UNIVERSITY of HAWAIʻI

LEEWARD COMMUNITY COLLEGE

Authorization to Plan

Associate in Science (A.S.) Degree in Natural Science with a concentration in Biological Science, Physical Science, or Engineering

Date of Proposal: Spring 2011
Proposed Date of Implementation: Fall 2011
AUTHORIZATION TO PLAN (ATP) AN ACADEMIC PROGRAM (Revised 06/12/07)

Please complete all sections with an emphasis on items 7, 8, 9 and 10. The ATP is not to exceed 5 pages.

1. School/College and Department/Unit: Leeward Community College, Math/Science Division

2. Chair/Convener of Planning Committee: Michael Reese

3. Program Category: X New ___Modified ___ Interdisciplinary


4b. List similar degrees or certificates offered in UH System:
   AS-NS at Kapi‘olani Community College
   AS-NS at Maui College

   The existing AS in Natural Sciences degrees at Kapi‘olani CC and at Maui College each contain essentially the same requirements as found in the proposed Leeward CC AS in Natural Sciences degree. The Kapi‘olani AS degree has two pathways, Life Science and Physical Science. The proposed Leeward CC AS degree as presently conceived also contains those two pathways as well as an Engineering pathway, each with requirements appropriate to that field of study and directly comparable and equivalent across campuses.

5. Planning

a. Planning Period: Spring 2011 and Summer 2011

b. Activities to be undertaken during the planning phase

   • Convene AS-NS Committee including STEM faculty, other faculty, and counselors. Submit Authorization to Plan.
   • Summer 2011: Develop program proposal for AS-NS degree. Complete research on related programs, student need and success, resource requirements, revenue model, and implementation plan. Vet with appropriate campus groups.
   • Summer/Fall 2011: Submit AS-NS proposal to the Curriculum Committee, Faculty Senate, Vice-Chancellor for Academic Affairs, Chancellor, Council of Chief Academic Officers, and to the Board of Regents.

c. Submission date of program proposal: Spring 2011 with implementation in Fall 2011.
d. Workload/budget implications during planning period: May entail some summer overload for 9 month faculty involved in project.

6. Program Description (Objectives and relationship to campus mission and strategic plan)

Description
The proposed AS-NS Degree will offer pathways for STEM (Science, Technology, Engineering, and Science) students planning to transfer to baccalaureate degree programs. The proposed AS-NS Degree for Leeward Community College will be very similar to the AS-NS currently offered by Kapi'olani Community College and Maui College.

The curriculum will require a minimum of 60 credits of 100 and 200 level courses as specified below. Courses required for the degree must have a minimum 2.0 grade point average (GPA).

General Education Requirements 23 - 26 credits
  Foundation 13 credits
  Diversification 10 - 13 credits
Additional Program Requirements 6 - 7 credits
Concentration Requirements 5 - 13 credits
  Life Sciences 5 credits
  Physical Sciences 13 credits
  Engineering 13 credits
Natural Science Electives 14 - 22 credits
Focus Requirements
  2 Writing Intensive courses (WI)
  1 Hawaiian/Asian Pacific (HAP)

Objectives
The AS-NS Degree will:

i. Facilitate articulation and transfer agreements between Leeward Community College and STEM programs at UH Manoa, UH Hilo, and other baccalaureate institutions.

ii. Provide pathways for students pursuing a STEM baccalaureate degree.

iii. Allow Leeward CC to identify, count, track and target STEM students for resource allocations, accreditation needs, and assistance to improve student success.

iv. Provide an Associate degree option for STEM transfer students.

Relationship to Campus Mission

The AS-NS degree aligns with the Leeward CC campus mission because it will provide
• access to broader post-secondary education in Hawai‘i by providing open-door opportunities for students to enter quality educational programs within their own communities,
• effective teaching of remedial/developmental education, general education, and other introductory liberal arts, pre-professional, and selected baccalaureate courses and programs, and
• the trained workforce needed in the State, the Asia-Pacific region, and internationally by offering occupational, technical, and professional courses and programs which prepare students for immediate and future employment and career advancement.

Relationship to Strategic Plan
The proposed AS Degree will directly address three of the five major goals of the UHCC Strategic Plan 2002-2010, Updated 2008-2015.

GOAL A: Promote Learning & Teaching for Student Success

B. Hawaii’s Educational Capital - Increase the educational capital of the state by increasing the participation and completion of students, particularly low-income students and those from underserved regions.

B5. Increase by 3% per year the number of students who successfully progress and graduate, or transfer to baccalaureate institutions, while maintaining the percentage of transfers who achieve a first year GPA of 2.0 or higher at the transfer institution.

GOAL B: Functions as a Seamless State System

B. Address critical workforce shortages and prepare students for effective engagement and leadership in a global environment.

1. Increase by 3% per year the number of degrees awarded, and/or transfers to UH baccalaureate programs that lead to occupations where there is a demonstrated State of Hawai‘i shortage of qualified workers, or where the average annual wage is at or above the U.S. Average.

3. Increase by 6% per year degrees/certificates awarded in Science Technology, Engineering, and Math (STEM) fields.

GOAL C: Promote Workforce and Economic Development

C. Contribute to the state’s economy and provide a solid return on its investment in higher education through research and training.

1. Increase by 3% per year the level of extramural fund support expended.
7. Program Justification (Needs and Rationale. Include, as appropriate, internal and external factors driving need for this program; description of needs assessment; number of interested student per year; need for such a program in relation to workforce development, graduate studies, etc.)

STEM students at Leeward Community College pursuing a baccalaureate degree are not served well by the A.A. degree offered. The Leeward Community College A.A. Degree has Diversification requirements in excess of those found in the General Education requirements of UH Manoa, including 1 Arts/Humanities/Literature, 1 Social Science, and 1 Natural Science. While this has served the typical Humanities student well by requiring more diversity, only the one Natural Science class is required of baccalaureate STEM students. The two extra A/H/L and SS classes only serve to add additional requirements on their pathway to a four-year institution and a baccalaureate STEM degree.

In addition, a student completing all of their Diversification requirements during their first two years of study is not bringing the additional skills they have obtained to these classes later in their academic career, as is more typical at a four-year institution.

The number of students who have or are attending Leeward Community College and then go on to obtain a baccalaureate STEM degree is unknown, however the enrollment in Chem 161B and 162B; Math 205, 206, 241, and 242; Physics 171 and 272; Biol 171 and 172; and Chem 272 and 273 can be seen as evidence of students at Leeward pursuing a four-year STEM degree since none of those classes are required for Leeward’s AA degree and all are required for a four-year STEM degree.

**Leeward Community College Academic Years 2006 – 2010**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>171</td>
<td>15</td>
<td>40</td>
<td>30</td>
<td>36</td>
<td>39</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>172</td>
<td>14</td>
<td>9</td>
<td>10</td>
<td>5</td>
<td>7</td>
<td>45</td>
</tr>
<tr>
<td>BIOL Total</td>
<td></td>
<td>29</td>
<td>49</td>
<td>40</td>
<td>41</td>
<td>46</td>
<td>205</td>
</tr>
<tr>
<td>CHEM</td>
<td>161B</td>
<td>89</td>
<td>102</td>
<td>94</td>
<td>106</td>
<td>97</td>
<td>488</td>
</tr>
<tr>
<td></td>
<td>162B</td>
<td>37</td>
<td>42</td>
<td>33</td>
<td>34</td>
<td>44</td>
<td>190</td>
</tr>
<tr>
<td>CHEM Total</td>
<td></td>
<td>126</td>
<td>144</td>
<td>127</td>
<td>140</td>
<td>141</td>
<td>678</td>
</tr>
<tr>
<td>MATH</td>
<td>205</td>
<td>122</td>
<td>140</td>
<td>127</td>
<td>153</td>
<td>155</td>
<td>697</td>
</tr>
<tr>
<td></td>
<td>206</td>
<td>90</td>
<td>76</td>
<td>64</td>
<td>64</td>
<td>75</td>
<td>369</td>
</tr>
<tr>
<td>MATH Total</td>
<td></td>
<td>212</td>
<td>216</td>
<td>191</td>
<td>217</td>
<td>230</td>
<td>1,066</td>
</tr>
<tr>
<td>PHYS</td>
<td>272</td>
<td>13</td>
<td>21</td>
<td>16</td>
<td>16</td>
<td>10</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>430</td>
<td>374</td>
<td>414</td>
<td>427</td>
<td></td>
<td>2,025</td>
</tr>
</tbody>
</table>
The unduplicated headcount of such students has risen from 261 in 2006 to 301 in 2010.

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>261</td>
<td>304</td>
<td>254</td>
<td>278</td>
<td>301</td>
<td>1,398</td>
</tr>
</tbody>
</table>

In addition, Leeward has a strong record of producing successful pre-engineering students who transfer to UH Mānoa and other institutions. Since 1981 between 5% and 10% of the graduates of the UH Mānoa’s College Of Engineering (CoE) and at least one graduate of the University’s College of Tropical Agriculture and Human Resources’ (CTAHR) Biological Engineering program, have taken some or all of their freshman and sophomore STEM and liberal arts coursework at Leeward CC. For example 7.8% of the CoE’s graduating class of the Fall 2009 semester, took their freshman and sophomore courses at Leeward CC.

Through this new AS-NS degree, the college will prepare students with a strong STEM background to enter baccalaureate degree programs to meet the increasing demands in many STEM fields, including Biotechnology, Marine and Environmental Sciences, Engineering, and others.

In 2005 the faculty of Kapi’olani Community College noted these same issues, stating that “The absence of a STEM AS degree impacts the growth of coherent, strong, and diverse STEM offerings and the success of our students in STEM.” Kapi’olani Community College instituted the AS-NS degree Program in Fall 2007. The faculty of Maui College followed with a similar AS-NS degree in 2009.

8. Description of Resources Required

a. Faculty (existing and new FTEs): The Math/Science Division currently has 14 full-time faculty and 14 lecturers teaching 55 Natural Science classes appropriate for this degree. No new permanent faculty will be required although additional lecturers may need to be hired based on demand. There is a total of 37 full-time faculty and 26 lecturers teaching science and math classes in the Math/Science Division. This includes many remedial and complimentary science and math classes necessary to offer an AS in Natural Sciences degree.

b. Library resources (including an evaluation of current resources and an estimate of the cost of additional resources required): No new resources are required.

c. Physical resources (space, equipment, etc.): The current physical resources are adequate.

d. Other resources required (staff, graduate assistantships, etc.): None anticipated.
9. **Five-Year Business Plan. Provide a five-year projected budget for the program that includes:**

   a. **Annual costs to implement the program**
      As this program uses already existing courses, financial impact should be minimal.

   b. **Projected enrollment and estimated tuition revenue**
      Enrollment projections are based on the current number of students taking STEM classes. We could anticipate at least 25 degrees awarded each year but that number may be as high as 100.

   c. **How will be program be funded?**
      No additional funds are requested, as the program will utilize existing courses. Additional sections of courses, if required, should be offset by tuition.

   d. **Does the current or proposed budget (Department/College/Campus) include funds or a request for funds for the proposed program?** Please provide details.
      No funds are requested, however if there are modest costs they will be offset by tuition and fees.

   e. **Given a “flat budget” situation, how will the proposed program be funded?**
      Not applicable

   f. **Mini Cost Revenue Template (Excel; top of next page)**
      Cost template assumes 8 credits of additional instruction would be required in the second and third year and 16 credits of additional instruction would be required in the fourth and fifth year. If all AS-NS students are drawn from other majors, the costs and revenue be zero.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PROGRAM COSTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Faculty w/o fringe</td>
<td>0</td>
<td>$12,448</td>
<td>$12,824</td>
<td>$26,416</td>
<td>$39,624</td>
</tr>
<tr>
<td>Other personnel costs w/o fringe</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment/Supplies</td>
<td>0</td>
<td>$400</td>
<td>$400</td>
<td>$800</td>
<td>$1,200</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL Expenses</td>
<td>0</td>
<td>$12,848</td>
<td>$13,224</td>
<td>$27,216</td>
<td>$40,824</td>
</tr>
</tbody>
</table>

*Faculty costs based on a Lecturer B pay rate, per credit hour: $1556 (AY 2012-2013), $1603 (AY 2013-2014), $1651 (AY 2014-2015). No UHPA contract beyond 2015, so AY 2014-15 pay rate will be used.

<table>
<thead>
<tr>
<th>REVENUES</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected Enrollment</td>
<td>0</td>
<td>40</td>
<td>40</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>No. of Courses</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>No. of Credits</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>SSH</td>
<td>0</td>
<td>160</td>
<td>160</td>
<td>320</td>
<td>480</td>
</tr>
<tr>
<td>Tuition Rate/Credit</td>
<td>0</td>
<td>$99.91</td>
<td>$102.91</td>
<td>$105.99</td>
<td>$109.17</td>
</tr>
<tr>
<td>Total Revenue from Tuition</td>
<td>0</td>
<td>$15,986</td>
<td>$16,469</td>
<td>$33,917</td>
<td>$52,402</td>
</tr>
<tr>
<td>Other Sources of Income</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL Revenues</td>
<td>0</td>
<td>$15,986</td>
<td>$16,469</td>
<td>$33,917</td>
<td>$52,402</td>
</tr>
</tbody>
</table>

UHCC Resident Tuition Rate Per Credit Hour: $97 (AY 2011-2012) in a 4 credit, 20 capped class. No tuition change has been announced beyond 2012, so a 3% increase, per year, will be used for revenue projection purposes.

10. Impact on current courses or programs.

As ICS 101 is a required course of the proposed AS degree, there should be an increased demand for that course, with as many as three extra sections a semester being offered by 2014. An increase of one section of the following courses a semester should also be expected by 2014: Math 135, Math 140, Chemistry 161, and Chemistry 162. An increase of students in the proposed AS degree is not anticipated in the first year, as that year will provide the time to recruit students into the program.

Related to that projection, the AS degree may slightly decrease the number of students taking 1 DA/DH/DL course and 1 DS course; that is with the assumption that those same students would be pursuing an AA degree rather than transferring to a baccalaureate degree granting institution without Leeward’s AA degree.
11. If this program is multidisciplinary, provide evidence of commitment for support from the colleges, departments, programs, and/or individuals expected to participate.
Not applicable
Reviewed by: *(The ATP has completed the campus approval process prior to review by Council of Chief Academic Officers)*

**Campus Chief Academic Officer:**
Comments and Recommendations:

<table>
<thead>
<tr>
<th>Print Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

**Council of Chief Academic Officers (System wide Consultation):**
Comments/Recommendations:

<table>
<thead>
<tr>
<th>Print Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

**Chancellor:** ___ Approved  ___ Disapproved

<table>
<thead>
<tr>
<th>Print Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

*(Final signed copy is provided to the Vice President of Academic Planning and Policy for Program Action Report)*