MEMORANDUM

TO: Reed Dasenbrock
   Vice Chancellor for Academic Affairs

FROM: Kristin Kumashiro
      Interim Dean, College of Natural Sciences

SUBJECT: Request for a Modification to the 45 Upper Division Credit Requirement for BS Botany degree

December 21, 2015

Please find attached a request for a modification to the 45 upper division credit requirement for the BS Botany degree. We are requesting a waiver of nine credits, for a total of 36 upper division credits.

This request is in conjunction with a separate request to modify the requirements for the BS Botany degree. The proposal restructures and reduces the number of required credits for the major and allows students increased flexibility in selecting courses for both their major and overall degree requirements.

If you have any questions regarding this proposal, please contact Lynne Higa (x64744; lynnheig@hawaii.edu).

APPROVED / DISAPPROVED: ______________________ Effective Date: ________________

Reed Dasenbrock
Vice Chancellor for Academic Affairs

Date

cc: Lynne Higa, College of Natural Sciences
    Alison Sherwood, Botany
MEMORANDUM

To: Reed Dasenbrock, Vice Chancellor for Academic Affairs

From: Alison Sherwood, Chair, Department of Botany

Via: Kristin Kumashiro, Interim Dean, College of Natural Sciences

Subject: Request for a modification of the 45 upper division credit requirement for the Botany BS degree

Date: December 21, 2015

Please find attached a request for a modification of the 45 upper division credit requirement for the Botany BS degree. We believe students in this degree program would be better served by a 36 upper division credit requirement, as outlined in the attached document. Please let us know if you have any questions.

APPROVED / DISAPPROVED

Reed Dasenbrock  
Vice Chancellor for Academic Affairs
Request to modify the 45 upper division credit requirement to 36 upper division credits for the Botany BS degree

The Department of Botany is requesting a modification of the 45 upper division credit (UDC) requirement in a similar spirit to that recently requested by the Departments of Chemistry and Biology for their degree programs, which was approved by the Mānoa Faculty Senate on 05/07/2014. It was indicated in a footnote on the final page of the document from the College of Natural Sciences that other programs, such as Botany, may be requesting a similar exemption in the future. This request is in conjunction with a proposal to modify the requirements for the BS Botany degree that is currently in the curriculum review and approval process (this revision is being concurrently submitted as a separate memo).

Like students in the degree programs of Biology and Chemistry, those in the Botany BS are affected by having a large number of required science courses at the 100- and 200- levels, which makes it impractical for students to complete 45 UDCs, especially if staying in line with the recommended total 120 credits and a degree completion time of four years. In addition to allowing students to complete their Botany BS in a timely manner, a modification of the 45 UDC requirement will provide consistency in the total number of credits required for degree programs across these units of the College of Natural Sciences. The Botany BS degree currently requires 123 total credits, with little to no flexibility.

Recent graduates and current majors do not meet new requirement. An analysis of graduates of the Botany BA and BS degree programs from 2008-2015 (Table 1) indicates that 63.6% of single-degree graduates had obtained fewer than 45 UDCs (compared with 62% in the Biology and Chemistry programs at the time of their analysis). Furthermore, 56.4% of all Botany BA and BS graduates had fewer than 45 UDCs, indicating that Botany students are currently unable to meet the 45 UDC requirement given their 100- and 200-level science course requirements.

Table 1. Survey of credits completed by Botany Graduates from Fall 2008 - Spring 2015

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>&lt;45 UDCs</th>
<th>&gt;45 UDCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Graduates</td>
<td>39</td>
<td>22 (56.4%)</td>
<td>17 (43.6%)</td>
</tr>
<tr>
<td>Single Degree Recipients</td>
<td>33</td>
<td>21 (63.6%)</td>
<td>12 (36.4%)</td>
</tr>
<tr>
<td>(excluding those with minors/certificates)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entered as Freshmen (i.e., excluding transfers)</td>
<td>9</td>
<td>2 (22.2%)</td>
<td>7 (77.8%)</td>
</tr>
<tr>
<td>Entered as Freshmen (i.e., excluding transfers), excluding minors and certificates</td>
<td>5</td>
<td>1 (20.0%)</td>
<td>4 (80.0%)</td>
</tr>
</tbody>
</table>
Additionally, although the percentage of graduates reaching the 45 UDC requirement was better for students who entered as freshmen (77.8-80%), the proportion of students in these categories is very low (28%, or 11 out of 39), and the majority of recent graduates would not have met the 45 UDC requirement.

Much like students in the Biology and Chemistry undergraduate programs, coursework required for the Botany BS major is sequential and interdisciplinary in nature. Botany BS students must take a series of required 100- and 200-level courses in the sciences (Biology, Chemistry, Physics and Math), which means they have a large amount of required lower-division coursework to complete before being able to proceed to their upper division courses in Botany. Fig. 1 illustrates these course relationships for the first five semesters of study, outlining courses that are required before a student starts taking upper division courses in the major. This coursework entails 50 credits total of 100-level (25 credits) and 200-level (25 credits) courses. An additional semester of study is required if a student does not place into MATH 215 or CHEM 161 in their first semester.

**Fig. 1. Revised Botany BS sequence of lower division courses in BIOL, BOT, CHEM, MATH, and PHYS (full course names and catalog descriptions for relevant courses to the BS major are included at the end of Appendix 1 of the proposed revision to the degree).**
The OVCAA approved the College of Natural Sciences’ request to delay implementation of the 45 UDC rule for all undergraduate degree programs until Fall 2014. (http://www.hawaii.edu/uhmfs/documents/2013_14/20140507_Delay%20UpperDiv%20Cr%20Rule.pdf; attached as Appendix 1). The Departments of Biology and Chemistry jointly submitted a request for a modification to the 45 UDC requirement at a point in time when CNS undergraduate degree programs were still required to complete 60 NI credits. As such, they requested a combination of 25 UD credits / 35 lower division credits based on analyses of student records and a review of their degree programs. This request was approved by the Mānoa Faculty Senate on 05/07/2014 (http://www.hawaii.edu/uhmfs/documents/2013_14/20140507_motion_naturalsciences.html; attached as Appendix 2).

However, in contrast to the 25 UDC / 35 major-related lower division credit option for students in Biology and Chemistry undergraduate degree programs, students following the proposed revision to the Botany BS program would be better served by a **36 UDC credit requirement** (Table 2), and which is much closer to the current 45 UDC requirement.

**Table 2. Summary of upper division credits under the proposed revision to the Botany BS degree (data summarized from four-year plan).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Required upper division credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>0</td>
</tr>
<tr>
<td>Year 2</td>
<td>0</td>
</tr>
<tr>
<td>Year 3</td>
<td>8</td>
</tr>
<tr>
<td>Year 4</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
</tr>
</tbody>
</table>

The proposed changes to the Botany BS degree will give students 27 required upper division credits. Students should easily be able to reach a total of 36 upper division credits – with most elective courses being three credits, the three elective courses will add up to nine credits. Ten elective credits are included in the proposed four-year plan, which would allow students to achieve 37 upper division credits.

Thus, in conjunction with the proposed revisions to the Botany BS degree, we request that students in the Botany BS degree program be granted a waiver of the 45 UDC requirement, to be substituted with a **36 UDC requirement**.
MEMORANDUM

TO: Reed W. Dassenbrock
Vice Chancellor for Academic Affairs

FROM: William L. Ditto
Dean, College of Natural Sciences

SUBJECT: Request to Delay Implementation of the 45 Upper Division Credit Rule

February 6, 2012

We have conducted a study that finds that 45% of students graduating with degrees in the College of Natural Sciences in a recent two-year period did not earn 45 upper division credits. We believe that implementation of the new rule would significantly impact our students and adversely affect graduation rates and time-to-graduation.

The problem is caused in part by the structure of the curriculum in the natural sciences. I had already planned to conduct a major review of the curriculum in the college. Such a review now seems in order 1) to evaluate the possibility of changes that could alleviate the impact of the upper division credit rule, and 2) to determine if such changes can be sufficient to allow our students to meet a 45 upper division credit requirement. In order to prevent the impact of the new rule on students entering in the fall of 2012 and in order to coordinate any curriculum changes identified in the review with the new rule, I propose a delay in the application of the upper division credit rule for students in the College of Natural Sciences.

I request that implementation of the graduation requirement for 45 upper division credits be delayed for a period of two years for students in the College of Natural Sciences while we conduct a review of our curriculum and degree requirements.

1/8/12

until Fall 2014

02-08-2012

Reed Dassenbrock
Vice Chancellor
for Academic Affairs

C: VC Francisco Hernandez
AVC Ron Cambra
AVC Alan Yang
Diane Nakashima, UHM Catalog Office
Lisa Imai, Records
Lisa Fujikawa, General Education Office
Gary Rodwell, Undergraduate Education
Registrar Stuart Lau
Financial Aid Director Jodie Kuba
Council of Academic Advisors
Appendix 2.

I. Statement of Problem

After examination of student records and review of our own degree programs, the Biology and Chemistry Departments have found that the new graduation requirement of 45 upper-division (UD) credit hours seriously jeopardizes the timely progress-to-degree for our ~1400 majors.

II. Background & History

The new graduation requirement of 45 UD credit hours took effect in Fall 2012,\(^1\) after discussion by various groups, including CAPP.\(^2\) The 45 UD requirement replaced the (requirement of) 60 non-introductory (NI) credit hours, due largely to non-uniformity of the NI designation and difficulties in implementation that were associated with the complicated interpretation of the requirement. The implementation of the 45 UD credit requirement coincided with the change in total credits from 124 to 120.

The College of Natural Sciences was granted a 2-year exemption from the 45 UD requirement for its majors, because several of our faculty voiced concerns about the change in its proposal stages. The exemption period was granted to assess the situation for our majors and to provide for adjustments that should be made. This document summarizes the results of our assessment and proposes alternatives that will foster student success, as it relates to the matter of the 45 UD requirement.

III. Summary Highlights of Biology & Chemistry Departments' Joint Evaluation of Majors, Graduates, and Programs:

1. Recent graduates and current majors do not meet new requirement. The academic records of recipients of undergraduate degrees in Biology (BA Biology, BS Biology, BS Marine Biology) and Chemistry (BA Chemistry, BS Chemistry) were examined for the 3-year period that encompasses AY 2010-2011, 2011-2012, and 2012-2013, as illustrated in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Survey of Biology and Chemistry Graduates from 2010-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Graduates</td>
</tr>
<tr>
<td>2. Single Degree Recipients (incl. those with minors)</td>
</tr>
<tr>
<td>3. Single Degree Recipients (excl. those with minors)</td>
</tr>
<tr>
<td>4. Entered as Freshmen (i.e., excl. transfers)</td>
</tr>
<tr>
<td>5. Entered as Freshmen, Single Degree</td>
</tr>
</tbody>
</table>

\(^{1}\) UHM Academic Policy MS.520, "Upper Division Credit Requirement", effective Fall 2012

\(^{2}\) http://www.hawaii.edu/uhmfs/documents/resolutions/201012_CAPP_Motion%20on%2060%20non-intro%20course%20credit%20requirement.pdf
III. Summary Highlights (cont'd):

2. The majority (~60%) of Manoa students who graduated with one degree would not have met the 45 UD requirement (Table 1, Items 2-3). Holding a minor only slightly improved these numbers, which is reasonable, given that the great majority of minor requirements are often lower-division courses.

We also included the question of how this rule would impact transfer students. During this period, there were 308 graduates in Biology and Chemistry, but only 129 of them entered Manoa as freshmen (Table 1, Item 4). The overall trend shows that the typical transfer student would have a slightly poorer outcome. Again, however, the majority of Biology and Chemistry graduates – across the board – do not have enough UD credits upon graduation to meet this requirement.

Finally, we note that these averaged data obscure more troubling results for a given, single year. In AY 2012-2013, there were 20 students who graduated with a BA or BS in Chemistry, of which only 5 (25%) had completed 45 or more credit hours of UD courses. Of these five students, four held a 2nd major, leaving only one single-degree recipient out of the entire year's Chemistry graduates who earned more than 45 UD credits.

3. The analysis of degree requirements across campus highlights the features of our program that prevent most of our majors from earning 45 UD credits in a timely fashion.

In a striking contrast to the great majority of other majors on the Manoa campus (for whom the 45 UD credit requirement is not a problem),

- Biology and Chemistry majors must take a sequence of 100- and 200-level courses in 3 or more areas in the first 2 years. The Biology and Chemistry degrees call for a broad foundation in the sciences and math, requiring coursework in 3-4 areas (Chemistry, Biology, Math, Physics):  
  - The courses in each of these areas are sequential. With the exception of 1st-year BIOL, the courses in each of 3-4 areas must be taken in-sequence & not concurrently.
  - Each sequence runs for 1-2 years, with a net credit count that accounts for most of the first 2 years. E.g., the BS in Chemistry requires 22, 11, and 9 LD credit hours in 100- and 200-level courses in CHEM, MATH, and PHYS, respectively, for a total of 42 LD credit hours. After these foundation courses are completed, then the student must take an additional 27 UD credits in CHEM courses. In contrast, the BA in Communicology requires a total of 33 credit hours, of which only 3 are LD (COMG 251, which does not have a specific course prerequisite). Similarly, the BA Psychology major will take 9 credit hours of required pre-major LD courses (PSY 100, 212, 225), and he/she may also take one LD course in a "foundation area". All remaining major requirements for the BA in Psychology are UD, and there are no implicit or explicit requirements for courses in other departments.
III. Summary Highlights (cont’d):

- These sequences provide the necessary foundation for the respective majors and are prerequisites for courses within and across disciplines. E.g., the 1st semester of calculus must be completed before the 2nd semester of calculus and also before the 1st semester of physics. Figure 1 illustrates these relationships for the BA/BS Chemistry track. Similar prerequisite networks are also found at the higher level. E.g., CHEM 351 (Physical Chemistry I) requires the completion of at least 3 semesters of chemistry, a year of calculus-based physics, and 3 semesters of calculus.

![Diagram](image)

**Figure 1. CHEM Major's Sequence of LD Courses in CHEM, MATH, PHYS**

- Biology and Chemistry majors cannot take most, if not all, UD courses (major-required or elective) before their 3rd year. Our majors spend most of their first 2 years taking the core sequences in the math and sciences, so they do not take the 300- and 400-level courses, until their junior and senior year.

- Biology and Chemistry majors have little room for the UD elective courses, particularly if the time-to-degree goal of 4 years is retained. The student must take the major-required sequences in the first two years (all LD), and then he/she will take the major-required UD courses in the 3rd and 4th year, leaving the balance of the "space" in the 4-year plan to tackle the campus-wide requirements (diversification, focus, foreign language, etc.), many of which are not UD. In fact, there is very little room in the 4-year plans for the UD electives that are needed to meet the 45 UD minimum. The constraints lead to the next problem,

- Biology and Chemistry majors will find that the only way to earn the 45 UD credit hours would be to lengthen their time-to-degree. This solution is universally unacceptable, as we strive to reduce the average time-to-degree. Also, this "solution" flies in the face of the motivation behind reducing the total credit load from 124 to 120 credits. Here, we also note that the time-to-degree for Chemistry majors is 5-5.5 years, well beyond the benchmark.
III. Summary Highlights (cont’d):

- Biology and Chemistry majors were never jeopardized by the 60 NI rule, because many of the courses in the foundation sequences are/were NI. Many other UHM programs were able to make a seamless transition & have no problem with the rule, but the basic structure of our programs – with significant credit loads at the LD level – forms the basis of this new problem.

4. The Chemistry and Biology degrees meet national standards and/or are comparable to other institutions’ programs. The degree requirements for our undergraduate degrees were compared to similar ones nationwide, and there are no significant differences. Specifically, we found that the content of our respective programs are consistent with those of other programs. In some cases, the consistency is marked by a certification by a national organization. E.g., the B.S. in Chemistry is certified by the American Chemical Society, the largest professional society for chemists in the US.3

We note that the level of a particular course might vary from one institution to another. E.g., 2nd- semester organic chemistry might be a 200-level course at UHM, but it is a 300-level course elsewhere, even though the content of the courses is roughly identical.

IV. Consideration of Previously Proposed Changes

Prior to Fall 2012, numerous suggestions were made to address the perceived (now real) problem that faced our majors. We considered all of these options, as follows

- “Should we renumber some of the required LD courses to the 300-level?” Answer: NO.
  The renumbering of, esp., 200-level courses to the 300-level to “shift” some of the credits to the upper level was suggested. However, the great majority of our LD CHEM and BIOL courses are also taught at the community colleges, so renumbering would create many new problems with articulation, among other considerations.

- “Should we increase the number of major-required UD courses? Answer: NO.
  We have already shown that the content of the Biology and Chemistry programs is consistent with what is taught at other colleges and universities. Thus, there is no substantiated need to add upper-level courses to address, e.g., a lack of rigor.

- Should we decrease the number of major-required LD courses?” Answer: NO.
  The time needed to cover the foundations of chemistry, biology, math, or physics appear to be roughly consistent with what is done elsewhere, so existing classes cannot be removed from the lower-level requirements without severe negative impact on our students’ preparedness for the upper-level coursework.

3 Degree certification information found at the URL: http://www.acs.org/content/dam/acsorg/show/governance/committees/training/acsapproved/degreeprogram/2008-acs-guidelines-for-bachelors-degree-programs.pdf
V. Proposals for Consideration

Based on our extensive study, we request that CAPP and the Manoa Faculty Senate consider and approve one of 3 alternatives to the 45 UD requirement.

1. Combination of 25 UD & 35 major-required LD credits as an option:

   "To earn a baccalaureate degree, students must complete either a minimum of 45 upper-division credits or a combination of no fewer than 25 upper-division and 35 major-required lower-division credits."

     Programs that do not have problems with the 45 UD requirement are unaffected. For degree programs such as the ones offered by Biology and Chemistry, the typical undergraduate’s course load in the various 100- and 200-level classes across multiple departments is accommodated. The "35-25" breakdown was determined by evaluation of our current and past students' records. It is also roughly consistent with the 60 NI requirement that was previously in place (i.e., 35 + 25 = 60). With this option, all but two of our recent BA CHEM majors would have graduated, and the two who did not meet the 25 UD requirement would have needed only 1 more 3-credit UD lecture course to meet the requirement.

2. Continuation of 60 NI credits as an alternative:

   "To earn a baccalaureate degree, students must complete a minimum of either 45 upper-division credits or 60 NI credits."

   This proposed alternative allows us to continue to apply the 60 NI requirement, which poses no problems for the Biology and Chemistry majors. However, if related policies and procedures have not changed since Fall 2012, then the recurrence of record-keeping (and other) problems that were experienced in the past should be expected.

3. Exemption for all Biology and Chemistry programs:

   "To earn a baccalaureate degree, students must complete a minimum of 45 upper-division credits. Exemptions are granted for all degrees offered by the Biology and Chemistry programs. Future exemptions are given on a case-by-case basis."

   This proposed alternative grants an exemption for all degrees in Biology (BA Biology, BS Biology, BS Marine Biology) and Chemistry (BA Chemistry, BS Chemistry, BA Biochemistry, BS Biochemistry), based on the information contained herein. It does not, however, apply to any other current or future program, so a similarly structured program will need to seek separate approval. It is conceivable that a new program in the basic sciences may share some key features with the various programs described here, particularly in newer areas that are cross-disciplinary in nature. For that reason, it may be preferable to use option (a) or (b).

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*This exemption may be requested for all or other Natural Sciences programs, such as Botany and Physics, pending the outcome of their respective analyses.*