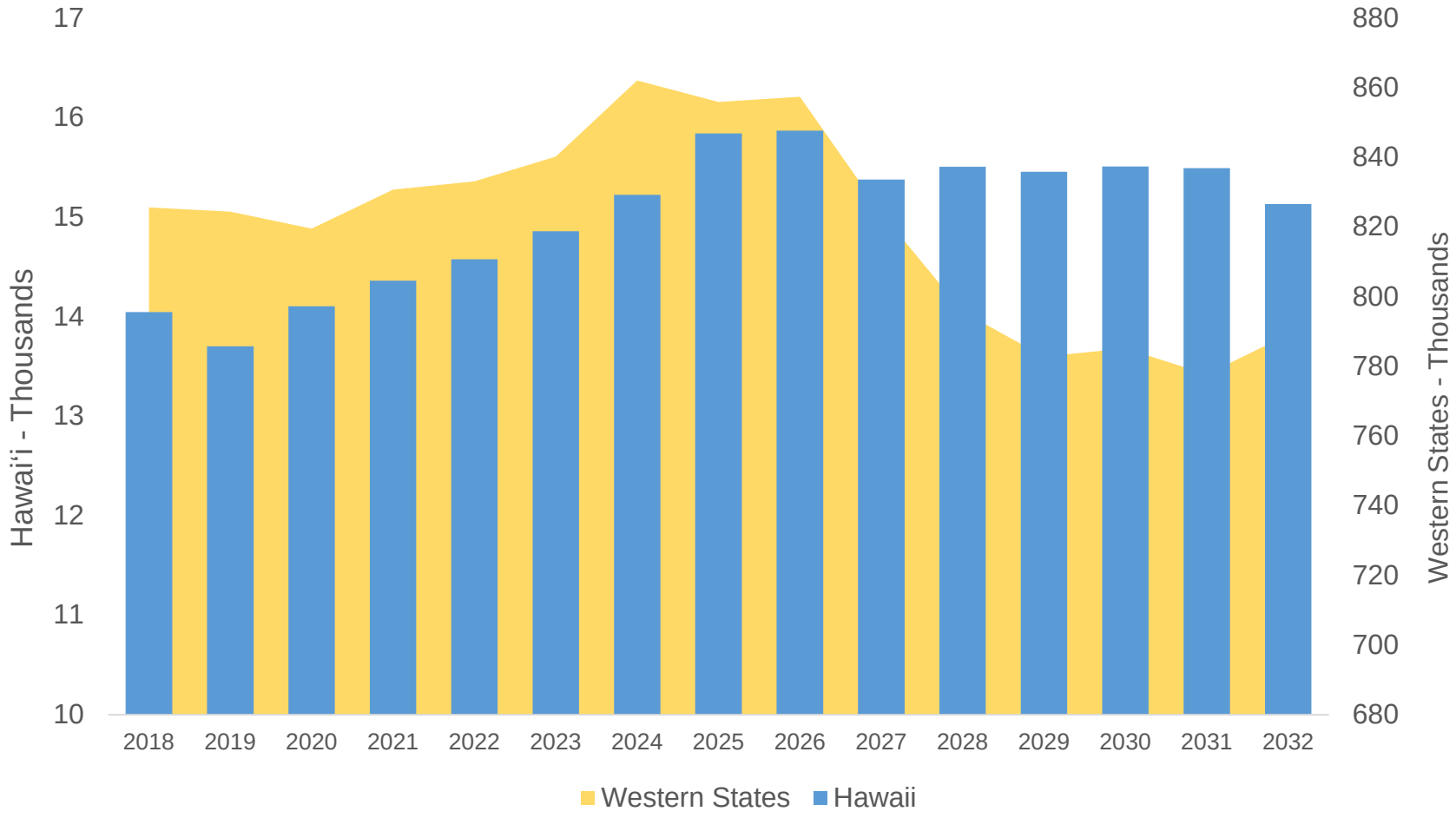
Falling unemployment rates are correlated with falling enrollment. Currently, unemployment is at historic lows and forecasts are for increases of less than 1 percentage point over the next four years.



* Unduplicated count of students; awards include: Bachelor, Associate, Certificate of Achievement and Advanced Professional Certificate.
** Source: Bureau of Labor Statistics.

WICHE Forecasts of High School Graduates

While high school graduates in Hawai‘i are expected to increase by 1,800 graduates from 2018 to 2025, high school graduates in the Western states are forecast to decline. Competition for our high school graduates will increase.

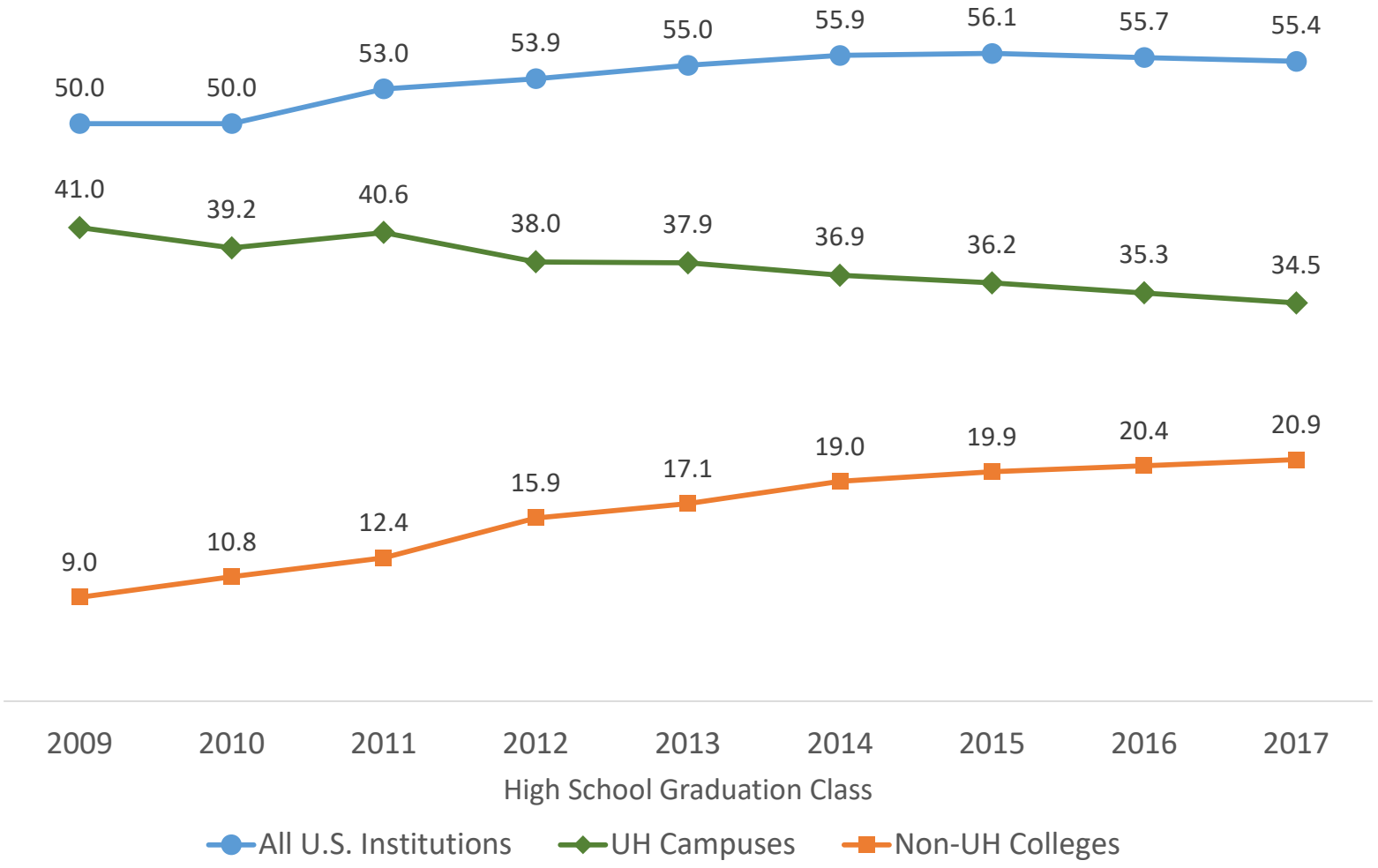


Source: Knocking at the College Door; WICHE; December 2016.

College Participation Rates of Hawai‘i Public High School Graduates

College choice by Hawai‘i high school graduates has had an increasingly large impact on UH enrollment.

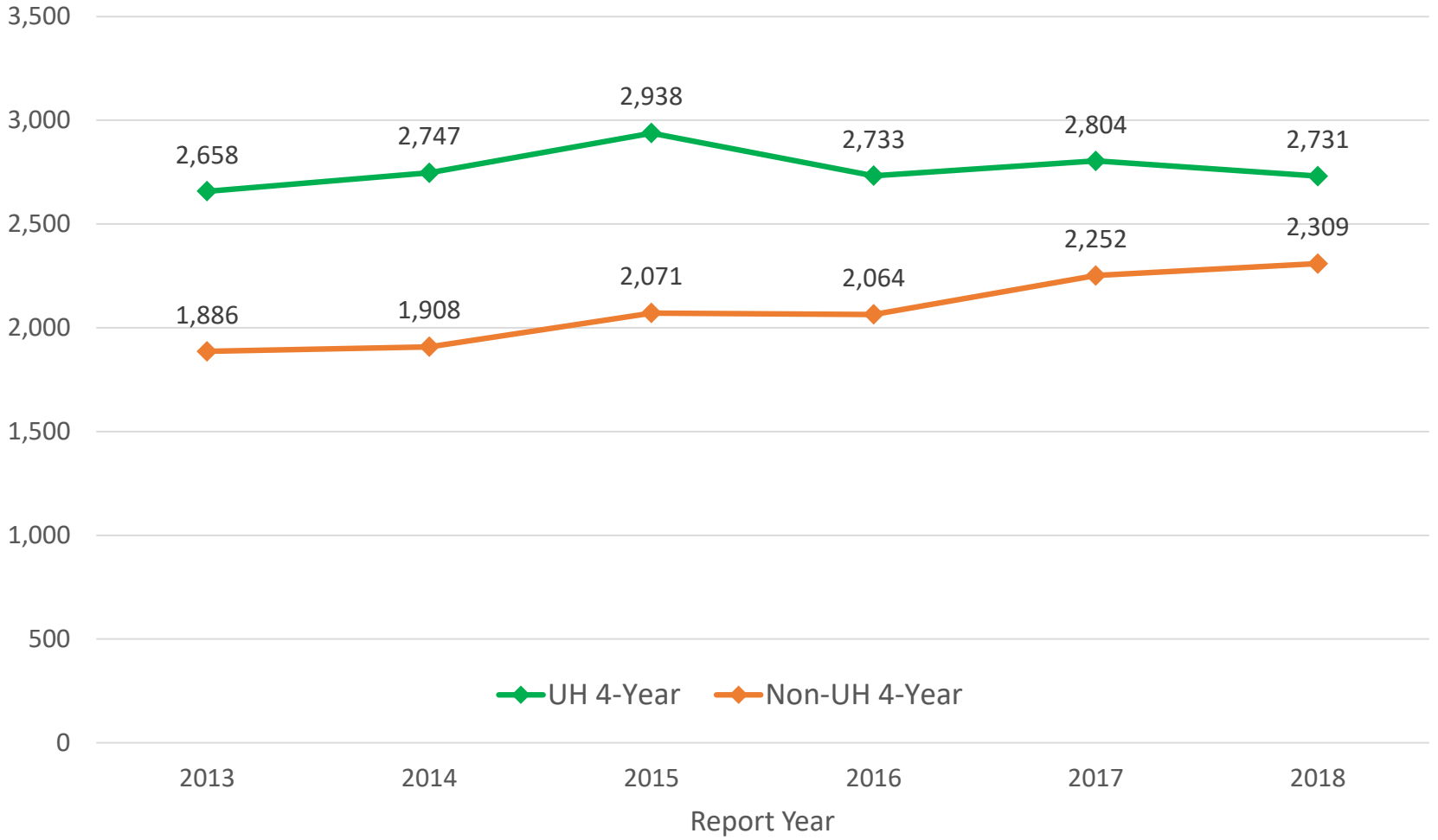
If UH had maintained its 2009 share, approx. 2,500 more public high school students would have enrolled between 2010-2017.



Source: Hawai‘i P-20 Career and College Readiness Indicators Reports.

UHCC Transfers Out to Four-Year Campuses

Transfers from the UHCCs to the UH four-year campuses have been flat, while transfers to non-UH four-year campuses have increased



UH System Goals for Enrollment

- Provide all qualified Hawai‘i residents an equal opportunity for quality college and university education
- Increase enrollment of target populations:
    - E.g. First-time students; transfers; good balance of non-residents; underserved regions
- Strategically align fiscal and facilities planning with enrollment and retention goals
- Develop data, tools, and innovative approaches to enrollment planning and decision making

Managing Enrollment at UH

UH Manoa, UH Hilo, UH West O‘ahu and the UH Community Colleges each have enrollment management processes to address the challenges we face. These processes include:

- Key personnel and offices assigned enrollment management responsibility
- Development of enrollment management plans
- Monitoring of progress toward goals
- Managing budgets to achieve enrollment objectives
- Increased cooperation and coordination across campuses
- Coordinated outreach to high schools and potential students

These University System role is to help set the agenda, provide tools and resources and assist in the coordination across units

University of Hawai‘i Mānoa

ENROLLMENT MANAGEMENT REPORT

2018-2019 Action Strategies for Enrollment Growth

- Increase applications of first-year and transfer students
  - Increased our outreach efforts with local, mainland counselors, and community college partners
  - Expanded our targeted recruitment efforts (with Native Hawaiian, UHCC Transfer, Veterans and Local Students)
- Increase yield and decrease summer melt
  - Implemented an aggressive yield and melt communication plan to both prospective students, parents and counselors
- Centralized Tuition Scholarship Management
  - Completed phase 1 by strategically consolidating, eliminating and allocating tuition scholarship funds
- Retention
  - Continue to grow and assess the UH Mānoa Hanai Mentor Program
  - Develop and deploy an Early Alert System
  - Continue proactive communication about registration to include problem-solving
- Graduate School
  - Expand the BAM Bachelor’s and Master’s Degree Pathways
  - Expand International 3+2 partnerships
  - Created Graduate SEMC (Strategic Enrollment Management Committee) to focus on unique graduate enrollment and student success issues

Campus Enrollment Targets 2018-19

	Measure	Historical Enrollment Count			Targeted Enrollment Count	
		Fall 2015	Fall 2016	Fall 2017	Fall 2018 (Planned)	Fall 2018 (Actual)
	Total Enrollment	**18,865**	**18,056**	**17,612**	**17,964**	**17,710**
	% Change Total	-3.3%	-4.3%	-2.5%	2.0%	0.6%
1	First-time Freshmen Total [1]	1,903	1,972	1,959	1,998	2,209
	% Change	3.4%	3.6%	-0.06%	2.0%	12.8%
	Hawai‘i High Schools [2]	1,137	1,282	1,207	1,231	1,288
	Mainland [3]	715	624	667	679	781
2	Transfer Total	1,492	1,390	1,401	1,443	1,584
	% Change	-5.6%	-6.8%	0.8%	3.0%	13.1%
	UH System School Transfer	844	826	780	841	821
3	Undergraduate Continuing / Returning [4]	9,571	8,996	8,807	8,983	8,565
	First-Time Freshmen Retained [5]	1,482	1,458	1,554	1,581	1,550
	Retention Rate	77.9%	76.6%	78.8%	80.8%	79.1%
	International [6]	1,228	1,144	1,099	1,121	1,134
4	Graduate Enrollment [7]	4,754	4,512	4,322	4,408	4,330

[1]Data from UH IRO Enrollment Table 5. [2] From UH IRO report: High School Background of First-Time Students. [3] Includes U.S. Military. [4] Does not include residual counts and unclassified.
[5]First-time freshmen retained calculated from enrollment figure from UH IRO Enrollment Table 5 for consistency purposes in 1 and the Retention Rate in 3.
[6] Includes non-resident alien. [7]From UH IRO Enrollment Table 6, Graduate Classified (includes Doctoral and Professional).

2018 Assessment

- Fall 2018 Enrollment Outcomes
  - Application Increases
    - Overall – 8%
    - First-time freshmen – 10.4%
    - Native Hawaiian – 6.3%
    - Local first-time freshmen – 12%
    - Graduate (classified and unclassified) – 2%
  - New Student Enrollment Increases
    - Overall – 8%
    - First-time freshmen – 11%
    - Native Hawaiian – 6.3%
    - Local first-time freshmen – 10%
    - Transfer students from UHCC – 5.2%
    - Graduate (classified and unclassified) – 8%
  - Overall Enrollment
    - For the first time since 2015, overall enrollment is up (1%)
  - Retention
    - Increased for the second consecutive year to 79.1%, highest rate since 2014

Campus Enrollment Targets 2019-20 to 2021-22

	Measure	Historical Enrollment Count			Targeted Enrollment Count		
		Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
	Total Enrollment	**18,056**	**17,612**	**17,710**	**18,473**	**19,236**	**20,000**
	% Change Total	-4.3%	-2.5%	0.6%	**4.3%**	**4.13%**	**3.97%**
1	First-time Freshmen Total [1]	1,972	1,959	2,209	2,308	2,411	2,519
	% Change	3.6%	-0.06%	12.8%	**4.5%**	**4.5%**	**4.5%**
	Hawai‘i Direct Entrants [2]	1,282	1,207	1,288	1,385	1,447	1,511
	Mainland/International	624	667	781	923	964	1,008
2	Transfer Total	1,695	1,586	1,691	1,742	1,794	1,848
	% Change	-7.3%	-6.4%	6.6%	**3%**	**3%**	**3%**
	Transfers from Hawai‘i	907	868	920	949	979	1,008
	UHCC System Transfers	826	780	821	845	871	897
3	Continuing / Returning [3]	8,996	8,807	8,565	9,077	9,467	9,853
	First-Time Freshmen Retained [4]	1,458	1,554	1,550	1,855	1,970	2,091
	Retention Rate – First-Time, Full-Time	**76.6%**	**78.8%**	**79.1%**	**80.4%**	**81.7%**	**83%**
	International [5]	1,144	1,099	1,131	1,210	1,307	1,441
4	Classified Graduate Enrollment	4,512	4,322	4,330	4,733	5,173	5,543
	New Graduate Enrolled	1,563	1,472	1,411	1,473	1,538	1,597

UNIVERSITY of HAWAI‘I® MĀNOA

2019-2020 Action Strategies for Enrollment Growth

- UH Mānoa’s EAB Partnership
  - With this partnership we will reach a larger number of prospective students (192% increase) by purchasing large volumes of names, and by identifying the right fit student and making effective contacts at critical times to saturate our primary and secondary markets.
  - Financial Aid Optimization - with EAB develop a financial aid optimization plan that includes a data analytical tool to further develop effective financial aid leveraging strategies for enrollment growth.
- Implement an integrated CRM (Customer Relationship Management software), to strategically communicate and engage students throughout their university life cycle - from prospective student to alumni.
- Retention Efforts
  - Expand the current ACE Learning Community as a requirement for all incoming freshmen
  - Implement Freshmen Common Book requirement
- Develop and Implement Graduate SEM Plan

UH Hilo
Enrollment Management Report

UNIVERSITY of HAWAI'I®
HILO

2018-2019 Action Strategies for Enrollment Growth

- Strategic use of financial aid
- Digital communication (email, web, texting, social media)
- UHCC Transfer Events
- UH common general education core
- Living Learning Communities
- ‘Opihi Student Success retention activity branding
- Mentor Collective peer mentoring program
- My Success early alert system

Campus Enrollment Targets, 2018-19 To 2020-21

	Measure	Historical Enrollment Count			Targeted Enrollment Count	
		Fall 2015	Fall 2016	Fall 2017	Fall 2018 (Planned)	Fall 2018 (Actual)
	Total Enrollment	3,829	3,666	3,539	3,613	3,406
	Percentage Change Total	-2.4%	-4.3%	-3.5%	2.1%	-3.8%
1	First-time Freshmen Total	**385**	**368**	**413**	**436**	**413**
	Percentage Change FTF	-10.9%	-4.4%	12.2%	5.6%	0.0%
1a	Hawai'i Island High Schools	164	160	166	172	182
1b	O'ahu High Schools	58	57	72	74	71
1c	Maui and Kaua'i High Schools	32	33	30	34	20
1d	Mainland [1]	97	77	114	124	103
2	Transfer Total	**408**	**397**	**371**	**371**	**337**
	Percentage Change Transfer	-6.7%	-4.9%	-7.0%	0.0%	-9.2%
2a	Hawai'i Community College	126	147	115	114	105
2b	Other UHCC	57	45	51	50	48
3	Continuing (Retention Rate Increase) [2]	2,135	1,979	1,873	1,880	1,853
3a	First-time Freshmen Retained[3]	272	271	248	289	270
	Retention Rates	63.2%	70.2%	68.3%	70.0%	66.0%
3b	Transfer Retained [3]	285	277	276	246	247

[1] Includes U.S. Military.

[2] Increase of #.# percentage points to the retention rate in the second fall semester of enrollment, decaying by 0.1 percentage point through fall 12.

[3] Corrected.

UNIVERSITY of HAWAI'I® HILO

2018 Assessment

- Increased applications and acceptances
- First-time freshmen enrollment sustains increase in prior year
- Fewer transfer students enrolled than targeted
- Increased Hawai'i island and resident enrollment; decreased non-resident enrollment
- Lower retention rates for first time freshmen and first time transfer students
- Improved persistence for continuing students
- Continued high FAFSA completions

UNIVERSITY of HAWAI'I®
HILO

2018 Assessment

- Financial Aid TV's Get Answers –
  - Total of 961 videos watched March to September 2018, video viewership highest on Saturday and most videos viewed between 6:00pm to 11:00pm
- EAB/Royall Decision IQ campaign –
  - Up to 7 messages delivered to 800+ accepted freshmen on decision to enroll
- Geo-fenced mobile advertising –
  - 700,000+ impressions, 8 UHCC campuses, nearly 4000 "click-thrus" to university website and 'apply' page
- Texting campaign –
  - Up to 12 messages, thousands of individual messages, delivered to 1200+ accepted freshmen and transfer students
- 'Opihi Student Success – Tailored communication for continuing and stopped out students
  - 2529 registered seniors, juniors, and sophomores contacted Spr 2018, average 86.6% across all 4 colleges registered for Fall 2018
  - 421 students stopped out AY 16-17 contacted, 37 (8.8%) registered to re-enroll for Fall 2018;
  - 13 students graduate through petition to modify graduation requirements
- Mentor Collective peer mentor program –
  - 89.3% of 93 new students matched with mentor, total 427 hours engagement Spr 2018
- MySuccess early alert system –
  - 6 Math & English courses, 1 Chemistry section, coordinated outreach with 5 student support program; 594 issues identified, 79% resolved timely, 59 flags raised, 86% cleared

UNIVERSITY of HAWAI'I® HILO

University of Hawaii Hilo

Campus Enrollment Targets 2019-20 to 2021-22

	Measure	Historical Enrollment Count			Targeted Enrollment Count		
		Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
	Total Enrollment	3,666	3,539	3,406	3,520	3,634	3,781
	Percentage Change Total	-4.3%	-3.5%	-3.8%	3.3%	3.0%	4.3%
1	First-time Freshmen Total [1]	**368**	**413**	**413**	**460**	**505**	**550**
	Percentage Change FTF	-4.4%	12.2%	0.0%	11.4%	9.8%	8.9%
1a	Hawai‘i Island Direct Entrants [2]	160	166	182	200	215	230
1b	O‘ahu Direct Entrants	57	72	71	80	90	95
1c	Maui County and Kaua’i Direct Entrants	33	30	20	30	35	40
1d	Mainland	77	114	103	150	165	185
2	Transfer Total [1]	**397**	**371**	**337**	**375**	**390**	**405**
	Percentage Change Transfer	-2.7%	-6.5%	-9.2%	11.3%	4.0%	3.8%
2a	Hawai‘i Community College	144	114	105	125	130	135
2b	Other UHCC	45	50	40	55	55	60
3	Continuing / Returning [3]	2,058	1,927	1,853	1,872	1,927	2,079
3a	First-time Freshmen Retained [4]	271	248	270	281	317	354
	Retention Rate – First-Time, Full-Time	70.9%	68.2%	66.0%	68.0%	69.0%	70.0%
3b	Transfer Retained [4]	277	276	247	246	277	292
3c	**Retention Rate – Full-Time**	72.1%	75.4%	70.4%	72.9%	73.9%	74.9%

UNIVERSITY of HAWAI‘I®
HILO

2019-2020 Action Strategies for Enrollment Growth

- EAB/Royall Strategic Search for prospective high school students
- Strategic use of financial aid
- Digital communication for prospective and continuing students
- 2+2 pathways for UHCC transfer students
- Entry and first year services for transfer students
- Completion of English and math in 1st year
- Career pathway major choice, career exploration, employment advising
- Service learning/community engagement connections
- Distance learning capacity for select majors

UNIVERSITY of HAWAI'I®
HILO

UH West O‘ahu

Enrollment Management Report

2018-2019 Action Strategies for Enrollment Growth

- Summer Bridge programs targeted to specific special cohorts: Ike Ola - Health Pathways, Pueo Scholars - Education Pathways, Onipa’a “Summer Melt” - Hawaiian Studies; Math Summer Bridge - low income, first generation students
- New Student Orientations targeted to specific student groups: Freshmen, Distance Education, Transfer, Ohana
- Recruitment events: Admissions Open House events prior to letter of intent day
- Financial aid, financial literacy and scholarship completion events
- Retention communication initiative: Email, direct mail and phone calls to continuing stop out students and students with registration holds
- Student employment combined with leadership and work skills training
- Pueo Mentors assigned to all Freshmen who met twice a semester
- E Ala Pono campaigns: High-touch advising by majors for all students combined with faculty referrals to campus resources
- Redesigned UH West Oahu website with new appearance and functionality
- Rolled out STAR GPS pathways across all majors and concentrations

UH West O‘ahu Campus Enrollment Targets, 2018-19 To 2020-21

	Measure	Historical Enrollment Count			Targeted Enrollment Count	
		Fall 2015	Fall 2016	Fall 2017	Fall 2018 (Planned)	Fall 2018 (Actual)
	Total Enrollment*	2,692	2,939	3,082	3,201	3,128
	% Change Total	**1.2%**	**9.2%**	**4.9%**	**3.9%**	**1.5%**
1	**First-time Freshmen Total***	254	292	282	296	242
	% Change	**-4.5%**	**15.0%**	**-3.4%**	**5.0%**	**-14.2%**
	Leeward Public High Schools	128	137	163	184	136
	Central O‘ahu Public High Schools[1]	57	75	62	65	57
	Hawai‘i Private Schools[2]	38	33	32	37	27
2	**Transfer Total**[3] *	557	599	585	605	561
	% Change	**-2.3%**	**7.5%**	**-2.3%**	**3.4%**	**-4.1%**
	Leeward CC	181	175	195	203	193
3	**Non-Traditional Total**	911	1,064	1,066	1,106	991
	% Change	**Not Available**	**16.8%**	**0.2%**	**3.8%**	**-7.0%**
	Part-Time & Age: 25 and over	709	789	775	805	727
	Veteran	202	275	291	301	264
4	**Continuing*/ Returning**[3] *	1,706	1,865	1,878	1,911	1,940
	First-Time Full-Time Freshmen Retained (Yr 1 to Yr 2)[4]	131	168	174	197	194
	Retention Rates	**67.2%**	**70.3%**	**65.4%**	**70.0%**	**72.1%**
	First-Time Full-Time Freshmen Retained (Yr 2 to Yr 3)[4]	100	123	127	169	Not Available
	Retention Rates	**51.3%**	**51.5%**	**47.7%**	**60.0%**	**Not Available**

[1] Includes U.S. Military.
[2] Includes U.S. related areas: Territorial Possessions, U.S. Commonwealths & Compact of Free Association states.
[3] Degree- seeking undergraduate students.
[4] Increase 4.6 percentage points to the retention rate in the second fall semester of enrollment, and 8.5 percentage points in the third fall semester of enrollment, to sustain 70.0% second year retention and 65.0% third year retention goals by 2020.
*Details provided for targeted groups only and may not add up to total.

UNIVERSITY of HAWAI‘I WEST O‘AHU

2018 Assessment

- Enrolled a record 3,128 students, which included 242 freshmen and 561 transfers.
- In Fall 2018, our first-time freshman enrollment decreased from Fall 2017 due to the reduction of funding initiatives targeting leeward high schools. In Fall 2017, UHWO had an increase in enrollment from Leeward public high school due to several targeted grant funded initiatives, ie. GEAR UP, Hawaii P20, Kamehameha Schools, and Title III U.S. Department of Education. These programs targeted Native Hawaiian, low-income, and first-generation students from Leeward high schools.
- Enrolled 1,940 continuing students, an increase from 1,878 enrolled in Fall 2017.
- Enrolled 265 early college students from five feeder high schools in Fall 2018.
- Increased the first-time freshman retention rate from 65.4% in 2017 to 72.1% in 2018, an all-time high since 2015.

Campus Enrollment Targets 2019-20 to 2021-22

	Measure	Historical Enrollment Count			Targeted Enrollment Count		
		Fall 2016	Fall 2017	Fall 2018 (Actual)	Fall 2019	Fall 2020	Fall 2021
	Total Enrollment*	2,939	3,082	3,128	3,388	3,664	4,018
	% Change Total	**9.2%**	**4.9%**	**1.5%**	**8.3%**	**8.1%**	**9.7%**
1	**First-time Freshmen Total***	292	282	242	286	310	335
	% Change	**15.0%**	**-3.4%**	**-14.2%**	**18%**	**8.5%**	**8%**
	Leeward Public High Schools	137	163	136	160	174	188
	Central O‘ahu Public High Schools[1]	75	62	57	67	73	79
	Hawai‘i Private Schools[2]	33	32	27	32	35	38
2	**Transfer Total**[3] *	599	585	561	662	761	868
	% Change	**7.5%**	**-2.3%**	**-4.1%**	**18%**	**15%**	**14%**
	Leeward CC	175	195	193	227	261	297
3	**Non-Traditional Total**	1,064	1,066	991	1,169	1,254	1,376
	% Change	**16.8%**	**0.2%**	**-7.0%**	**18.0%**	**7.3%**	**9.7%**
	Part-Time & Age: 25 and over	789	775	727	844	901	968
	Veteran	275	291	264	325	353	408
4	**Continuing*/ Returning** [3] *	1,865	1,878	1,940	1,989	2,145	2,309
	First-Time Full-Time Freshmen Retained (Yr 1 to Yr 2) [4]	168	174	194	207	223	242
	Retention Rates	**70.3%**	**65.4%**	**72.1%**	**70.0%**	**70.0%**	**70.0%**
	First-Time Full-Time Freshmen Retained (Yr 2 to Yr 3) [4]	123	127	Not Available	185	207	234
	Retention Rates	**51.5%**	**47.7%**	**Not Available**	**62.5%**	**65.0%**	**67.5%**

[1] Includes U.S. Military.
[2] Includes U.S. related areas: Territorial Possessions, U.S. Commonwealths & Compact of Free Association states.
[3] Degree- seeking undergraduate students.
[4] Increase 4.6 percentage points to the retention rate in the second fall semester of enrollment, and 8.5 percentage points in the third fall semester of enrollment, to sustain 70.0% second year retention and 65.0% third year retention goals by 2020.
*Details provided for targeted groups only and may not add up to total.

UNIVERSITY of HAWAI‘I WEST O‘AHU

2019-2020 Action Strategies for Enrollment Growth

Recruitment - First time Students

- Continue to expand on successful strategies in 2017-2018 enrollment management campaigns with specific emphasis for Native Hawaiian, low income and first generation students.
- Enhance admissions outreach to high schools, community events and college fairs.
- Offer additional academic programs of high interest to students and address state workforce needs (i.e. Health Sciences, STEM, and Creative Media).
- Provide financial aid awards offers through direct mail and email to enhance student enrollment commitment.
- Improve and expand automated communications to build sense of relationship between prospective student and UH West Oahu.
- Utilize predictive analytics to identify and connect with accepted freshmen and transfer students who may be likely to enroll at UH West Oahu if given additional attention, information and/or support.
- Increase early college High School vertical articulation pathways through high school partnerships to facilitate transfer credits to UH West Oahu and enhance academic preparedness.

2019-2020 Action Strategies for Enrollment Growth

Recruitment - Transfer Students

- Offer degree programs after work hours targeting working adults.
- Attract UH community college students pursuing the AS in Natural Science by offering the BS in Natural Science at UH West Oahu.
- Offer transfer workshops at community colleges featuring information sessions on admissions, advising and financial aid.
- Facilitate Academic Program Presentations to highlight UHWO concentrations and programs.
- Host Virtual Transfer Workshops via Zoom to neighbor island prospective students featuring admission, financial aid and advising.
- Increase use of advising tools to promote knowledge of UHWO Academic programs (ie, use Star GPS – What If Journey)
- Improve collaboration and information with University Center partners on neighbor islands.
- Pilot 5-week accelerated courses in collaboration with UH System and Distance Education programs.
- Enhance online advertising and promotion to cater to active duty military and working adults.
- Host online admissions information sessions to active duty military.

2019-2020 Action Strategies for Enrollment Growth

Retention - New and Continuing students

- Support FAFSA/scholarship completion and provide assistance and information for families from the West O‘ahu region.
- Build out E Ala Pono early alert campaigns to further connect the student to faculty and academic advisors to campus resources, ie, tutoring, mental health services, financial aid planning.
- Assign students to a Math entry course of Math 100 Survey of Math and Math 115 Statistics.
- Assign students to ENG 100T. Students may test out to ENG 100.
- Implement CLEP (College Level Examination Program) testing options targeting working adults and military students to meet degree requirements.
- Work directly with undeclared students to select a major by Spring 2019.
- Enhance communication campaigns by phone, website and social media to notify students of important dates for registration, financial aid and financial

2019-2020 Action Strategies for Enrollment Growth

Retention – New and Continuing Student

- Place course embedded tutors into pre-requisite classes.
- Increase academic persistence and student success for first year on-campus and first year distance education transfer students at UH West O‘ahu through engaging academic and cultural events, activities, and workshops.
- Provide one-to-one peer mentorship and support for first year students at UH West O‘ahu. Build leadership skills for mentees and provide learning tools and career opportunities for all students.
- Increase and strengthen academic programs to support students’ student skills -high demand skills in West O‘ahu region.
- Increase usage of predictive analytics in course scheduling and space utilization to maximize course sequencing.
- ncrease career readiness through student internships and employment, service learning opportunities, senior projects and senior practicums that align with employment placement after graduation and/or preparation for graduate school.
- Identify and develop locations around campus for students to interact and socialize between and after classes to facilitate a sense of belonging.
- Increase opportunities for on-campus employment by expanding the Federal Work Study program for needy students.
- Create a more vibrant campus by enticing students to remain on campus after classes by offering more on-campus employment, creating physical spaces for student hang-outs, and increasing student-centered activities.
- Foster an institutional climate that promotes success for Native Hawaiian, low income, first generation, students with disabilities, and other underrepresented students.
- Expand Naulu Center Services and student life to foster holistic student development and increase engagement in co-curricular activities.

UH Community Colleges
Enrollment Management Report

Performance Indicators for Student Enrollment and Success

- Targets meet state's workforce needs for human capital development.
- Targets drive strategic campus actions, system-level policies, and resource allocation and requests.
- Performance-to-targets reviewed semi-annually at each campus.
- System-wide supports focus on student success:
  - Performance incentives to campuses for increased transfers, degrees, and certificates.
  - Transformation to "student ready" colleges to support increased retention and completion.
  - Alignment of degree programs and students' plans with state workforce needs (http://uhcc.hawaii.edu/workforce).

CC Targets for Student Enrollment and Success

Targeted Student Population	Basis of Performance Target (To be reached by 2027)	Fall 2021 Enrollment Target
High School Direct Entry (first fall after HS)	Reach 65% or greater college-going rate at all DOE high schools (http://uhcc.hawaii.edu/highschool_data/)	2,902
Working Age Adults (ages 25-44)	Increase postsecondary participation in population to 4%	9,610
Non-High School Graduates (e.g., GED)	Incremental growth	1,632
International Students	Campus growth targets	1,150
First Year Students	Reach 65% retention rate of first year students	
	Other (new non-targeted students, continuing students)	16,710
	TOTAL	**32,004**

CC Enrollment Targets

Fall 2015 to Fall 2018

	Historical			Targeted Projection	
	Fall 2015	Fall 2016	Fall 2017	Fall 2018 (Planned)	Fall 2018 (Actual)
FIRST TIME STUDENTS FROM TARGETED POPULATIONS					
High School Direct Entry	2,980	2,725 (-9%)	2,596 (-5%)	2,657	2,637 (2%)
Working Age Adults (ages 25-44)	2,339	2,303 (-2%)	2,077 (-10%)	2,548	1,995 (-4%)
Non-High School Graduates (e.g., GED)	558	506 (-9%)	466 (-8%)	523	389 (-17%)
International	390	406 (4%)	390 (-4%)	420	337 (-14%)
All Other	5,812	5,629 (-3%)	5,862 (4%)	5,545	6,297 (7%)
CONTINUING STUDENTS					
All (including retained students)	18,291	17,188 (-6%)	16,050 (-7%)	16,762	15,164 (-6%)
TOTAL ENROLLMENT	**30,370**	**28,757** (-5%)	**27,441** (-5%)	**28,455**	**26,819** (-2%)

2.3% Increase in New Students

*Targets set to meet Fall 2020 benchmark for enrollment goals for identified groups of students (new and continuing).

Fall 2018 Assessment

- Low unemployment and workforce demand affecting prospective and continuing student enrollment.
- Direct entry from high school to UHCC increased from prior year, reversed a 6-year slide.
- Early admit program enrollment growth (43% increase from prior year).
- Drop (12%) in students who identified as having a GED (mirroring drop in students earning GED).
- Student completion (degrees and certificates awarded) remained steady vs. enrollment.
- UHCC introduced new Integrated Student support initiatives to improve student retention and completion which showed pockets of excellence in the first year.

Campus Enrollment Targets:

Actuals – Fall 2016 to 2018; Targets – Fall 2019 to 2021

UNIVERSITY of HAWAI'I® COMMUNITY COLLEGES

	Historical (% change from prior year)			Projections (% change from prior year)		
	Fall 2016	2017	2018	2019	2020	2021
FIRST TIME STUDENTS FROM TARGETED POPULATIONS						
High School Direct Entry	2,725 (-9%)	2,596 (-5%)	2,637 (2%)	2,747 (4%)	2,813 (2%)	2,902 (3%)
Working Age Adults (ages 25-44)	2,303 (-2%)	2,077 (-10%)	1,995 (-4%)	3,062 (54%)	3,658 (20%)	4,336 (19%)
Non-High School Graduates (e.g., GED)	506 (-9%)	466 (-8%)	389 (-17%)	573 (47%)	632 (10%)	699 (11%)
International	406 (4%)	390 (-4%)	337 (-14%)	445 (32%)	473 (6%)	497 (5%)
Other New	5,629 (-3%)	5,862 (4%)	6,297 (7%)	6,527 (4%)	6,693 (3%)	6,860 (2%)
CONTINUING STUDENTS						
Working Age Adults (ages 25-44)	4,944 (-7%)	4,790 (-3%)	4,665 (-3%)	5,025 (8%)	5,148 (2%)	5,274 (2%)
Non-High School Graduates (e.g., GED)	984 (-9%)	840 (-15%)	762 (-9%)	885 (16%)	910 (3%)	933 (3%)
International	603 (-7%)	584 (-3%)	563 (-4%)	617 (10%)	635 (3%)	653 (3%)
Other Continuing	10,657 (-5%)	9,836 (-8%)	9,174 (-7%)	9,662 (5%)	9,752 (1%)	9,850 (1%)
TOTAL ENROLLMENT	**28,757** (-4%)	**27,441** (-5%)	**26,819** (-2%)	**29,543** (10%)	**30,714** (4%)	**32,004** (4%)

*Targets set to meet benchmarks for enrollment goals for identified groups of students (new and continuing).

Strategies for Targeted Populations, 2018-20

UNIVERSITY of HAWAI'I COMMUNITY COLLEGES

High School Direct Entry

- Convert more early admit students to degree-seeking students, post-high. Prioritize early college opportunities within career pathways.
- Facilitate more completions of UH application for admission and financial aid with Hawaii P-20.
- Analyze enrollment patterns. Aim to achieve campus-based targets for increased college enrollment.

Non-High School Graduates (e.g., GED)

- Establish new options for federal financial aid eligibility for those in Career and Technical Education pathways.

International Students

- Increase outreach through recruitment fairs and recruiting agents.

Working Age Adults (ages 25-44)

- Offer fully online AA and additional online classes in accelerated five-week format.
- Implement comprehensive marketing campaign for "stopped out students" to re-enroll to complete degrees.
- Streamline re-enrollment processes for stopped out students.
- Promote Hawaii Promise as making education more affordable for Hawaii residents.

Strategies for Enrollment Growth Through Student Success Initiatives, 2018-20

- Improve first year students' success to support retention into second fall:
  - First-year Math & English Redesign
  - Informed choice and placing students on the right "pathway"
- Facilitate completion and transfer by securing academic pathways including baccalaureate pathways for prospective transfers.
- Offer flexibility in course offerings including more online courses in accelerated 5 week format and fully online degree programs.
- Recruit stopped out students to re-enroll and complete degrees.
- Communicate and deliver financial/Hawaii Promise opportunities, supports.
- Integrate Student Support across campuses and for specific priority populations, such as returning adults.
- Streamline online admissions applications and onboarding.
- Increase academic support with various methods (e.g. peer mentors and transfer navigators).
- Offer Strategic professional development for teaching and learning (faculty guilds).
- Continue institutional research: e.g. Why do UHCC students not transfer in greater numbers and why don't more transfer to UH campuses?

Summary and System-wide Next Steps

Strengthening enrollment efforts

- Setting and achieving targets
- Expanding and intensifying recruitment
- Improving retention, especially of first-year students
- Building stronger transfer pathways
- Link Early College to academic pathways

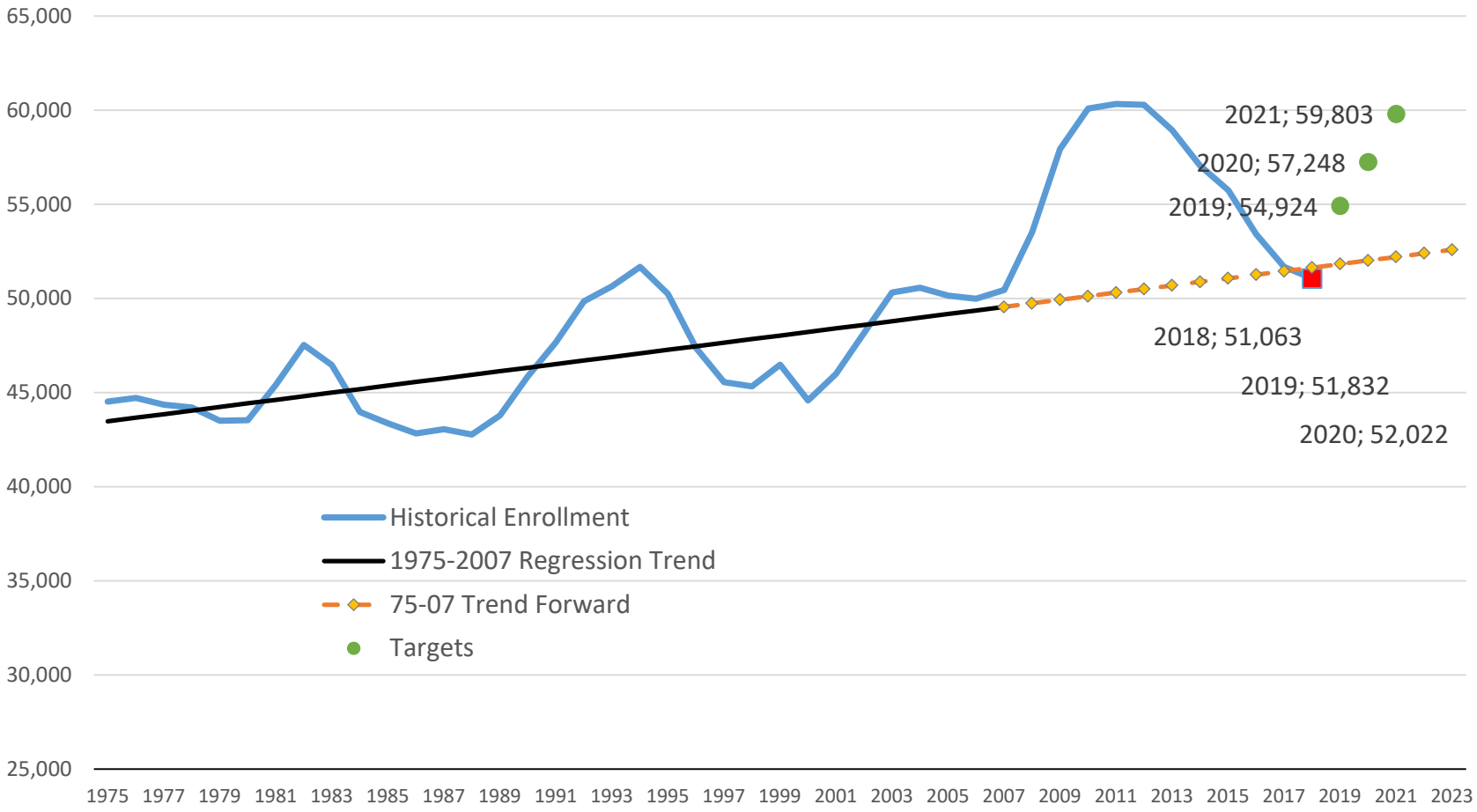
New initiatives

- FAFSA completion project with DoE
- $400,000 Lumina grant to target returning adults
- Increased funding for distance learning focused on accelerated programs
- $39 million Federal Grant to GEAR UP to help low-income students

Enrollment Going Forward

The immediate goal is to reverse the enrollment decline and return to the long-term growth trend.

Going forward, the UH Units have set ambitious enrollment objectives.



Academic Planning Update

Donald O. Straney
Vice President for Academic Planning and Policy

Academic and Student Affairs Committee
1 November 2018

Academic Program Planning Steps

- Department/Division/College Planning
- Campus Concept Proposal (Authorization to Plan)
- New Program Proposal
- Provisional-to-Established Proposal
- Program Review
  - Continue
  - Merger
  - Stop-out

New Proposals Coming to the Board in 2018-19

UH Mānoa

- BS Engineering Science
- MS Finance
- MS Marketing
- MS Information Systems

UH Hilo

- BS Aeronautical Science

UH West O‘ahu

- Creative Media

New Proposals Coming to the Board in 2019-20

UH Mānoa

- BA Public Policy
- Professional MA Asian International Affairs
- BS Construction Engineering

Concept Proposals Planned

	2018	2019	2020	2021
UH Mānoa	4	3	3	0
UH Hilo	0	1	0	1
UH West O‘ahu	2	0	0	0
UHCCs	1	1	1	0

Provisional-to-Permanent Proposal Schedule

	2018	2019	2020	2021	2022
UH Mānoa	1	5	2	5	2
UH Hilo	0	3	1	0	0
UH West O‘ahu	0	0	0	0	0
UHCCs	2*	3	1	0	0

* One proposal shared by 5 campuses

Merged Programs

UH Mānoa

- 2 tropical agriculture programs merged into 1
- 3 MA programs in Asian languages to be merged into 1 (2019)
- 3 PhD programs in Asian languages to be merged into 1 (2019)

Stopped-out Programs

UH Mānoa (7)

BS or BA in Ethnobotany, Plant and Environmental Protection Services, Zoology (2)
Masters in Biological Engineering, Geosciences for Professionals
Doctorate in Public Health

UH Hilo (3)

Bachelors in Economics, Environmental Science (BS remains)
MS Clinical Psychopharmacology

UHCCs (7)

Small Vessel Fabrication and Repair (Honolulu)
Plant Biology and Tropical Agriculture (Kauai)
Sustainability Science Management (Kauai)

Types of Program Proposals

- Capital-intensive proposals
  - Require appropriation of new positions, operating funds and/or CIP funds
- Redirection or Modernization proposals
  - May include new directions, but not new appropriations
  - Respond to student demand and what competitors are doing (e.g., sustainability)
  - Generally entail reallocations, rebalancing and refocusing of unit academic programs and instructional resources
  - Can be delivered with revitalization or modernization of facilities
- Modifications of existing program proposals
  - May involve change in name or type of degree
  - Generally require minimal curricular changes or resource needs
- Rapid Response to Emerging State Needs
  - Unanticipated program needs requiring rapid planning and implementation

6-Year Academic Plan Report (August, 2019)

Overview of Current Programs

- Summary of IAFP unit descriptions, goals and priorities
- Brief description of current unit program organization and strengths

6-Year Academic Goals

- Unit priorities and goals for meeting economic, social needs
- Changing demographic demands
- Online program developments

6-Year Academic Plan

- Schedule of concept, new and provisional-to-permanent proposals
- Impact on facilities, budget and enrollment plans
- Changes in existing programs
- Future opportunities under consideration

Summary of Proposals Coming This Year

DTS 19155

University of Hawai'i at Hilo Administration
Office of the Chancellor

UNIVERSITY of HAWAI'I® HILO

UNIVERSITY OF HAWAII
BOARD OF REGENTS

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UNIVERSITY OF HAWAII
PRESIDENT'S OFFICE

October 25, 2018

MEMORANDUM

TO: Lee Putnam
Chair, Board of Regents, University of Hawai'i

VIA: David Lassner
President, University of Hawai'i

VIA: Donald Straney
Vice President for Academic Planning and Policy

FROM: Marcia Sakai
Interim Chancellor, University of Hawai'i at Hilo

SUBJECT: Request to establish a new provisional Bachelor of Science degree in Aeronautical Sciences, University of Hawai'i Hilo

SPECIFIC ACTION REQUESTED:

It is respectfully requested that the University of Hawai'i Board of Regents approve the establishment of a new provisional degree, the Bachelor of Science in Aeronautical Sciences, within the College of Agriculture, Forestry, and Natural Resource Management, University of Hawai'i Hilo (UH Hilo).

RECOMMENDED EFFECTIVE DATE:

Fall 2019

ADDITIONAL COST:

The proposed program will require an initial campus investment of $107,000 to demonstrate feasibility, but at the same time will leverage existing investments in the College of Agriculture, Forestry, and Natural Resource Management; the College of Arts

200 W. Kāwili St.
Hilo, Hawai'i 96720-4091
Telephone: (808) 932-7348
Fax: (808) 932-7338
hilo.hawaii.edu

and Sciences; and the College of Natural and Health Sciences. With positive proof of concept, we will seek an appropriation to grow the program.

PURPOSE:

The proposed Bachelor of Science in Aeronautical Sciences is designed to serve as a pivot toward aeronautical science and its applications that will integrate with UH Hilo's existing STEM program strengths in general education as well as in agriculture, conservation biology, natural hazards, marine and terrestrial resources, astronomy, and GIS education and research. The program will have concentrations in Commercial Professional Pilot Training (CPPT) and Commercial Aerial Information Technology (CAIT), where there is a high projected workforce need in the State.

BACKGROUND:

Board of Regents policy 5.201 "Instructional Programs" sets that policy for the establishment of all new instructional programs.

At its January 12, 2017 meeting, the Board of Regents Committee on Academic and Student Affairs considered a request from UH Hilo to establish, as provisional, the Aeronautical Sciences B.S. The proposed program was designed to provide a 4-year degree pathway for students interested in a fixed wing pilot career track. It also included flight-training courses across the four years of the program, delivered by a third-party provider operating out of the Hilo International Airport. The Committee expressed concern regarding enterprise and operational risks associated with the flight training provider and the Hilo airport location. The Committee deferred the proposal until further information could be provided.

The current proposed program is broadened to offer students two different, but connected pathways into commercial aviation. Both concentrations share a common core of commercial aviation courses for the first three years, coupled with a final year of specialization in either 1) CPPT or 2) CAIT. The first option has been re-designed to address concerns of risk and capacity of flight training raised earlier by the Committee. The second option provides a productive path for students interested in aeronautical science applications but not in obtaining a commercial pilot's license.

The proposed program satisfies the criteria for decision-making regarding the establishment of provisional degree programs RP 5.201, III.A. (1a) and (3) as follows:

(1) a. The Board shall approve the establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president.

and

(3) All new program proposals shall be consistent with the institution's mission.

UH Hilo's mission is to challenge students to reach their highest level of academic achievement by inspiring learning, discovery and creativity inside and outside the classroom. We are reminded of this by the proverb 'A'ohe pau ka 'ike i ka halau ho'okahi/One learns from many sources, which serves as strong guidance for our decision-making. Our kuleana/responsibility is to improve the quality of life of the people of Hawai'i, the Pacific and the world.

Given this mission and direction, UH Hilo's program array demonstrates the campus' priority for programs that take advantage of the unique physical and social characteristics of the island and that serve students who seek opportunities for highly engaging and experiential learning (UH Integrated Academic and Facilities Plan). The proposed Bachelor of Science in Aeronautical Sciences aligns with UH Hilo's focus on professional programs that prepare students for the workforce, including accounting, business, education, nursing, pharmacy, and counseling psychology, by now including a pathway to commercial aviation. The proposed program also aligns with UH Hilo's focus on the application of science in such fields as agriculture, conservation biology, geography, geology, environmental sciences, marine science, and astronomy, using tools for information development, such as GIS, data visualization and data science. The proposed program would add to our students' toolkit for data collection, information creation, and information communication, and strengthen both undergraduate and graduate research across those fields.

The proposed Bachelor of Science in Aeronautical Sciences program will leverage UH Hilo's strength in undergraduate STEM disciplines, strongly coupled with experiential learning, in an area where there is high projected workforce need in the State.

The first concentration in CPPT provides a simple, direct pathway to earn all the FAA licenses and certificates required to pursue a commercial Airline Transport Pilot license and begin a career as a commercial airline pilot. This pathway is similar to the military pilot training model, where intensive flight school follows completion of a college degree. The CPPT concentration is structured as three years of university classroom and flight simulator learning coupled with a final year at a 6-8 month flight school program of the student's choice. Credit for flight school is transferred back to UH Hilo to complete the degree, saving students the cost of an additional year of college.

The concentration is designed to prepare students with both technical and management expertise in the field of commercial aviation along with the opportunity to pass many of the written exams required for FAA licenses and certificates in advance of attending flight school. Students who complete this program will have all the FAA certificates and licenses to be qualified to fly commercial multi-engine aircraft in nearly all conditions and

will be eligible for the Airline Transport Pilot certificate upon completion of the requisite flight time.

The second concentration in CAIT will provide the training and background to attain current FAA licensing for the highly restricted commercial UAS operations of small drones, as well as preparation for future full integration of large UAS operations into commercial airspace. The first three years of the program develop a solid background in commercial aviation that will be needed by commercial UAS pilots as this nascent industry transitions to full commercial operations in the near future. The CAIT concentration is designed to be coupled with a focus in Geography, a STEM field, or Computer Science using available electives. Data Science is an emerging focus.

This concentration will create opportunities for the University to establish new partnerships with private industry, educational institutions, and government agencies. Fields such as agriculture, conservation biology, geography, environmental sciences, marine science, and astronomy have ever-increasing need for environmental data with high spatial and temporal resolutions, which are not generally available by other means. Students with a strong background in commercial aviation, UAS operations, payloads, instrument calibration, data handling, and interpretation will be in high demand. UH Hilo has an existing relationship with the FAA that allows us to obtain Certificates of Waiver or Authorization (COAs) for Research and Training on a per project basis, which would allow additional privileges for CAIT.

An October 2018 EMSI analysis from the Office of the Vice President for Community Colleges Institutional Research Office reports:

- Between 2016 and 2026, Hawai'i will see 207 new airline pilot, co-pilot and flight engineer position openings.
- During the same time period, Hawai'i will see 186 replacement pilot position openings.
- The demand for commercial level UAS pilots with information technology backgrounds is difficult to assess as this is an emerging field. However, it appears that it will be significant. A recent report by the FAA suggests that there will be an exponential increase in these positions in the near future.

Based on our review of enrollment by Hawaii residents at select out-of-state flight training universities, contact with Civil Air Patrol squadrons, communication from interested veterans, students and families, and student interest in the UAS certificate program, we estimate that program enrollment will exceed 80 students at maturity, including participation from UH community colleges.

The proposed B.S. in Aeronautical Science is a campus priority. It will provide important career training and opportunities for students in both commercial aviation and the rapidly growing field of unmanned aviation technology. The proposed program will support economic development opportunities on Hawai'i island by creating activity in the

aeronautics/aerospace/astronomy cluster and align with DBEDT's plan to build and strengthen Astronomy and Aerospace on Hawai'i island.

ACTION RECOMMENDED:

It is recommended that the Board of Regents establish a new provisional degree, the Bachelor of Science in Aeronautical Science in the College of Agriculture, Forestry and Natural Resource Management at the University of Hawai'i Hilo.

Attachment

cc:: Kendra Oishi, Executive Administrator and Secretary of the Board, University of Hawai'i

Kenneth Hon, Interim Vice Chancellor, Academic Affairs

BACHELOR OF SCIENCE IN AERONAUTICAL SCIENCES: A PROPOSAL FOR PROVISIONAL STATUS FROM UH HILO

I. Program Purpose and Outcomes

Purpose

Hawai'i is the only state completely surrounded by ocean and consists of a 2,000 mile long chain of islands with the fourth largest coastline in the United States. Hawai'i is heavily dependent on the aviation industry to support the economic driver of tourism and to transport large amounts of freight to and between the islands. Advances in aeronautics will continue to be increasingly important to monitor and manage remote lands, agriculture, natural hazards, fisheries, and the immense marine resource of the Northwest Hawaiian Islands. The proposed degree in Aeronautical Sciences will provide an opportunity for residents of Hawai'i to meet future needs in the commercial aviation industry and the rapidly expanding field of Unmanned Aviation Systems (UAS).

The proposed Bachelor of Science in Aeronautical Sciences will provide important career training and opportunities in both commercial aviation and the rapidly growing field of unmanned aviation technology. Establishing a degree will also provide opportunities to create new partnerships with private industry, educational institutions, and government agencies that are not currently possible. Developing aeronautical sciences teaching and research fits with the Hawai'i DBEDT's plans to build and strengthen Astronomy and Aerospace on Hawai'i Island. Unmanned aviation technology fits well within UH Hilo's current mission of applied science and agriculture research, data science, and astronomy. These fields are tied together by the ever increasing need for environmental data with high spatial and temporal resolutions, which are not generally available by other means. Students with a strong background in commercial aviation, UAS operations, payloads, instrument calibration, data handling, and interpretation will be in high demand as this nascent industry continues its rapid expansion. This degree concentration will add an important dimension of applied science that will integrate with UH Hilo's current research being conducted with state and federal agencies, as well as private stakeholders.

Outcomes

The CIP code for this program will be: 49.0102 Airline/Commercial/Professional Pilot and Flight Crew[1].

The Bachelor of Science in Aeronautical Sciences will offer students two different pathways into commercial aviation, a Commercial Professional Pilot Training concentration and a Commercial Aerial Information Technology concentration. Both concentrations share a common core of commercial aviation courses for the first 3 years, coupled with a final year of specialization in either 1) Commercial Professional Pilot Training or 2) Commercial Aerial Information Technology.

The first concentration in Commercial Professional Pilot Training (CPPT) provides a simple, direct pathway to earn all the FAA licenses and certificates required to pursue a commercial Airline Transport Pilot license and begin a career as a commercial airline pilot. The Aeronautical Sciences Bachelor's degree is structured in a fashion similar to military pilot training, where intensive flight school follows completion of a college degree. The CPPT concentration is structured as 3 years of university classroom and flight simulator learning, coupled with a final year at a 6-8 month flight school program. Credit for flight school is then transferred back to UH

[1] https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88673

Hilo to complete the degree, saving students the cost of an additional year of college. The concentration is designed to prepare students with both technical and management expertise in the field of commercial aviation along with the opportunity to pass many of the written exams required for FAA licenses and certificates in advance of attending flight school. Students who complete this program will have all the FAA certificates and licenses to be qualified to fly commercial multi-engine aircraft in nearly all conditions and will be eligible for the Airline Transport Pilot certificate upon completion of the requisite flight time.

The second concentration in Commercial Aerial Information Technology (CAIT) will provide the training and background to attain current FAA licensing for the currently highly restricted commercial UAS operations of small drones, as well as preparation for future full integration of large UAS operations into commercial airspace. The first 3 years of the program develop a solid background in commercial aviation that will be needed by commercial UAS pilots as this nascent industry transitions to full blown commercial operations in the near future. The CAIT concentration is designed to be coupled with a focus in Data Science, Geography, a STEM field or Computer Science using available electives.

Program Learning Outcomes are designed to meet the stringent requirements of the FAA and high expectations set by the commercial aviation industry :

1. Ability to pilot and command single and multi- engine private and commercial aircraft in a variety of visual and instrument conditions **or** ability to fly and control large commercial unmanned aircraft in commercial airspace in a wide variety of conditions.
2. Demonstrate an understanding of the performance and operating characteristics of both manned and unmanned aircraft. Understand the principles of aerodynamics, aircraft design/construction, and automated control systems.
3. Thorough knowledge and understanding of ground and in-flight support aviation operations and applicable FAA regulations for both commercial aviation and commercial UAS operations.
4. Ability to create approved written flight plans and other professional and technical written reports including an accurate and detailed flight logbook.
5. Understand principles of meteorology and navigation, ability to use GPS systems, fluency with aviation maps and FAA radio location (VOR) systems, ability to navigate an airplane or UAS between points well beyond visual range.
6. Thorough understanding of the principles and regulations applied to aviation safety. Ability to perform risk assessment related to aviation safety for both commercial aviation and commercial UAS operations.
7. Proficiency in communications with regional FAA, airport tower authorities, ground controllers, and other aircraft.
8. Thorough knowledge of regulations related to the maintenance of aircraft-UAS and associated systems.
9. Explain the integration of airports, airspace, and air traffic control in managing the National Airspace System. Thorough working knowledge of the airspace and support systems.
10. Demonstrate a thorough understanding of national and international aviation law and regulations.
11. Proficiency in professional communications and oral presentations.
12. Demonstrate competence in using computers at a level consistent with current professional practice for commercial pilots **or** comprehensive understanding of flight control, sensor applications, calibrations, data collection and reduction, and interpretation of a wide range of applications for UAS.

The above outcomes establish what students will know and be able to do upon completion of the program.

Alignment with the UH System and UH Hilo Integrated Academic and Facilities Plans.

Aviation plays a fundamental role in the lives of nearly everyone in the State of Hawai'i. The proposed Bachelor of Science Degree in Aeronautical Sciences is an applied degree that will make education more accessible for students interested in applied aviation careers. Aviation produces high quality jobs that will improve the lives of Hawai'i's citizens, an underlying principle of the UH IAFP. The proposed program offers a relatively low cost entry into fields of applied aeronautical science with potential for future expansion. We are in a period of significant technological change where advances in robotics and machine learning are going to change the way commercial and non-commercial enterprises operate. While the combination of commercial airline pilots and UAS pilots may initially appear to be two completely different fields, in 10 to 20 years the use of large robotic aircraft systems will most likely be fully integrated into national and international airspace. A large number of new jobs will be created at this nexus of old and new technologies. This is an opportunity for the University of Hawai'i to identify an emerging field and to develop educational programs that train the future workforce for this field.

UH Hilo has a strong focus on applied research in agriculture, conservation biology, natural hazards, astronomy, and marine and terrestrial resources along with offering numerous workforce ready majors in Education, Nursing, Agriculture, Business Administration, and applied STEM fields, including graduate programs in Pharmacy and Tropical Conservation Biology and Environmental Sciences (TCBES). The Aeronautical Sciences degree and especially the Commercial Aerial Information Technology concentration are complementary to these fields, strengthening both undergraduate and graduate research in Geography, Environmental Sciences, Biology, Marine Science, Data Science, Agriculture, Geology, and TCBES.

Evidence of Continuing Need for the Program

The FAA and BLS predict that there will be a steadily increasing demand for both commercial airline pilots. The field of commercial UAS pilots is so new that there are very few predictions on job numbers, however, the FAA anticipates an explosive growth in the sales of commercial UAS aircraft in the coming decade.

Nationally, there will be a moderate number of high paying (>$100,000) airline pilot positions with the major airlines, largely due to retirement over the next two decades within the United States. Major U.S. airlines still have a large pool of experienced regional pilots to choose from for each of these openings. Globally there will be a large demand for pilots within international airlines, especially those in Asia and the Middle East. These airlines pay 10-20% premiums for fluent English-speaking pilots that can navigate international airspace. A 2014 report by Boeing that is still widely quoted predicted the need for over 500,000 pilots by 2036 resulting in a global need for 26,000 pilots per year. In North America, there is a projected need for about 4,400 pilots per year for the next two decades.

The real growth in pilot jobs in the United States has been within regional carriers affiliated with major airlines over the past several years. Projections show that in the next few years there will be more passenger miles flown within the U.S. on regional carriers than on major airlines and the need for regional pilots will continue to expand. The rapid increase in demand for regional pilots began several years ago and left many of these carriers with insufficient crew to fly scheduled routes. It takes approximately 10 pilots to keep a regional aircraft in full service compared to the 14-18 pilots needed for aircraft flown by major airlines. This rapid

growth has caused many of the majors to begin raising entry salaries from $20,000-$40,000 dollars to $40,000 to $60,000 in order to attract and retain pilots. The regional airlines are aggressively recruiting pilots straight from flight school.

An October 2018 EMSI analysis from the Office of the Vice President for Community Colleges Institutional Research Office reports the following demands within the State of Hawai'i. Between 2016 and 2026, Hawai'i will see 207 new airline pilot, co-pilot and flight engineer position openings per year along with 186 replacement pilot openings. Even if the UH Hilo program graduated all of our projected enrollment, it would represent less than 10% of this projected need. Mokulele Air is willing to consider UH Hilo graduates for positions as second in command to earn hours and Hawaiian Airlines expressed support for the program and a desire to consider graduates once they had accumulated sufficient flight time. Empire Air, which runs Ohana Air, is one of the 11 regional airlines recruiting at an event on November 10th in Waikiki for pilots directly with 250 hours of flight time, roughly what UH Hilo graduates with a commercial multi-engine rated pilot rating will have coming directly at graduation.

The demand for commercial level UAS pilots with information technology backgrounds is more difficult to assess as this is an emerging field, but it appears it will be significant. A recent report by the FAA suggests that the use of UAS is set to exponentially expand in the next 5-10 years. The FAA predicts that commercial UAS operations will expand from around 73,000 to a minimum of 300,000 by 2022. In addition, current regulations allow only limited flying of large UAS (>55 kg) in commercial airspace. The current fleet of high end commercial drones is predicted to increase from 16,000 today to over 50,000 by 2020, which will require a significant increase in highly skilled operators. At some point in the near future, commercial UAS, similar to or larger than current military models, will begin to be integrated into commercial airspace in the United States. While the FAA is largely quiet about ongoing rulemaking, the Airline Pilots Association has made it clear that UAS using commercial airspace should meet both commercial pilot and commercial aircraft standards if they are to be integrated in the commercial airways of the National Airspace System.

II. Program Organization

Both concentrations of the program will share identical curriculum during the first 3 years of the program. This will ensure that all graduates have the necessary background to pilot commercial aircraft within the National Airspace System governed by the FAA. The common curriculum includes fourteen new classes including six 1 credit hour flight simulation labs along with eight 3 credit hour courses in safety, weather, navigation, aviation operations and resources, and career development. The rest of the courses are a mixture of General Education, basic mathematics, chemistry, and physics, along with five electives that can be used to focus each students degree.

The intention is to make the first two years of the program available to community college students across the state. All of the non-aviation courses within the first two years are found at all of the community colleges in Hawai'i. The two subject matter courses covering safety and navigation will be offered to all students via Distance Education, thus allowing community college students to complete the bulk of the required courses on their home island. The simulator courses require special equipment and face to face instruction with a pilot and need to be taught at the UH Hilo campus. A special condensed version of these courses will be offered during the summer to students that wish to matriculate from community colleges.

Years 1-3 Curriculum to be Completed at UH Hilo for Both Concentrations:

Fall Year 1		Fall Year 2		Fall Year 3	
AERS 101 Elem Private Pilot Operations I	1	AERS 220 Elem Multi-Engine Ops I	1	AERS 260 Aviation Systems & Instruments	1
GE Multicultural Perspectives I	3	AERS 250 Aviation Safety	3	AERS 340 Advanced Simulated Maneuvers	3
GE Arts, Humanities, Literature	3	GE GEOG 201 Interpreting GEOG Data	3	AERS 355 Domestic & Intl Navigation	3
GE ENG 100 Composition I	3	GE CHEM 151 Elem Survey of Chem	3	AERS 387 Crew Resource Management	3
GE Social Science I	3	GE CHEM 151L Elem Survey of Chem Lab	1	GE Social Science II	3
Elective	3	Elective	3	Writing Intensive Elective	3
Total Credits:	**16**	**Total Credits:**	**14**	**Total Credits:**	**16**
Spring Year 1		**Spring Year 2**		**Spring Year 3**	
AERS 102 Elem Private Pilot Operations II	1	AERS 221 Elem Multi-Engine Ops II	1	AERS 370 Preparation for Practical Single/Multi Engine Flying	1
GE MATH 140 or 140X Precalculus	3	AERS 251 Aviation Weather	3	AERS 471 Aviation Operations	3
GE Language Arts	3	GE Hawai'i Pan Pacific	3	AERS 472 Aviation Career Development (GCC)	3
GE Biological Science	3	PHYS 151 College Physics I	3	AERS 473 Leadership as a Pilot	3
GE Arts, Humanities, Literature	3	PHYS 151L College Physics I Lab	1	Writing Intensive 300-400 Elective	3
GE Multicultural Perspectives II	3	Elective	1	Elective	1
Total Credits:	**16**	**Total Credits:**	**14**	**Total Credits:**	**14**

During the 4th year of the degree program, the requirements of the two concentrations diverge. Students seeking a the Commercial Professional Pilot Training will attend an FAA certified flight school to obtain the necessary FAA licenses and certifications, while those pursuing the Aerial Information Technology concentration will remain at the UH Hilo campus for concentrated courses in UAS flight and data collection and interpretation.

Commercial Professional Pilot Training Concentration (CPPT) To be completed at a flight provider of the students choice		**Commercial Aerial Information Technology Concentration (CAIT)** To be completed at UH Hilo	
Fall Year 4		**Fall Year 4**	
AERS 201 Private Pilot: Pre-Solo	5	AERS 152 Introduction to UAS	3
AERS 202 Private Pilot: Solo & Checkride	5	GEOG 470 Remote Sensing/Air Photo	3
AERS 203 Cross Country Single Engine Pilot in Charge	5	AERS 354 UAS Robotics	3
		Elective	3
		Elective	3
Total Credits:	**15**	**Total Credits:**	**15**
Spring Year 4		**Spring Year 4**	
AERS 310 Instrument Basic	3	AERS 352 UAS Mission Plans and Simulation	3
AERS 311 Instrument Advanced	3	AERS 452 UAS Flight	3
AERS 388 Crew Resource Mgmt. and Crew Operations	2	GEOG 480 Geog Info Sys & Visualization	3
AERS 420 Commercial Certificate (Multi-Engine)	5	Elective	3
AERS 421 Commercial Single-Engine Add On	2	Elective	3
Total Credits:	**15**	**Total Credits:**	**15**

The 4th year of commercial pilot training for all students will initially be at the ATP Flight School in Mesa Arizona. Training is comprised of eight flight training courses and corresponding ground school components. Students are required to take and pass all the required FAA flight and written examinations to achieve their commercial multi-engine instrument rating and will also be given the opportunity to qualify as certified flight instructors. Students completing this course of study will eligible to earn their Airline Transport Pilot certificate upon completion of 1500 hours of flight time (250 hours are earned during training) earned while flying as a certified flight instructor, a second in command at a regional airline, working for private transportation companies, or other venues (freight, medical transport, tourism, etc.).

The UH Office of General Counsel has recommended that the UH Hilo enter into a formalized MOU with ATP flight school similar to those MOU's held by participating clinical sites for university health education programs. The MOU will outline respective areas of liability and will be finalized upon final approval of the program.

Structuring the commercial pilot training in a manner similar to military pilot training provides several significant advantages over traditional programs where flight training is spread out over four years. Operating as a cohort will instill the sense of professionalism required to succeed in the aviation field. Students are provided a

thorough background in the theoretical, applied, and managerial aspects of professional flight prior to flight training. This will let the students focus on the important aspects of learning to fly and gives them a significant advantage over students applying for flight school with no background.

UH Hilo chose to initially partner with ATP as it is a large national flight training provider that can guarantee a concentrated course of flight training for all UH Hilo students, reasonable costs and available financing, a well run professional environment that instills the right attitude for a successful career, extensive aircraft resources and aircraft maintenance facilities, high retention and completion rates (90% for students with some aviation background), guaranteed jobs as flight instructors for qualified students, and extensive employment connections with regional airlines.

The 4th year of aerial information technology will consist of required courses in remote sensing, geographical information systems (GIS), UAS flight and technology, and four electives directed toward advanced remote sensing and GIS, data collection and interpretation. In reality, because there are five electives in the first three years students can choose to take courses stretched over a longer time period. The nine electives allow students in this concentration to obtain a subject certificate in Data Science, minor in other STEM fields, or obtain a double major in Geography.

Admission Policies

The proposed program will operate under a cohort model to attract, engage, and retain students interested in commercial aviation careers. Airlines are focused on ensuring that pilots are trained to high professional standards from the first day. UH Hilo students will be housed together in the residence halls as a living learning community centered on aviation careers. The cohort model works to reinforce desired behaviors and to create a sense of belonging to a professional unit. Development of an aviation-based student community will encourage students to attend UH Hilo from the beginning.

Students in both concentrations in the program will be required to meet the UH Hilo application requirements.

In addition, for admission to the Commercial Pilot Professional Flight concentration include proof of the ability to pass a FAA first-class medical physical examination, administered by a FAA Certified Aeromedical Examiner Physician and documentation of at least one hour of flight time recorded in a pilot's logbook. The medical exam is required to obtain FAA licenses and the flight time is to assure students understand what flying a small aircraft actually entails.

There are no additional admission policies for students entering into the Commercial Aerial Information Technology concentration.

Transfer Policies

The Commercial Aerial Information Technology concentration will interface naturally with UH Community College (UHCC) programs due to common requirements and technology related course offerings in robotics and electronics. In collaboration with Hawai'i Community College, we are planning to offer courses in these fields accessible by both HawCC and UH Hilo students. UH Hilo will also offer a path for interested UHCC students to complete years 1 and 2 of the program concurrently with completion of their Associate Degree by offering the second year content courses of Aviation Safety and Weather online and creating special summer

flight simulator institutes for UHCC students. This will allow UHCC students to seamlessly enter the program in the third year of either concentration.

III. Student Demand

Applied aeronautical sciences programs are not presently offered within the State of Hawai'i. Hawai'i residents who wish to pursue this must leave the state to enroll in an aeronautical science program.

The Aeronautical Sciences degree directly serves a state need for producing commercial pilots for the local commercial aviation industry. It has the potential to attract and retain Hawai'i resident students who currently enroll in more costly aeronautical science programs at other institutions. Students pursuing this concentration to become airline pilots will be able to complete their on-campus coursework in 3 years, making it less expensive than a traditional 4 year degree. This results in an effective discount of $20,000 to $25,000 to the cost of flight school for Hawai'i students from about $75,000 to $50-55,000. The program produces significant cumulative costs savings for residents of Hawai'i of around $250,000 per 10 students annually completing the program, which is roughly 70 percent of the cost of delivering the program. We believe that the cost savings associated with the UH Hilo Commercial Airline Pilot concentration will encourage more local students to pursue higher education here.

There will be similar but smaller cost savings for students following the Commercial Aerial Information Technology concentration. These students will benefit by not having to pay significantly more in out of state tuition to become certified UAS operators with data analysis capabilities. We also feel that because UAS is so strongly interconnected with research applications at UH Hilo, students will receive a more comprehensive education than they might at an university focused solely on aviation.

It is anticipated that twenty students will enroll in the Commercial Professional Pilot Training (CPPT) concentration each academic year, and ten students in the Commercial Aerial Information Technology (CAIT) concentration starting in the fall of 2020. We have projected 50% fewer students in Fall 2019 due to the short time from approval to implementation. Twenty students in the Commercial Professional Pilot Training concentration is a moderate estimate based upon various potential sources of students, and an average of 40 Hawai'i students in comparable Aeronautical Sciences programs in the continental U.S. and the price advantage for enrollment in the proposed program at UH Hilo.

Enrollment (Fall Headcount)	Year 1 19-20	Year 2 20-21	Year 3 21-22	Year 4 22-23
Cohort 1 Pilot	10	7	9*	0
Cohort 1 UAS	5	4	6*	3
Cohort 2 Pilot		20	11	12*
Cohort 2 UAS		10	7	9*
Cohort 3 Pilot			20	11
Cohort 3 UAS			10	7
Cohort 4 Pilot				20
Cohort 4 UAS				10
Totals:	**15**	**41**	**69**	**81**

* Includes addition of 3 articulated UHCC students per concentration in the 3rd year.

We expect to recruit approximately 30 resident students per year into the proposed program, 20 into the Commercial Professional Pilot Training Concentration (CPPT) and 10 into the Commercial Aerial Information Technology concentration (CAIT). The overall numbers are based upon reasonable retention rates similar to UH Hilo's overall rates for this program. In addition, we accounted for 3 community college transfers entering each concentration in the 3rd year.

UH Hilo is currently developing a recruitment strategy for the program which will begin upon BOR approval of the program. The strategy includes developing print material, using of social media, developing articulation agreements with community colleges, visiting local Civil Air Patrol Squadrons (composed of high school students interested in aviation), and visiting Big Island and Oahu High Schools.

Program Cost Savings Compared to Continental U.S. Four Year Degree Programs

One of the primary goals of the Aeronautical Sciences degree is to offer Hawai'i residents a more affordable pathway into aviation related careers. The proposed program will offer significant cost savings over similar programs offered in the continental U.S., as illustrated in the table below.

Estimated 4-Year Cost of Attendance- Student Entering in Fall 2019
Commercial Professional Pilot Training Concentration

	UH Hilo	Embry Riddle Aeronautical U Prescott[2]	Arizona State University[3]	Central Washington University[4]
Flight Instruction	$75,995	$80,000	$82,369	$61,950
Tuition	$22,033	$142,616	$113,344	$86,332
Fees	$1,426	$7,272	$2,872	$7,608
Books and Supplies	$4,482	$5,600	$5,200	$4,008
Meals and Housing	$34,259	$45,576	$52,984	$44,460
Personal Expenses	$13,238	$13,635	$7,928	$7,008
Transportation	$1,939	$11,424	$5,504	$5,040
Loans Fees	$242		$288	
Airfare Transport to/from HI	$1,000	$4,000	$4,000	$4,000
Cost of Attendance for 4 years:	$154,613	$310,123	$274,489	$220,406

The cost of the UH Hilo pilot training program varies between 50% and 70% of similar four year degrees offered on the mainland. A detailed list of costs to students for the proposed UH Hilo pilot training program are provided in the table below. Total four-year costs actually can vary from $121,664 to $159,856, depending upon living arrangements.

Currently ATP flight schools' cost for flight instruction is fixed at: $75,995[5] for an intensive 9 month program which allows students to earn all required FAA licenses. If flight costs at ATP flight schools increase, students will have alternative options as we create articulation agreements with other major flight instruction providers.

[2] https://prescott.erau.edu/admissions/estimated-costs/
[3] https://students.asu.edu/standard-cost-attendance#nonresident
[4] http://www.cwu.edu/financial-aid/2018-2019-cost-attendance
[5] https://atpflightschool.com/airline-career-pilot-program/

Estimated 4-Year Cost of Attendance[6] for Student Living in Residence Halls at UH-Hilo in Years 1-3

	2019-2020	2020-2021	2021-2022	2022-2023 (CPPT)	Total for 4 Years (CPPT):
Flight Instruction				$75,995	$75,995
Tuition	$7,272	$7,344	$7,417		$22,033
Fees	$461	$475	$490		$1,426
Books and Supplies	$1,071	$1,103	$1,136	$1,171	$4,482
Meals and Housing	$8,495	$8,750	$9,013	$8,000	$34,259
Personal Expenses	$3,164	$3,259	$3,357	$3,458	$13,238
Transportation	$464	$477	$492	$506	$1,939
Loans Fees	$78	$81	$83		$242
Total CPPT Concentration:	**$21,006**	**$21,490**	**$21,988**	**$89,130**	**$153,613**
Total for CAIT Concentration:	**$21,006**	**$21,490**	**$21,988**	**$22,499**	**$86,983**

The costs for the Aerial Information Technology concentration are the same as any other 4 year degree offered at UH Hilo. The program will also provide significant cost savings for students who otherwise would be forced to turn to universities at other locations in the U.S. for a similar degree.

IV. Program Resources and Efficiency

The Bachelor of Science degree in Aeronautical Sciences will require approximately $200,000 in new equipment expenses and 3.67 Faculty FTE phased in over 4 years. The faculty positions will either be reallocated or be allocated as new positions to UH Hilo. The current physical facilities at UH Hilo are sufficient to provide office, classroom, and simulator laboratory space for this program.

The request for reallocated or new faculty positions is based upon teaching 18 new courses with a cumulative SSH of 2710 calculated based upon the number of students shown in the enrollment table.

Courses, Sections, SSH (Annual)	Year 1	Year 2	Year 3	Year 4
Projected New Courses	2	4	8	4
Projected New Sections per Course	1	1	1	1
Projected New SSH (added by year)	30	328	1380	972

In year 1, an Instructor with commercial pilot qualifications will be hired to begin teaching developing simulator courses and developing the online weather and safety courses to be offered in year 2. An assistant or

[6] https://hilo.hawaii.edu/financialaid/CostofAttendance1819.php

associate professor in aeronautical sciences will be hired in year 2 to develop the courses for year 3. An educational specialist will also be hired in year 2 to manage the program and to provide more of the time intensive teaching required by the simulator laboratory courses. In year 4, the program plans to add a 0.67 FTE Instructor, who will lead the Commercial Aerial Information Technology concentration. The program's two concentrations will be fully staffed with 3.67 FTE.

Personnel (Instructional)	Year 1 19-20	Year 2 20-21	Year 3 21-22	Year 4 22-23
Projected New Faculty FTE	1.0	2.0	0	.67
Projected FTE Reallocations	0	0	0	0
Projected New Faculty Salaries	80,000	165,000	0	47,000
Cumulative Faculty Salaries	80,000	245,000	245,000	302,000

The 3.67 FTE program personnel will require office space that is easily accommodated on the UH Hilo campus. All members of the Aeronautical Science faculty will serve as mentors and academic advisors to program students.

We have worked with all programs that may be impacted by the implementation of the proposed program and have been assured by the respective program chairs that the proposed program students are welcome in their classes.

The proposed program will require classroom instructional space at UH Hilo for the simulator lab and content courses. At maximum this will be 10 semester hours of classroom space per week for instruction. There is sufficient space to accommodate the classroom needs of the proposed program—even at full capacity. The simulators will require a full time laboratory space, which can be provided.

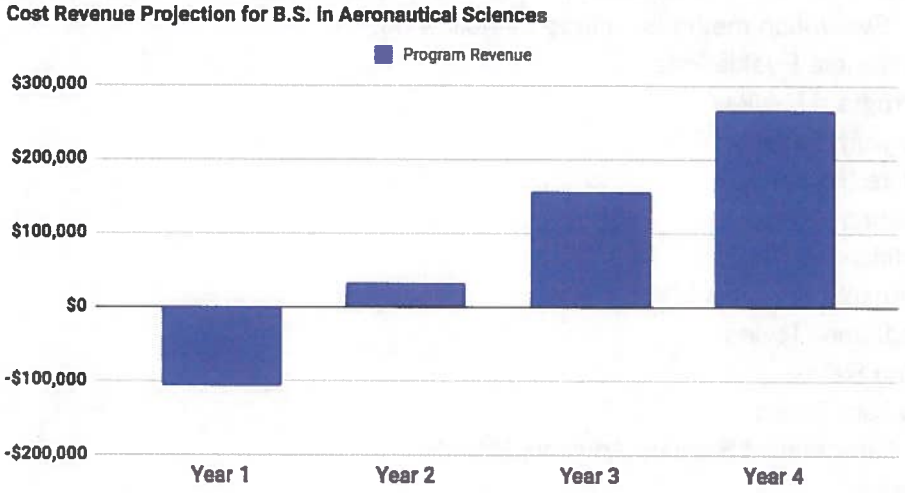
The program plans to purchase 2 CRX open cockpit professional simulators for a total cost of $50,000 each. During the first academic year of implementation, there will be another $20,000 cost to purchase 6 desktop flight simulators to be used by students both during and outside of class hours. The estimated maintenance cost for all simulator equipment is $20,000 annually.

Program Operating Costs (equipment, accreditation, fees, etc)	Year 1 19-20	Year 2 20-21	Year 3 21-22	Year 4 22-23
- 6 Desktop Flight Simulators	$20,000			
- 2 CRX Open Cockpit Simulators	$100,000			
- Simulator Maintenance/Year	$20,000	$20,000	$20,000	$20,000
- UAS Aircraft and Sensors			$80,000	
- UAS Maintenance/Year				$10,000

UH Hilo currently runs a subject certificate in UAS and has fleet of 3 UAS. No additional startup software or peripherals will be required for the Aerial Information Technology concentration in the first two years. In the third year the program plans to purchase 1-2 commercial grade UAS with several different types of sensors (~$80,000). While similar technology does exist on the UH Hilo campus, the existing equipment is paid by and dedicated to research projects and will not be available for teaching. The cost of maintenance is estimated to be approximately $10,000 per year and will begin in year 4.

Funding from the program will initially rely on tuition revenues with support, if necessary, from the UH Hilo reserves. Projected net revenues (tuition less a 12% contribution to financial aid) from tuition demonstrate that the program will be vibrant if we can recruit 30 students along with 6 students from the community colleges in year three. The total student numbers in the enrollment table also include attrition rates appropriate to UH Hilo. This particular model shows sustained net revenues of about $250,000 per year, once the program reaches year 4.

Resources/Funding	Year 1 19-20	Year 2 20-21	Year 3 21-22	Year 4 22-23
Tuition/Special Fund Allocation	$111,000	$306,434	$520,881	$617,554
Budget Shortfall (reserves)	$110,000	$0	$0	$0



Net Revenue	Year 1 19-20	Year 2 20-21	Year 3 21-22	Year 4 22-23
Net Tuition Revenue	$111,000	$306,434	$520,881	$617,544
Total Program Cost	$218,000	$273,500	$363,537	$350,872
Net Revenue	($107,000)	$32,934	$157,344	$266,672

We also ran enrollment multiple models to determine the long term viability of the proposed program. Enrollment of a 20 student cohort with 4 community college transfers produces positive revenues of about $75,000 in year 4. Another model analyzed the results of having 50% of the cohort entering in year three from community colleges, which would significantly reduce UH Hilo revenues. Using a cohort of 24, the program had a net revenue of $30,000 in year 4, without the 4-6 additional community college students included in the other models. The calculated break even point for this program was a cohort of 17 with 3 community college transfers in year 3. Enrollment numbers less than this will result in an unsustainable program that cannot brought forward for permanent status.

V. Program Effectiveness

The Program can partially be evaluated by results of students passing the battery of written and skills tests administered by the FAA prior to awarding of licenses and certificates.

Upon BOR approval, the Bachelor of Science Degree in Aeronautical Sciences is also scheduled to go through the most thorough WSCUC (WASC) substantive change review in order to become an accredited program. We have begun this process, but full review is not slated until February or March of 2018. This review is required because of the very different nature of pilot training compared to programs currently offered at the UH Hilo campus. Additionally, we have been working closely with WSCUC to be able to create a clearly documented procedure for transferring and accepting academic credits from non-academically accredited flight providers.

Many other evaluation methods will be used to measure and demonstrate the quality and effectiveness of the proposed program. Evaluation methods include the following:

- Faculty and Course Evaluations
- Academic Program Review
- External Program Review
- Program Accreditation
- Student Retention Rates
- Student Certification Rates
- Student Internship Supervisor Interviews
- Student Graduation Rates
- Student Hiring Rates
- Student Advisory Board
- Community Aeronautical Science Advisory Board
- Alumni Surveys
- Other Student Learning Assessments

VI. Conclusions

The aviation sector, both locally and nationally, is a source of excellent jobs for residents of Hawai'i. The proposed Bachelor of Science of Aeronautical Sciences program is relatively low cost. By combining a student pool of traditional commercial pilots with students pursuing jobs in the emerging field of UAS, delivery is much more efficient. The Aeronautical Sciences degree fits well within other applied science degrees being offered at UH Hilo and can leverage existing UAS research and supporting programs in remote sensing, GIS, robotics, data science, and STEM fields. There is already a high demand for our faculty and students doing emergency

management, rescue, volcano monitoring, tracking forest health, and agricultural monitoring from both government and private businesses just on Hawai'i Island. In the coming years there will be a moderate need for commercial airline pilots, but an ever increasing demand for UAS pilots that are capable in designing, carrying out, and interpreting aerial surveys within and beyond the State of Hawai'i.

UH Hilo

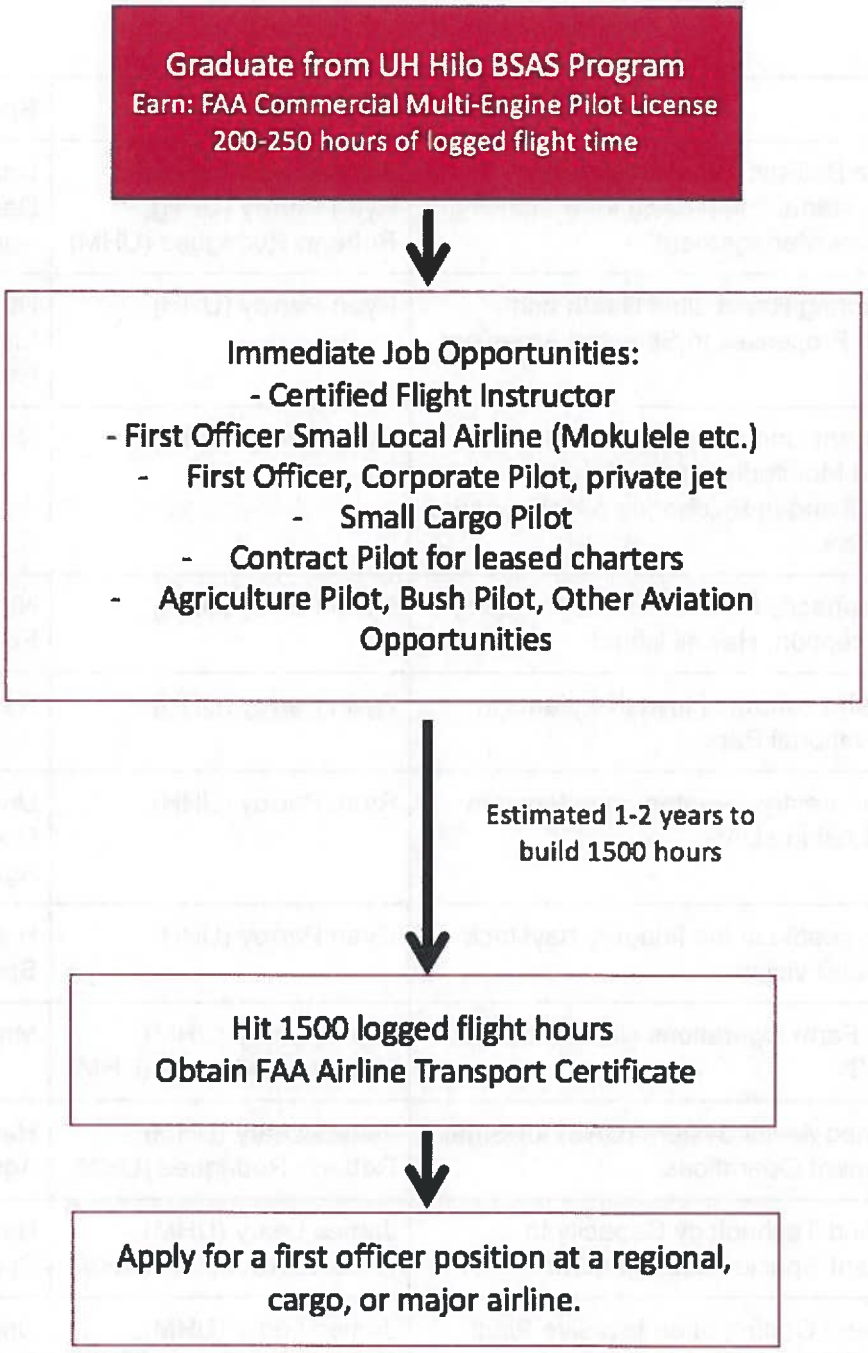
B.S. Aeronautical Sciences

Program Proposal

Appendices

Appendix A

Pathway to Major Airline Employment


Graduate from UH Hilo BSAS Program
Earn: FAA Commercial Multi-Engine Pilot License
200-250 hours of logged flight time
Immediate Job Opportunities:
- Certified Flight Instructor
- First Officer Small Local Airline (Mokulele etc.)
- First Officer, Corporate Pilot, private jet
- Small Cargo Pilot
- Contract Pilot for leased charters
- Agriculture Pilot, Bush Pilot, Other Aviation Opportunities
Estimated 1-2 years to build 1500 hours
Hit 1500 logged flight hours
Obtain FAA Airline Transport Certificate
Apply for a first officer position at a regional, cargo, or major airline.

Appendix B

Unmanned Aerial Systems Research in Progress UH System

Project Title	PI	Sponsor
Integrating Herbicide Ballistic Technology with Unmanned Aerial Systems (HBT-UAS) for enhancing Invasive Plant Species Management	James Leary (UHM), Ryan Perroy (UHH), Roberto Rodriguez (UHM)	United States Department of Agriculture
Detecting and Monitoring Rapid Ohia Death and post-infection Forest Processes in Selected Areas on Hawaii Island	Ryan Perroy (UHH)	Hawaii Department of Land and Natural Resources
Develop and Implement Unmanned Aircraft Systems (UAS) Research and Monitoring at Ala Kahakai National Historic Trail and at Pu'uhonua o Honaunau National Historical Park	Ryan Perroy (UHH)	National Park Service
RAPID: Increasing capacity for data collection during the 2018 East Rift Eruption, Hawaii Island	Ryan Perroy (UHH)	National Science Foundation
Enhance detection and control of invasive plants in Hawai'i Volcanoes National Park	Ryan Perroy (UHH)	National Park Service
A pilot study for agroforestry inventory monitoring in the Marshall Islands using sUAS	Ryan Perroy (UHH)	United States Department of Agriculture
Finding the invasive needle in the imagery haystack via sUAS and computer vision	Ryan Perroy (UHH)	Hawaii Invasive Species Council
Transforming Small Farm Operations with Unmanned Aerial Systems (UAS)	James Leary (UHM), Roberto Rodriguez (UHM)	Maui County
Developing Unmanned Aerial System (UAS) for Small Farm Pest Management Operations	James Leary (UHM), Roberto Rodriguez (UHM)	Hawaii Department of Agriculture
Building Research and Technology Capacity to Support Invasive Plant Species Management	James Leary (UHM), Roberto Rodriguez (UHM)	Hawaii Invasive Species Council
Aerial Surveillance and Control of an Invasive Plant Species in Hawaii's Priority Watershed Forests	James Leary (UHM), Roberto Rodriguez (UHM)	United States Forest Service
Autonomous Control Technology for Unmanned Aerial Systems with Agricultural and Environmental Applications in Central Pacific Islands	Luke Flynn (UHM)	NASA

Appendix C

Letters of Support

Mokulele Airlines

UHM CTAHR

MOKULELE AIRLINES

October 16, 2018

Dr. Marcia Sakai
Interim Chancellor
University of Hawai'i at Hilo
200 W. Kawili Street
Hilo, HI 96720-4091

RE: Aeronautical Science Program, University of Hawai'i at Hilo

I am writing in strong support of the proposed Bachelor of Science in Aeronautical Science (BSAS). This support comes from many perspectives, including being a 1991 BS graduate of Purdue's Aviation and Transportation Technology program and presently serving as President of Mokulele Airlines.

Aviation is absolutely crucial to the economies of our state and the Asian-Pacific region. It is not only the needs of tourism but also the increasing need for timely transport of commerce and perishable agricultural products. Furthermore, there is an increasing need for pilots due to combined impact of retirements and expanding global operations.

The proposed program will allow Hawai'i students and others from Pacific Islands and Island SE Asia to obtain aviation training and a BSAS that is not present in their countries and unlikely to be offered soon. While, students will likely have to leave the state to complete their senior year FAA certifications with an approved flight training provider it will be a better option for most Hawai'i students than spending 4-yrs in a mainland aviation program and provide them with closer ties to local aviation and aeronautical technology industries. Currently, local students who wish to pursue their dreams of being a commercial airline pilot must study on the mainland where out-of-state and private school tuition is high and usually leaves graduates with massive tuition debt beyond the fees for flight training.

Mokulele Airlines would welcome qualified graduates of the BSAS program into its Second in Command (SIC, First Officer Equivalent) program in an effort to assist in professionally developing the next generation of pilots with interest Hawai'i-based careers. The SIC pilots receive a modest stipend for their services while benefiting from industry training and earning the flight time experience necessary to qualify for a non-restricted Airline Transport Pilot (ATP) license and fly for Mokulele or move on to regional jets. The opportunity to provide a pathway from university to industry for future UH Hilo graduates would be an enormous sense of pride for our airline. It is also important for us to share advice and industry perspectives with the next generation.

I enthusiastically support this program and encourage the State Legislature to provide the requisite staffing and budgetary support. Indeed, it is great opportunity for our island, our state and our region.

Sincerely,

Rob McKinney,
President, Mokulele Airlines

P O Box 4409 Kailua-Kona, Hawai'i 96745
www.mokuleleairlines.com

College of Tropical Agriculture and Human Resources
Founding College of the University of Hawai'i
Office of the Dean and Director for Research and Cooperative Extension

UNIVERSITY of HAWAI'I MĀNOA

October 19, 2018

Marcia Sakai, PhD
Interim Chancellor
University of Hawai'i at Hilo
200 W. Kāwili Street
Hilo, HI 96720-4091

Dear Interim Chancellor Sakai:

Dr. Bruce Mathews asked me to evaluate your university's desire to develop a pilot and unmanned aerial vehicle program. As a past private pilot, when my medical certificate was current, I appreciate the work and skill it takes to become a private pilot and go beyond that license.

As the Dean of the College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawai'i at Mānoa, I can look at CTAHR's programs and determine if there is any overlap or conflict. I can tell you that this program would in no way interfere, conflict or cause any level of consternation to CTAHR's plans and future expectations.

Several faculty members in CTAHR use drones in their research, so if students with drone skills wished to go onto graduate school, there may be limited opportunities to continue their studies at the graduate level in those programs.

Thank you for the opportunity to comment.

Sincerely,

NB Comerford

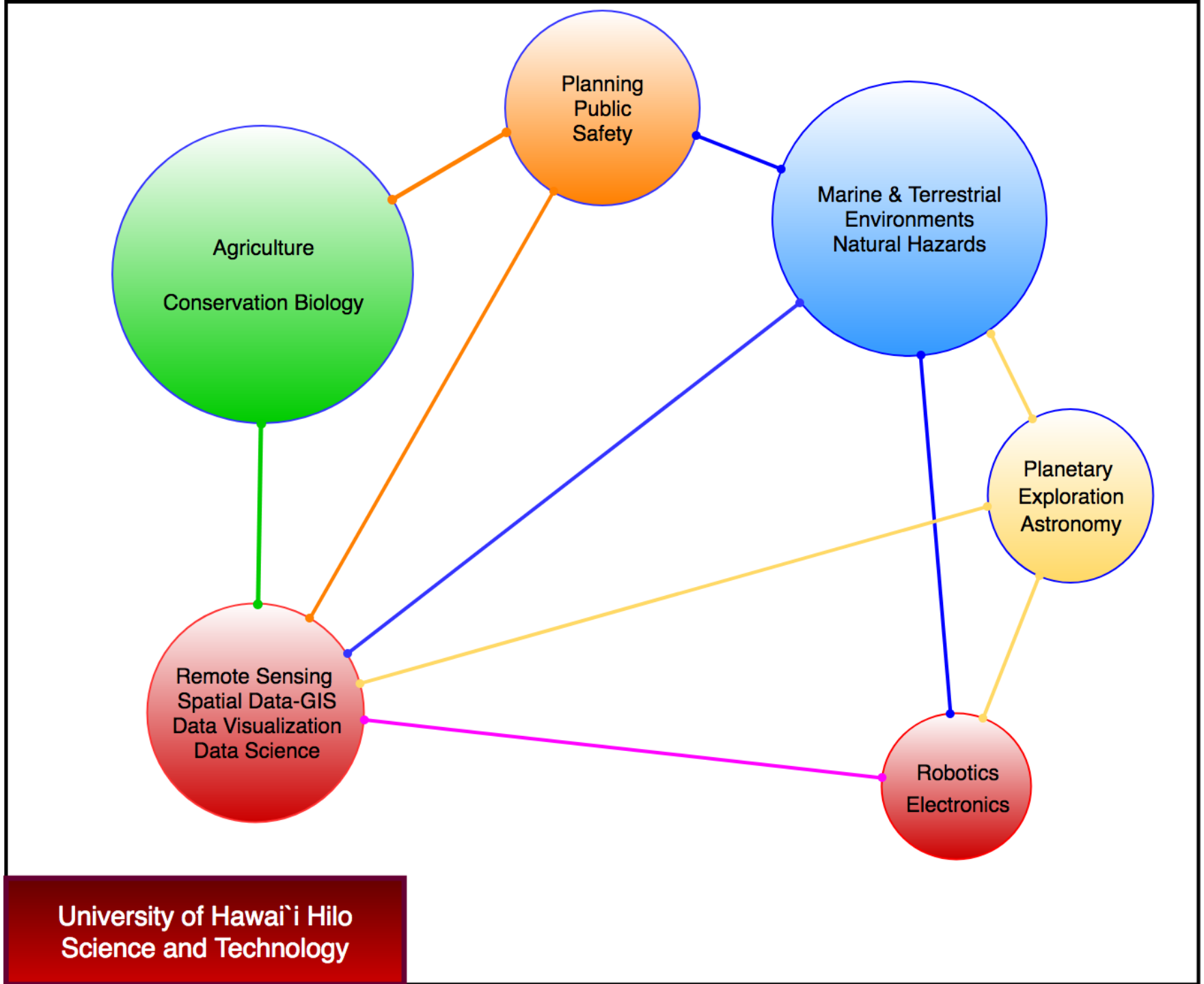
Nicholas Comerford, PhD
Dean and Director for Research and Cooperative Extension

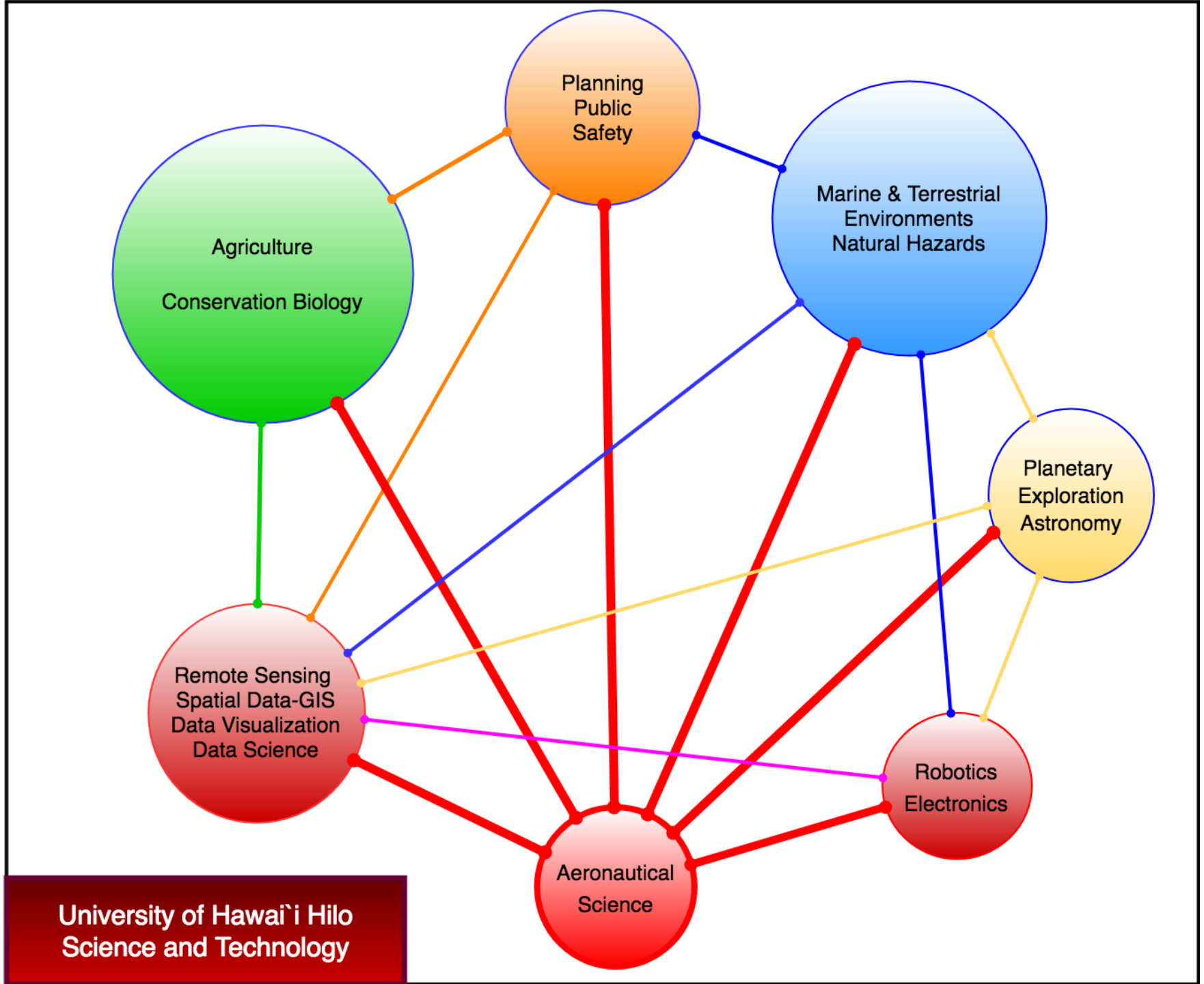
c: Bruce Mathews, College of Agriculture, Forestry and Natural Resources Management, University of Hawai'i at Hilo
Michael Bruno, Office of the Vice Chancellor for Academic Affairs, University of Hawai'i at Mānoa

3050 Maile Way, Gilmore Hall 202 Honolulu, Hawai'i 96822-2271
Telephone: (808) 956-8234, Fax: (808) 956-9105
E-mail: dean@ctahr.hawaii.edu

UH Hilo Strength in applied STEM fields

Toward a 21st Century Technology Hub


Planning
Public
Safety
Agriculture
Conservation Biology
Marine & Terrestrial
Environments
Natural Hazards
Planetary
Exploration
Astronomy
Remote Sensing
Spatial Data-GIS
Data Visualization
Data Science
Robotics
Electronics
University of Hawai`i Hilo
Science and Technology


Planning
Public
Safety
Agriculture
Conservation Biology
Marine & Terrestrial
Environments
Natural Hazards
Planetary
Exploration
Astronomy
Remote Sensing
Spatial Data-GIS
Data Visualization
Data Science
Robotics
Electronics
Aeronautical
Science
University of Hawai`i Hilo
Science and Technology

UH HILO DRONE TEAM
Students & staff in the field at recent lava flow

19151

Office of the Vice Chancellor for Academic Affairs

UNIVERSITY of HAWAI'I® MĀNOA

UNIVERSITY OF HAWAII BOARD OF REGENTS

18 OCT 25 P3:45

RECEIVED

October 24, 2018

MEMORANDUM

TO: Lee Putnam, Chair
Board of Regents

'18 OCT 25 A8:23

VIA: David Lassner
President

UNIVERSITY OF HAWAII
PRESIDENT'S OFFICE

VIA: Donald Straney
Vice President for Academic Policy and Planning

VIA: David Lassner
Interim Chancellor

FROM: Michael Bruno
Interim Vice Chancellor for Academic Affairs
and Vice Chancellor for Research

SUBJECT: APPROVAL OF NEW PROVISIONAL BACHELOR OF SCIENCE IN ENGINEERING SCIENCE AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

SPECIFIC ACTION REQUESTED:
It is respectfully requested that the Board of Regents approve as provisional the Bachelor of Science in Engineering Science in the College of Engineering at the University of Hawai'i at Mānoa.

RECOMMENDED EFFECTIVE DATE:
Effective Fall 2019.

ADDITIONAL COST:
The proposed program will leverage recent strategic investments in the hiring of Engineering faculty and will require additional nominal resources (lecturers) necessitated by an increase in overall enrollment. These investments, which amount to $185,000, are funded through recent allocations from the central administration and reallocations within the College for greater efficiency.

PURPOSE:
The proposed Bachelor of Science in Engineering Science is designed to meet the demand, from students as well as industry professionals, for a more interdisciplinary approach to engineering education. Biomedical Engineering is currently the fifth most popular engineering major nationally, yet no ABET-accredited degree exists within the

2500 Campus Road, Hawai'i Hall 209
Honolulu, Hawai'i 96822
Telephone: (808) 956-8447
Fax: (808) 956-7115

State. Aerospace Engineering is in extraordinarily high demand across the nation, with many aerospace companies across the country, some with offices here in the State. It is anticipated that the local industry here will grow as well, and graduates from this program will be able to help drive that growth.

The proposed program will allow the College and the university to be much more agile and strategic in the development and deployment of ABET-accredited engineering programs in high demand areas. Under this proposed program, students will be immediately enrolled in an ABET-accredited undergraduate degree program. As indicated earlier, the initial program concentrations will be Biomedical Engineering and Aerospace Engineering, two areas where there is high need and demand in the state and across the country.

BACKGROUND:
Pursuant to Board of Regents Policy 5.201: Instructional Programs, "The Board shall approve the establishment of all new instructional programs granting academic credit leading to a degree or credential, upon recommendation by the president."

The UHM College of Engineering offers ABET-accredited undergraduate degrees in Computer Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering. The College also offers the MS and PhD in Civil Engineering, Electrical Engineering, and Mechanical Engineering.

To meet the demands of engineering program curricula for specific degrees, curricula in traditional engineering disciplines typically have little room for breadth outside of engineering. However, innovation often comes from a mixing of engineering with other disciplines, such as life, medical and other sciences. A more interdisciplinary approach to engineering, with greater collaboration with non-engineering disciplines, is highly desirable in engineering education today. The Engineering Science curriculum will be able to accommodate more mixing of engineering and other disciplines, all while allowing the students to graduate from an accredited engineering program.

The proposed BS in Engineering Science complements current engineering degrees by leveraging faculty and curricular resources. In addition, it provides the infrastructure to incubate new degrees in areas that are responsive to state needs and in areas where UHM is positioned to excel. As an example of this approach, the provisionally approved Bachelor of Science in Computer Engineering was initially established as a "computer track" within the BS in Electrical Engineering. Once demand for the degree grew, the Board of Regents approved the stand-alone BS in Computer Engineering in 2010. The degree is now fully accredited by ABET, with enrollment and outcomes that have exceeded projections.

The College plans to have the same success in emerging areas by establishing the Bachelor of Science in Engineering Science as an incubator for new programs. Employers are looking for more and more technologically skilled talent, and there are many opportunities for engineers with a more interdisciplinary background, be that in medical sciences, data analytics, or materials science and engineering and other areas.

The two initial tracks within the degree will be Biomedical Engineering and Aerospace Engineering.

As mentioned earlier, Biomedical Engineering is currently the fifth most popular engineering major nationally, yet no ABET-accredited degree exists within the state. Biomedical engineers are equipped to work in medical fields and are prepared to pursue graduate degrees in the biomedical sciences and medicine. Per Hawai'i Industry Sectors, the average salary is $85,000 (and $135K nationally). It is important to note that this effort is a collaboration with JABSOM, consistent with our strategic approach to encourage more multi-disciplinary, responsive degree programs, unbounded by traditional college and department silos.

Aerospace Engineering, offered in collaboration with the Hawai'i Space Flight Laboratory and the Hawai'i Institute of Geophysics & Planetology (SOEST), will prepare graduates for careers with the many aerospace companies across the country, some with offices here in the State. It is anticipated that the local industry here will grow as well, and graduates from this program will be able to help drive that growth. The average salary for aerospace engineers is $94,000 (and $160K nationally). Again, this program is an example of the multi-disciplinary, multi-college academic programs that we are seeking to encourage.

In the future, the College anticipates developing tracks in other emerging fields, such as cybersecurity and data science. If approved, the College will seek ABET accreditation for the BS in Engineering Science in 2021 (the earliest date possible). Graduation from an ABET-accredited program is required for professional engineering licensure (after gaining work experience).

Per the *Integrated Academic and Facilities Plan* (IAFP), "UH Mānoa must also continue to meet the professional workforce needs of Hawai'i in areas such as education, medicine, nursing, law, business, social work and engineering. Work must continue to integrate education, innovation and scholarship, across disciplines, and to develop the next generation of Hawai'i's leaders." As an interdisciplinary program, the proposed BS in Engineering Science fits within the mission of the IAFP so that we meet the needs of the state and support the development of new industries for Hawai'i's next generation.

The proposed BS in Engineering Science is a priority for UHM as the degree creates the infrastructure for the campus to be strategic and agile in the development and deployment of engineering programs in high demand areas. While UHM offers the only ABET-accredited degrees in the state, Hawai'i students interested in biomedical engineering and aerospace engineering have to attend college on the U.S. continent, which ultimately is a loss for the state as many of these students do not return to Hawai'i. The UHM needs to be positioned to respond better to changes in industry, workforce needs, and student demand. The proposed program is a step towards that goal within the field of engineering. The BS in Engineering Science degree is included our 6-year academic master plan. Other programs included in the plan may be found in the attached document.

Our studies indicate that enrollment will exceed 100 students with an average of 30 graduates/year by the fourth provisional year. The program will utilize recently approved allocations, and reallocated resources from within the College. UHM has invested in the hiring of engineering faculty in high demand areas over the last few years, with two new faculty slated to begin in January and in Fall of 2019. As the program leverages existing courses, we anticipate that new lecturers will be needed to add sections of introductory-level courses to meet demand. The faculty hires were funded through strategic investments from central administration and recent retirements. We will cover the additional lecturers through a reallocation of resources within the College and through the projected increase in tuition dollars as a result of an increase in student semester hours. All engineering students pay a $500 program fee per semester. The fee will also apply to students in the proposed program. Current facilities are sufficient to support the increase in enrollment, which will represent an 8% increase in overall College enrollment.

The proposed Bachelor of Science in Engineering Science represents a new approach in being responsive to changes in industry and needs within the state. Through the establishment of tracks, UH Mānoa is positioned to be both agile and responsible in creating new programs in high demand areas where we are positioned to excel. Further, the proposed tracks in Biomedical Engineering and Aerospace Engineering will meet the immediate needs in the state by preparing future leaders to serve in emerging industries.

ACTION RECOMMENDED:
It is recommended that the Board of Regents approve as provisional the Bachelor of Science in Engineering Science in the College of Engineering at the University of Hawai'i at Mānoa.

Attachments

cc: Executive Administrator and Secretary of the Board Kendra Oishi
Interim Dean H. Ronald Riggs

Program Proposal

Bachelor of Science in Engineering Science

I. Program Purpose and Outcomes

Emerging and innovative technologies are developing and changing quickly, often outside of traditional engineering disciplines. Employers are looking for more and more technologically skilled talent, and there are many opportunities for engineers with a more interdisciplinary background, be that in medical sciences, data analytics, materials science, cybersecurity, and other areas. The BS in Engineering Science will allow students to follow a more interdisciplinary and nimble program than the traditional degree programs in the College of Engineering (CoE) can accommodate.

In addition to allowing for more interdisciplinary engineering education, the program is also designed to serve as an incubator for more targeted engineering degree programs through the development of specialized tracks. The initial program tracks are Biomedical Engineering (BME) and Aerospace Engineering (Aero). If a track is successful in enrollment and in meeting desired outcomes, the College will propose that these tracks become stand-alone degree programs in the future. While ABET, the engineering accreditation organization, recognizes 28 different programs (including Engineering Science); the College currently offers only four.[1] Through the proposed BS in Engineering Science, the College will be equipped to expand strategically our offerings based on student interest, state and workforce need, and our own capacity, allowing UH Mānoa to better compete with engineering programs across the country. In addition to flexibility in program offerings, there is another practical advantage to using this "incubator" approach. It is fairly easy for us to get the engineering science program ABET accredited because there are no specialized program criteria that we need to meet; we need meet only the general criteria that all accredited programs must meet. Hence, regardless of "track", students will graduate from an ABET-accredited program. Once we are ready to establish a specialized program, everything will be in place for it to become ABET-accredited as well, and the transition for the students will be seamless.

Engineering accreditation by ABET requires all programs to have the following student outcomes and to assess rigorously the achievement of these outcomes:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
(3) An ability to communicate effectively with a range of audiences;
(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;

[1] Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering.

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The above outcomes establish what the student will know and be able to do upon completion of the program.

The proposed program is consistent with the *Integrated Academic and Facilities Plan for the University of Hawai'i System*, approved by the Board of Regents on April 20, 2017. This program will help UH attract more high school students locally and nationally. For example, BME and Aero are areas where we already have faculty expertise but no program. BME is the 5th most popular engineering major nationally, with about 40% female students (our current ratio is about 22%, which is consistent with the national average over all engineering majors). Currently, Hawai'i students interested in BME and Aero must go out of state for the degree. These and other tracks will allow students to study more in their areas of interest and still graduate from an ABET-accredited program. As an additional opportunity for students to pursue an engineering degree, this program will also help retention and persistence of enrolled students. Engineering has already established pathways with the UH Community Colleges for transferring students. This new program will strengthen these pathways and create more opportunities for students across the System.

Evidence of Continuing Need for the Program

UH Mānoa offers the only ABET-accredited engineering degrees in the state, and engineering is critical to the continued development of Hawai'i's economy. Society is becoming ever more technological, and the need for engineers is increasing. In addition, engineering is becoming more interdisciplinary, as "engineering" is applied to more and more areas. Biomedical engineering is an example of a fairly recent discipline, especially when compared to the traditional fields of civil, electrical, and mechanical engineering. Over the last 10 years, the number of degrees awarded nationally in those three programs has increased 22%, 4%, and 60%, respectively. During the same time, however, the number of degrees awarded in biomedical engineering has increased 108%. Similarly, aerospace engineering has increased 36%. It is imperative that UH Mānoa adapt to new programs in engineering.

UH Mānoa engineering graduates are hired by large multinational firms, including Boeing, Raytheon, Northrup-Grumman, and Microsoft. Career opportunities are good. An engineering education teaches students to find realistic solutions to practical problems. This is a skill set that is transportable to a number of different fields. Many employers, especially in industries that do not align solely with a traditional discipline, are looking for employees with technical training and they will hire cross-discipline, i.e., they will hire

from multiple disciplines for the "same" job.

Engineering Science, designed as an interdisciplinary program, is broad enough to correspond with a variety of employment categories, and graduates can work in multiple areas. As sustainability considerations in design and operations become more and more required, engineers with special training will be needed, and this program would be able to accommodate a program of study that will fulfill this niche. In addition, graduation from an ABET-accredited program will allow graduates to pursue professional engineering licensure after gaining work experience. As baby-boom engineers retire, there will continue to be a need for new engineers to replace them.

As noted in the beginning, employers are looking for technically skilled workers outside of the traditional disciplines that we currently offer. For example, both Bank of Hawaii and American Savings Bank are interested in engineers with data analytics capabilities. Cybersecurity is another area in great demand in virtually all industries. Tremendous opportunities for engineers with more material science skills exist, as new materials are developed. The demand for engineers with a medical focus is set to explode as medicine becomes ever more technologically based. This program will allow students to focus on new and emerging areas of interest in ways that the traditional programs cannot allow.

Graduates following the BME track in Engineering Science will find opportunities in hospitals, which are in need of trained engineers to deal with the ever-increasingly sophisticated machines used for diagnostics and surgery. These graduates also will be well suited for graduate studies in biomedical sciences and medicine as well. This track is being developed in concert with JABSOM.

The track in Aerospace Engineering has been developed in collaboration with the Hawai'i Space Flight Laboratory and Hawai'i Institute of Geophysics & Planetology (SOEST). In addition to many aerospace companies, some with offices here, UH Mānoa itself may become a center for designing and launching small satellites. This program will be able to supply the technical workforce to support these activities, as well as provide the scientists with the technology they need to do their science.

Engineers with training in emerging areas such as cybersecurity and data science are becoming more and more sought after, including non-engineering industries. For example, we have met with the heads of Bank of Hawaii and American Savings Bank about their interest in engineering graduates, and the former comes regularly to our career fair. The program tracks will be carefully controlled to respond to emerging areas, market needs, and student interest. We anticipate that once the program is established there will be 30-50 graduates per year.

According to Hawai'i Industry Sectors, "Engineering, All Other" (which includes the interdisciplinary Engineering Science degree) has a "bright outlook," with 711 jobs projected in 2018. The average entry-level salary in the state is $96K ($97K nationally), with an overall average salary of $128K (or $153K nationally). For Biomedical Engineering, Hawai'i Industry Sectors projects 34 jobs/year, and over 22,000 nationally.

The average entry-level salary in the state is $65K ($85K nationally), with an overall average salary of $85K ($135K nationally). For Aerospace Engineering, Hawai'i Industry Sectors projects 195 jobs/year, and over 70,000 nationally. The average entry-level salary in the state is $77K ($110K nationally), with an overall average salary of $94K ($160K nationally).

The proposed Engineering Science program is designed to help UH Mānoa keep pace with and better respond to emerging industries and programs of study.

II. Program Organization

The BS degree program requires a minimum of 124 credit hours for the Biomedical Engineering Track and 124 credit hours for the Aerospace Engineering Track.
Students must complete the College of Engineering requirements, which satisfy the University General Education Core Requirements. These courses total 51 credit hours. (A list is available upon request).

Program Requirements: **Biomedical Engineering Track**
Students in the Biomedical Engineering track must complete an additional 73 credit hours:

Biology, Chemistry, Biomedical Engineering (24)

- BIOL 171 + 171L Introduction to Biology (with Lab) (4)
- PHYL 141/141L Human Anatomy and Physiology/Lab (4)
- EE 480 Introduction to Biomedical and Clinical Engineering (3)
- BIOC 241 Fundamentals of Biochemistry (3)
- MICR 361 Introductory Bioinformatics (4)
- ENGR 396 Junior Vertically Integrated Project (3) or ME 481 (4)
- EE 496 Capstone Design Project (3) or ME 482 (3)

Mechanics (13)

- CEE 270 Applied Mechanics I (3)
- CEE 271 Applied Mechanics II (3)
- ME 371 Mechanics of Solids (3)
- ME 311 Thermodynamics (4)

Signal and Systems (18)

- EE 160 Programming for Engineers (4)
- EE 211 Basic Circuit Analysis I (4)
- EE 351/351L Linear Feedback Control Systems/Lab (4)
- ME 375 Dynamics of Machines and Systems and Lab (4)
- ME 402 Dynamics Systems Laboratory (2)

Math (6)

- MATH 302 Introduction to Differential Equations I (3)
- MATH 372 Elementary Probability and Statistics (3)

Core Electives (12, 6 from each of any two of the following core areas):

- *Sensing*
  BE 373 Transport Phenomena (3), BE 420 Sensors and Instrumentation for Biological Systems (3), EE 323 Microelectronic Circuits I (3)
- *Thermodynamics and heat, mass transfer*
  ME 322 Mechanics of Fluids and Lab (4), ME 422 Heat Transfer and Lab (4), ME 423 Mass Transfer (3) ME 360 Computational Methods in Engineering (3)
- *Materials/Manufacturing*
  ME 331 Materials Science and Engineering (3), ME 341 Manufacturing Processes and Lab (4)
- *Medical/Chemistry*
  CHEM 272/272L Organic Chemistry I/Lab (5), CHEM 273/273L Organic Chemistry II/Lab (4), PHYL 142/142L Human Anatomy and Physiology/Lab (4), MICR 461 Immunology (3)

Program Requirements: **Aerospace Engineering Track**

Students in the Aerospace Engineering Track must complete an additional 73 credit hours:

Aerospace, Aeronautics and Astronautics (20)

- ASTR 281 Astrobiology (3)
- ME 418 Power & Propulsion (3)
- ME 419 Astronautics (3)
- GG 460 Geological Remote Sensing (4)
- ME 481 Design Project I (4)
- ME 482 Design Project II (3)

Signal and Systems (18)

- EE 160 Programming for Engineers (4)
- ME 213 Introduction to Engineering Design (3)
- EE 211 Basic Circuit Analysis I (4)
- ME 375 Dynamics of Machines and Systems and Lab (4)
- ME 451 Feedback Control Systems (3)

Mechanics (17)

- CEE 270 Applied Mechanics I (3)
- CEE 271 Applied Mechanics II (3)
- ME 311 Thermodynamics (4)
- ME 322 Mechanics of Fluids and Lab (4)
- ME 371 Mechanics of Solids (3)

Math (9)

- MATH 302 Introduction to Differential Equations I (3),
- MATH 307 Linear Algebra and Differential Equations (3) or
  MATH 311 Introduction to Linear Algebra (3)
- ME 360 Computational Methods in Engineering (3)

Core Electives (9):

- ME 374 Kinematics/Dynamics of Machinery (3),
- ME 422 Heat Transfer and Lab (4)
- ME 404 Computational Fluid Mechanics (3)
- ME 424 Introduction to Gas Dynamics (3)
- ME 471 Experimental Stress Analysis (3)
- ME 473 Vibrations (3),
- ME 492 Special Topics in Mechanical Engineering: Orbital Mechanics (3)
- ME 492 Special Topics in Mechanical Engineering: Aerodynamics (3)
- EE 323 Microelectronic Circuits I (3)
- ME651 Automatic Control (3)
- ME 696 Advanced Topics in Mechanical Engineering: Guidance, Navigation & Control (3).

Notes:

1. All courses currently exist and will be offered regularly.
2. MATH 302 is taught over the summer, which will allow UHCC transfers to still graduate in 4 years.
3. CEE 270 is taught as CE 270 at the UH Community Colleges

Sample curriculum sheets for the Biomedical Engineering and Aerospace Engineering tracks are available upon request.

Because of the requirements of the engineering profession as specified in ABET-accreditation standards, specific training in certain areas of specialty is necessary for a BS degree in engineering, which increases the total required credit hours. Currently, the minimum credit hours required are 124 for the BS in Civil Engineering, 125 for the BS in Computer Engineering, 122 for the BS in Electrical Engineering, and 125 for the BS in Mechanical Engineering.

Admission and Transfer Policies

There is no additional admission policy to the engineering science program other than that of admission to the College of Engineering and UH Mānoa. Requirements for admission to UH Mānoa are described in the UH Mānoa Catalog. High school students applying to the College of Engineering should have completed high school course work including mathematics up to at least trigonometry, with preference for pre-calculus or high school calculus, and one year of high school chemistry and physics with a special emphasis on grades in these courses (B or better preferred). Students are encouraged to take Advanced Placement courses in these subject areas while in high school and to submit AP scores, but this is not required. The College also uses aptitude tests and high school records in its screening procedures.

Students who have not met the admissions requirements directly into an engineering major can enroll as pre-engineering (PREN) students. The College offers advising for PREN students, includes them on the email lists for announcements of College activities and events, and PREN students may register for lower division (100 and 200 level) engineering courses without special overrides, provided they meet the prerequisites.

As the demand for engineers in the State of Hawai'i's workforce continues to increase, the College has been looking at innovative academic pathways for students of all ages and educational backgrounds to obtain the necessary knowledge and course work to graduate with an accredited Bachelor of Science degree in engineering. One such pathway, through a Memorandum of Understanding (MOU), assists students who choose to begin their journey towards an engineering degree at a UH Community College for reasons ranging from tuition considerations to the need for preparatory course work. Freshmen who do not meet the admission requirements are also encouraged to enroll at one of the UH System Community Colleges in order to complete courses or meet grade requirements.

Through the MOU, students who successfully complete the Associate of Science in Natural Science (AS-NS) degree with a Pre-Engineering Concentration at a UHCC may transfer to the UHM College of Engineering with junior status. Transfer students must have completed ENG 100, MATH 241 and 242, PHYS 170/170L, and CHEM 161/161L and 162 or their equivalents and have an overall cumulative GPA of 3.0 or higher. In essence, the MOU provides a 4-year degree plan for engineering students who begin at a UH Community College. Annually, the College accepts 200+ transfer/AS-NS students, and a high percentage of these earn the BS degree, becoming productive members of the State's engineering community.

III. Student Demand

It is envisioned that students who will enroll in the program will include existing engineering students and new students. According to undocumented conversations with local practicing engineers who mentor high school students, there exist a number of students who are interested in pursuing biomedical or aerospace engineering related careers. Because of the lack of such engineering programs at UH, many of these students chose to attend colleges on the mainland and some of them had to select a different major when they eventually chose to attend UH. With the proposed degree program in place, we will be able to attract the students who would otherwise go to the mainland for college.

The College surveyed engineering students to gauge interest in the proposed program. The survey was conducted in four engineering courses, including one sophomore-level required course, two junior-level required courses, and one senior-level elective course. Of the 209 students surveyed, 141 (68%) agreed that they would like to see an Engineering Science major at UH Mānoa. Of the 141 students, 68 indicated that they would be interested in a biomedical engineering track and 64 would be interested in an aerospace engineering track. (The full survey results are available upon request.)

The survey revealed that 68% of the students who responded support the establishment of the new program. Out of the 141 students who are supportive of the program, there were 68 (48%) students expressing interest in the biomedical engineering track and 64 (45%) students expressing interest in the aerospace engineering track. Based on the student response, it can be estimated that around 20% of the 141 students will enroll in the program per year, plus 15 new students per year in the first few years. The estimated

enrollment is about 45. The number is expected to grow as the program becomes more widely known and new tracks are added. With current, recently approved, and reallocated resources, the program will accommodate 150 students.

In addition to new/transfer students, we do expect this program to attract students that might otherwise go to other programs. For example, we anticipate the BME program to be attractive to some students that are interested in medical school. It will be excellent preparation for that (a surprising number of physicians have a connection to engineering, either having started in engineering or even having graduated in it). Should they not get into medical school, they will have a degree that will prepare them well for the workforce. In addition, some may choose to stay in engineering rather than medical school.

Enrollment *(fall headcount)*	**Previous Years**			**Current Year**	**Projected Years**			
	2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Projected: BS in Engineering Science					45	80	95	115
Engineering Undergraduates	1,336	1,357	1,359	1,351	1,371	1,401	1,436	1,470
Engineering Graduate Students	138	135	125	130	140	145	150	160
Degrees Awarded *(per year)*								
Projected: BS in Engineering Science Degrees						10	30	30
Engineering Undergraduate Degrees	243	275	260	265	270	280	310	315
Engineering Graduate Degrees	54	40	45	48	54	60	65	70

IV. Program Resources and Efficiency

UH Mānoa invested in several strategic hires over the last few years that have increased faculty expertise in the College to support the proposed program. As a result, faculty in the College are already active researchers in the areas to be included in the program, with additional faculty hires in biomedical engineering and aerospace engineering approved[2]. The proposed program leverages and takes full advantage of courses currently offered in the College as well as in the College of Natural Sciences, the School of Ocean & Earth Science and Technology, and the John A. Burns School of Medicine. For BME, JABSOM was part of the planning process. They have agreed to allow students in the program to take the following courses: PHYL 141/141L, PHYL 142/142L, BIOC 241. Their faculty will also be

[2] A new faculty member in biomedical engineering begins in January 2019. We have approval to initiate a search for a new hire in aerospace engineering; that person is anticipated to begin in Fall 2019. Both hires are in the ME department.

involved in the capstone design projects. Similarly, for Aerospace we worked with the Hawai'i Space Flight Laboratory and the Hawai'i Institute of Geophysics & Planetology (SOEST). Researchers in these units have been very interested for some time in partnering with Engineering because of their need for more engineers focused on this area. They will be offering GG 460 and will be involved in the capstone design projects.

With the current course inventory and recent strategic hires, we are able to accommodate the projected increase in enrollment. Should enrollment increase beyond the projections, lecturers may need to be hired. These will be funded in part using the increase in tuition and fee revenue, and internal reallocations. It should be noted that the campus planning has Engineering growing to 1600 undergraduates in 5 years, which is a growth of about double of what this program is expected to bring (i.e., this program is projected to contribute somewhat less than 50% of that growth). Hence, we are well within the campus plans for engineering.

Initially, the program will be run out of the dean's office. We have a tenured assistant specialist who will help run the program. Ultimately, the program may join an existing department, or if it's wildly successful it could become a standalone department but that is far into the future. All courses and faculty are existing, and so teaching assignments and sections do not change. The ME and EE departments will share in the tuition funds derived from the students in the program proportionally to the enrollment in the respective courses of the departments.

All undergraduate students in Engineering pay a program fee of $500 per fall/spring semester after the freshman year. The program fee will apply to students in the proposed BS in Engineering Science as well. Program fees support regular lab and equipment upgrades as well as lecturers and teaching assistants in the College in support of the labs.

The Department of Academic Services advises all undergraduate students in the College (including pre-majors), and current staff levels are sufficient to support the proposed program.

CURRENT ACADEMIC PERSONNEL	Current Year
Current Faculty FTE	52.25
Current Faculty Salaries ($)	$6,203,869
Current Lecturers ($)	$65,798
Current Graduate TAs	21

PROJECTED ACADEMIC PERSONNEL	Current Year	Projected Years				
	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Projected New Faculty FTE	1	1	0	0	0	0
Projected New Faculty Salaries ($)	$90,000	$95,000	0	0	0	0
Projected New Lecturers ($)	0	0	0	0	0	0
Projected New Graduate TAs	0	0	0	0	0	0

The College is funded through an allocation of tuition/special funds, general funds, summer

session allocations, and program and course fees, as indicated below. Extramural awards totaled $3.9M (2017-18). The proposed program will both increase the efficiency of current resources and generate additional tuition revenue and program/course fees, especially insofar as it attracts students that would otherwise choose a university on the U.S. continent.

CURRENT RESOURCES/FUNDING	Current Year
Tuition/Special Fund Allocation	$2,475,575
General Fund Allocation	$7,436,291
Summer Session Allocation	$86,973
Program/Course Fee Allocation	$1,067,500

While the courses required for the program currently exist, we anticipate the need for additional sections of core courses as enrollment grows. The new faculty hires, existing lecturer pool, and tuition allocations will be sufficient to meet these needs, especially as student semester hours increase.

COURSES, SECTIONS, STUDENT SEMESTER HOURS (SSH) *(Annual)*								
	Previous Years			Current Year	Projected Years			
	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Projected New Courses	*n/a*	*n/a*	*n/a*	0	0	0	0	0
Projected New Sections	*n/a*	*n/a*	*n/a*	0	1	1	0	0
Projected New SSH	*n/a*	*n/a*	*n/a*	0	60	214	514	701
Current Courses Offered	221	228	106	225	225	225	225	225
Current Sections Offered	414	428	198	422	422	423	424	424
Current Annual SSH	21,651	22,644	11,008	22,260	22,464	22,814	23,201	23,401

The projected enrollment for this program is less than 8% of the current enrollment in the College. In addition, some portion of these students are anticipated to come from existing programs. As such, the new program will not put an additional or unmanageable burden on our facilities. Indeed, there is even possibility of it alleviating some of the demand. It is anticipated that some students will want to work with JABSOM and SOEST faculty for their capstone design projects; insofar as those students then work in the labs of those faculty it will reduce the demand on engineering facilities.

There is no other ABET-accredited engineering program that is similar at any UH campus. For the biomedical engineering track, the closest program is the biological engineering program in CTAHR. ABET classifies biological engineering and biomedical engineering as two distinct engineering majors with their own program criteria. The biological engineering program in CTAHR is focused on the design, production, and operation of engineered systems of which a major component is living organisms. The proposed biomedical engineering track emphasizes training in engineering and medical sciences for healthcare. There is no significant overlap between the two programs.

V. Program Effectiveness

The Engineering Science program will be evaluated using the assessments used by the Department of Electrical Engineering and the Department of Mechanical Engineering with appropriate modifications for the Engineering Science program. The Departments have the following assessments:

Course assessments: Every semester, the Department administers a student survey of all EE courses to determine the effectiveness of the course and its instructor. It also administers a student survey to determine the effectiveness of the course in achieving educational program outcomes. The curriculum linkages to program outcomes are available upon request.

Industrial Advisory Board: Both Departments have an Industrial Advisory Board made up of representatives from industry. They provide feedback from employers of our graduates about the undergraduate program. The board meetings are held regularly and cover an overview of the program including laboratory tours, and meetings with students. The Board provides a written report about the program to the Department.

Senior Project Report Assessments: The Engineering Science program will require a 3-credit senior project course, which is the capstone design course. The quality of a sample of projects is assessed every semester.

Performance Rubrics on EE/ME Courses: The Departments have implemented an assessment process of measuring the performance of students over a collection of EE/ME courses. The courses cover the student learning outcomes. The instructor for the course does the evaluation.

We will also survey our graduates to determine where they get their initial employment after graduation.

College of Engineering will apply for the Engineering Science program to be accredited by ABET, which is the national accreditation organization for engineering programs. Demonstrating effective assessment of student performance and a process for continuous improvement is a major part of achieving accreditation. The estimated earliest date for ABET accreditation is 2021. Curriculum maps used to indicate relationship of courses to program outcomes are available upon request.

VI. Conclusion

In summary, there is strong evidence of the need of an ABET-accredited, interdisciplinary engineering degree program at University of Hawai'i at Mānoa. As emerging technologies develop and change quickly, often outside of traditional engineering disciplines, this program will allow us and students to adapt more quickly than traditional programs. There are many employment opportunities for engineers with a more interdisciplinary background.

The planned tracks in Biomedical Engineering and Aerospace Engineering will not only provide additional educational opportunities to the students in Hawai'i, they will also attract more students nationally and internationally. The new program will provide engineers with necessary technical skillsets for the booming industry in healthcare and aerospace in Hawai'i, and thus will contribute to the state economy. Current resources and recent allocations are sufficient to ensure the successful launch of this program as well as secure accreditation in the near future.

The proposed BS in Engineering Science provides the infrastructure necessary for UH Mānoa to be more agile and strategic in launching new engineering programs that meet state and national need, particularly in areas where we are positioned to compete and to excel.

Current Academic Programs (as of October 2018)		
UH Mānoa		
College/Department/Division and Degree Program	**Approved Degrees**	**Future plans for the next 6 years (indicate progam action and planned year, for new degrees, indicate ATP year)**
College of Arts and Humanities		
American Studies	PhD, MA, BA	
Art	MFA, BFA, MA	
Art History	MA	
Communicology	MA, BA	
Creative Media	BA	BFA under consideration
Dance	MFA, MA, BFA, BA	
History	PhD, MA, BA	
Interdisciplinary Studies	BA	
Music	PhD, MMus, MA, BMus, BA	
Philosophy	PhD, MA, BA	
Religion	BA	
Religion (Asian)	MA	
Theatre	PhD, MFA, MA, BA	
College of Social Sciences		BA in Global Studies (ATP 2018/19)
		AA/BA/MA in Criminology/Criminal Justice (ATP 2018/2019 in collaboration w/ HonCC)
		BA/MA in Social Sciences (ATP 2019)
Anthropology	PhD, MA, BA	
Communication/Journalism	MA, BA	
Communication & Information Sciences (joint w/CNS, Shidler & Social Sciences)	PhD	
Economics	PhD, MA, BA	
Ethnic Studies	BA	
Geography	PhD, MA, BA	

Political Science	PhD, MA, BA	
Psychology	PhD, MA, BS, BA	
Public Administration	MPA	BA in Public Policy (Proposal 2019)
Sociology	PhD, MA, BA	
Urban and Regional Planning	PhD, MURP	
Women's Studies	BA	
College of Natural Sciences		BS in Data Science (ATP 2018/19); Professional MS in Data Science (ATP 2018/19)
Astronomy	PhD, MS, BA	
Astrophysics	BS	
Biochemistry	BS, BA	MS, PhD in Biochemistry (ATP 2020)
Biology	BS, BA	
Botany	PhD, MS, BS, BA	If life sciences departments (Biology, Botany and Microbiology) merge, graduate programs may be reorganized as well.
Chemistry	PhD, MS, BS, BA	
Communication & Information Sciences (joint program w/Natural Sciences, Shidler & Social Sciences)	PhD	
Computer Science	PhD, MS, BS	
Ethnobotany	BS	Stopped Out for termination.
Information and Computer Sciences	BA	
Library and Information Science	MLISc	
Marine Biology (graduate programs joint with SOEST)	PhD, MS, BS	BA in Marine Biology (ATP 2018/19)
Mathematics	PhD, MA, BS, BA	
Microbiology	PhD, MA, BS, BA	See Botany note regarding graduate programs in life sciences.
Molecular Cell Biology	BS	
Physics	PhD, MS, BS, BA	

Zoology	PhD, MS, BS, BA	BA/BS in Zoology: Stopped out for termination; See Botany note regarding graduate programs in life sciences.
College of Languages, Linguistics and Literature		
Chinese	BA	
Classics	BA	
East Asian Languages & Lit (Chinese)	PhD, MA	The three MA programs and three PhD programs (CHN, JPN, KOR) to merge into a single MA and single PhD in 2019/20
East Asian Languages & Lit (Japanese)	PhD, MA	The three MA programs and three PhD programs (CHN, JPN, KOR) to merge into a single MA and single PhD in 2019/20
East Asian Languages & Lit (Korean)	PhD, MA	The three MA programs and three PhD programs (CHN, JPN, KOR) to merge into a single MA and single PhD in 2019/20
English	PhD, MA, BA	
French	MA, BA	
German	BA	
Japanese	BA	
Korean	BA	
Linguistics	PhD, MA	
Philippine Language and Literature	BA	
Russian	BA	
Second Language Studies	PhD, MA, BA	
Spanish	MA, BA	
Hawai'inuiākea School of Hawaiian Knowledge		PhD in Hawaiian Knowledge (ATP 2019)
Hawaiian	MA, BA	MA in Hawaiian Education (ATP 2019)
Hawaiian Studies	MA, BA	
School of Pacific and Asian Studies		
Asian Studies	MA, BA	Professional Master's in Asian International Affairs (Proposal 2019)
Pacific Islands Studies	MA, BA	

School of Ocean and Earth Science and Technology		
Atmospheric Sciences	PhD, MS, BS	
Geology	BA	
Geology and Geophysics	PhD, MS, BS	
Geoscience for Professionals	MGEO	MGEO: Stopped out for possible termination.
Global Environmental Science	BS	
Marine Biology (joint w/Natural Sciences)	(PhD), (MS)	
Ocean & Resources Engineering	PhD, MS	Considering a bachelor's degree.
Oceanography	PhD, MS	
Shidler College of Business		
Accounting	MAcc, BBA	
Business Administration	PhD, MBA	
Communication & Information Sciences (joint w/Natural Sciences & Social Sciences)	(PhD)	
Entrepreneurship	BBA	
Finance	BBA	MS in Finance (Proposal 2018)
General Business	BBA	
Human Resource Management	MHRM, BBA	
International Business	BBA	
Management	BBA	
Management Information Systems	BBA	MS in Information Systems (Proposal 2018)
Marketing	BBA	MS in Marketing (Proposal 2018)
School of Travel Industry Management		
Travel Industry Management	MS, BS	
College of Education		
Athletic Training	MS	
Curriculum Studies	MEd	
Early Childhood Education	MEd	
Education	PhD	
Education (Teaching)	MEdT	
Educational Administration	MEd	
Educational Foundations	MEd	

Educational Psychology	PhD, MEd	
Elementary Education	BEd	
Kinesiology and Rehabilitation Science	MS, BS	
Learning Design and Technology	PhD, MEd	
Professional Educational Practice	EdD	
Secondary Education	BEd	
Special Education	MEd	
College of Engineering		BS Construction Engineering (Proposal 2019); BS in Engineering Science (Proposal 2018)
Civil Engineering	PhD, MS, BS	
Computer Engineering	BS	
Electrical Engineering	PhD, MS, BS	
Mechanical Engineering	PhD, MS, BS	
College of Tropical Agriculture and Human Resources		
Animal Sciences	MS, BS	
Fashion Design and Merchandising	BS	
Biological Engineering	MS, BS	MS Biological Engineering: Stopped out for termination.
Dietetics	BS	
Entomology	PhD, MS	
Environmental Management	MEM	
Food Science	MS	
Food Science & Human Nutrition	BS	
Human Development and Family Studies (formerly Family Resources)	BS	Considering MS with focus on Asian and Pacific Islander or multicultural families.
Molecular Biosciences and Bioengineering	PhD, MS	
Molecular Biosciences and Biotechnology	BS	
Natural Resources & Environmental Management	PhD, MS, BS	
Nutrition	PhD	
Nutritional Sciences	MS	

Plant and Environmental Protection Sciences	BS	Stopped out for termination.
Tropical Agriculture and the Environment	BS	Formerly BS in Tropical Plant & Soil Sciences. Program merged Plant & Environmental Sciences and Tropical Soil Sciences undergraduate programs.
Tropical Plant & Soil Sciences	PhD, MS	
Tropical Plant Pathology	PhD, MS	
School of Architecture		Bachelor of Architecture (ATP 2020) -- 5 Year professional degree
Architecture	DArch	
Landscape Architecture	MLA	
Environmental Design	BEnvD	
William S. Richardson School of Law		
Law	JD, LLM	
Juridical Science	SJD	
John A. Burns School of Medicine		JABSOM, in collaboration with UH West Oahu, discussing new undergraduate degree in the health sciences.
Biomedical Sciences	PhD, MS	
Biomedical Sciences (Tropical Medicine)	PhD, MS	
Cell and Molecular Biology	PhD, MS	
Clinical & Translational Research	MS	
Communication Sciences and Disorders	MS	
Developmental and Reproductive Biology	PhD, MS	
Epidemiology	PhD	
Medical Technology	BS	
Medicine	MD	
School of Nursing and Dental Hygiene		
Dental Hygiene	BS	
Nursing	PhD, MS, BS	
Nursing Practice	DNP	
Myron B. Thompson School of Social Work		

	Public Health	PhD, DrPH, MPH, MS, BA	DrPH: Stopped out for termination.
	Social Work	MSW, BSW	
	Social Welfare	PhD	