1. Put the “Women & Leadership in Engineering and Applied Sciences” program online.

Background:

Women & Leadership in Engineering and Applied Sciences was implemented in fall 2014 and fall 2015, and it was in response to findings from the Women in Engineering Mentoring Network (WEMN) program implemented since fall 2010 as a result of STEP IB. Women & Leadership in Engineering and Applied Sciences” compliments and supplements WEMN.

ENGR 4950, “Women & Leadership in Engineering and Applied Sciences,” is a one-credit hour seminar class adapted from other Women In Science and Engineering (WISE) programs in the U.S. Each week of ENGR 4950 features a speaker who is either a female alumni of the College of Engineering and Applied Sciences, a female CEAS faculty, or a women leader in STEM (Science, Technology, Engineering and Applied Sciences). The topics addressed each week deals with the challenges and the opportunities facing women in engineering and applied sciences, with each speaker offering success strategies and life examples. With consent of the speakers, the presentations, including discussions, have been captured on videos.

Each ENGR 4950 student is assigned an e-Mentor who is a CEAS women alumna, and the students are provided with a structured mentoring experience that is realized through a series of question-and-answer (Q&A) correspondences between the mentor and the mentee, and responses to reading materials. Students gave very positive evaluation of ENGR 4950 as evidenced by course surveys, by the richness of the correspondences between mentors and mentees, and by the responses to reading assignments. ENGR 4950 has been offered in fall semesters only, and it has served about 20 students each year.

In order to double the impact of ENGR 4950, we propose to create an online ENGR 4950 to be offered in spring semesters, beginning in spring 2017, in addition to the fall semesters.

Justification

In Year 7 No-Cost Extension, we will create a digital library of the 11 speakers who have presented in 2014 and 2015, and record five additional speakers in fall 2016. The speaker’s videos will anchor the online ENGR 4950 in spring semesters, and in fall semesters to be used when a speaker has to cancel due to illness, scheduling conflict or weather conditions.

Other course materials such as the reading materials and Q&A’s assignments between mentors and mentees, are already available on WMU’s Desire-to-Learn e-learning platform.

Scale-Up and Sustainability

Our goal is to enroll 50 first-time first-year female students per year, which would involve 75-100% of new incoming female CEAS students. ENGR 4950, both the traditional and the online version, will be sustained, through workload reassignment of CEAS faculty and administrators.

Budget: $3480 = $20/hr [(4 hrs * 11 videos) + (4hrs * 5 videos)] + $2200 for computer for video editing)
2. Sophomore Experience on Career Development

Background

The Sophomore Experience on Career Development was implemented in 2014-15 and 2015-16 in response to comments from our alumni with the goal of helping the CEAS students improve the skills set necessary to compete for and be successful in landing an internship. In the pilot year (2014-15), 22 students enrolled in the Sophomore Experience on Career Development. This was a biweekly, 14-session seminar course which met for 50 minutes throughout the entire 2014-15 academic year. In 2015-16, the curriculum and course materials were revised, and the 14-session program is being offered in one semester on a weekly basis at two different days/times. Twenty-five students enrolled in fall 2015 and 30 have registered for spring 2016. The students are incentivized to participate in the Sophomore Experience with a $100 book scholarship if they satisfactorily complete all the assignments of the program and with perfect attendance. Students who participated in the Sophomore Experience on Career Development do not receive academic credit and pay no tuition. The course materials are available on Desire-to-Learn, WMU’s e-Learning platform. Formative assessment of the class shows high student satisfaction. From the pilot group, 80% obtained an internship after participation in the program. Of students in the fall 2015 group, 97% of students went on at least one interview for an internship and as of this writing 47% have already obtained internship after participation in the program (more details).

Justification

To triple the impact of the Sophomore Experience, we propose to develop the curriculum and course materials for a hybrid online course for a Certificate Program on Career Development. The curriculum development, including the online and the face-to-face components, will be completed in collaboration with the WMU Extended University Program, which provides resource and expertise for online program and courses development campus-wide. We will also create the structure or outline and the fee structure of a Certificate program.

Scaling-Up and Sustainability

The goal of the Sophomore Experience on Career Development is to enroll 125-150 sophomores per year or 30-40% of the sophomore population in CEAS. Sustainability of the program will be achieved through the program fee, and the sharing of resources between the WMU Career and Student Employment Services, CEAS, and teams of industries that are currently recruiting and employing our students as summer or year-around interns.

Budget: Stipend and tuition = $21,441 for one full-time calendar year Graduate Assistant to work with EUP to create the hybrid online course and to teach a pilot section.
3. Develop and Implement a 1-2 credit hour engineering mathematics course focusing on the application of Pre-Calculus in engineering.

Background

- In fall 2012, CEAS instituted an admissions requirement in which students taking Algebra II must achieve a grade of B or higher in no more than two attempts to proceed in CEAS. STEP-EXEP cohorts were created in fall 2013 in which students in a cohort took the same 2-to-3 courses (Algebra II, First-Year Seminar) together. In fall 2014, ENGR 1002, a 1 credit-hour recitation on the use of Algebra II in engineering, was added to the cohort schedule. The STEP-EXEP and ENGR 1002 impacts on the CEAS-EXEP students is summarized in Table 1 below, and it shows increasing number of students passing Algebra II (grade ≥B) above the baseline year.

<table>
<thead>
<tr>
<th>CEAS-EXEP</th>
<th>Total # Students</th>
<th>Avg. ACT-MATH</th>
<th>Standard Deviation</th>
<th># Alg II ≥B 1st Attempt</th>
<th># Alg II ≥B 2nd Atpt.</th>
<th>Total # Alg II ≥B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2012</td>
<td>62</td>
<td>21.1</td>
<td>1.5</td>
<td>17 (27.4%)</td>
<td>7 (11.3%)</td>
<td>24 (38.7%)</td>
</tr>
<tr>
<td>Fall 2013</td>
<td>79</td>
<td>20.0</td>
<td>3.9</td>
<td>29 (36.7%)</td>
<td>12 (15.2%)</td>
<td>41 (51.9%)</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>90</td>
<td>21.7</td>
<td>1.4</td>
<td>45 (50.0%)</td>
<td>10 (11.1%)</td>
<td>55 (61.1%)</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>82</td>
<td>22.5</td>
<td>1.4</td>
<td>27 (33.0%)</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

WMU is in discussion with the superintendents of public school systems in southwest MI to create a dual enrollment program for Pell-grant eligible high school students, with a STEM focus. ENGR 1002 and the STEP cohort will be available for students taking Algebra II in high schools.

For Year 7 No-Cost Extension, we propose creating ENGR 1003 that focuses on application of Pre-Calculus in engineering. We envision a hybrid online course format.

Justification

CEAS has the expertise and experience in teaching the application of mathematics to engineering at all levels -- Algebra II, Pre-Calculus, and Calculus. Three CEAS faculty and an administrator were involved in implementing an engineering mathematics course, ENGR 1990, adapted from the Wright State University model through our participation in the NSF-funded National Engineering Mathematics Education: Phase 3 program. ENGR 1002 is a spin-off of ENGR 1990. Video lectures and problem-solving of ENGR 1002 and ENGR 1990 have been created using TechSmith and Microsoft Powerpoint and One Note.

Creating ENGR 1003 is a natural extension of our engineering mathematics efforts. It will contribute to the participation of Pell-grant eligible, high school students in CEAS through dual enrollment.

Scaling Up and Sustainability

Our target is 25 Pell-grant eligible students per year who are taking Pre-Calculus in high schools. Once the course materials for the hybrid online ENGR 1003 have been created, the course can be sustained by reassignment of workload of faculty and an administrator.

Budget: Stipend and tuition = $21,441 for a GA to be under the supervision of STEP PI in creating the course materials.
4. Write a field manual and tools book for Student Success Center Operation, Training, and Assessment.

Background

Through STEP IB, the number of Student Success Centers (SSC’s) has increased from one SSC in 2009 to four in 2015 involving ~20 SSC staff, with two (2) members at senior status under the direct supervision of the STEP Program Director. We developed an attendance tracking software that uses swipe card readers have been developed and shared it with the university community. Working with the Office of Institution Research, a report that reads attendance output and produces academic performance and status of the attendees have also been created and shared with other WMU units that have SSC’s. (In fact, the report has been renamed from “Student Success Engineering” to “Students Attending Success Center Sites,” to reflect adaption by five other academic units across the campus.) By fall 2015, 607 individual CEAS students have attended a SSC with 3,885 total visits. Of the four SSC’s maintained by CEAS and five SSC’s maintained by five other WMU units, CEAS student’s usage of SSC’s in 2015 represented 28% of individual users and 29% of total visits, even though CEAS constitutes 12% of the university student population.

The STEP-SSC is a member of the Michigan Tutors Association, and the STEP-SSC staff members are trained using materials adapted from MTA.

For Year 7 No-Cost Extension, we propose to write a field manual and tools book for SSC’s that we will test against the 2016-17 operations. The field manual and tools book will describe all of the SSC operations and activities around the calendar year, automatically prompting the attention of the STEP Program Director; it will put the tutor training materials on the WMU online learning platform; and automatically generate reports on attendance and content areas tutored, as well as performing analysis at critical points of the academic year for reporting purposes.

Justification

Having a field manual and tools book with the functionalities as described above will streamline the SSC operations and make the task of the STEP Program Director in supervising the SSC’s more effective and more efficient, particularly in formative assessment of SSC operations for continued improvement and deployment of resources.

Scaling-Up and Sustainability

The number of SSC’s has been scaled up university-wide due in part to CEAS successes. We will continue to think of creative marketing strategies to increase usage, particularly by potential “at-risk” students. The SSC’s operating cost will be sustained through the use of Differential Tuition, which was approved by the WMU Board of Trustees in fall 2012. Under DT, $195,000 each academic year has been set aside for sustaining the STEP program, including the SSC’s operations.

Budget: $100,000 for the salary of the STEP senior and student staff members.
5. Math Placement of Incoming CEAS Students Using ALEKS

Background

In spring 2015, the WMU Calculus Task Force (CTF) with representation of CEAS met to begin the task of evaluating teaching and learning of the Calculus sequence, particularly Calculus I and II, with the goal of improving student learning and success. Proper math placement, identification and remediation of gaps that are student-specific are among the issues identified that impact student learning and success. Prior to fall 2015, students were placed into Calculus or other math courses using the ACT-MATH sub-score. Beginning in 2015, the State of Michigan changed its official college readiness exam to SAT.

After careful evaluation of several math placement tests including the American Association of America (MAA)’s on-line placement test delivered through Maplesoft, and several other products, the CTF has identified ALEKS as most appropriate to WMU for both placement and continuing online support, whereby students remedy the identified knowledge and skill gaps after six months of their initial test date. Several CTF committee members interacted with ALEKS representatives, participated in webinars (note: CTF also attended webinars for the MAA product), and one member attended a one-day workshop as a part of the background investigation of this tool.

We propose for Year 7 No-Cost Extension a pilot of enrolling ~400 new incoming first-year CEAS students in ALEKS in 2016-17, and to research its impact on student learning and success. Instructors assigned to teach Calculus I in Fall 2016 will provide feedback about student remediation improvement at regularly scheduled coordination meetings held during the semester. WMU’s COGNOS report generated by the Office of Institutional Research and ALEKS reports will serve as the basis for discussion and future decisions about further use of ALEKS.

Another initiative that will begin in spring 2016 is coordinated teaching of Calculus I. We are also planning to use a remediation product associated with ALEKS, which will lay the groundwork for the placement pilot in fall 2016.

Justification

Better math placement of students in their first semester at college, with accompanying online support to remedy knowledge and skill gaps identified by ALEKS, could make a significant impact on student learning, success, and continuation in CEAS.

Scaling-Up and Sustainability

If the pilot shows success in improving student performance, it is expected that ALEKS will be progressively rolled-out to the rest of the WMU entering students. This may occur in several steps. At this juncture, it is believed the cost of this placement instrument and its administration will eventually be built into the admission and or orientation fee structure for all students.

Budget: $6,000 from the Participant Support Costs budget line.

We have received a special discount from ALEKS of $15 per student (instead of the usual $25 per student) for the pilot study.
6. Create online Early Intervention program

Background

Through the implementation of the Early Intervention (EI) program implemented in spring 2013, we have collected a wealth of materials on student learning and success. These materials include the Learning Cycle, Metacognition, Creating Semester-Long Calendar; How to Calculate Grade Point Average, Templates for Tracking Studying Hours Per Week, Setting Goals, Time Management, Mapping a Realistic Study Plan, Reading and Understanding Class Syllabi, etc. In addition to the EI program staff, the CEAS Advising staff regularly use these materials for advising students.

For Year 7 No-Cost Extension, we propose to create an eLearning EI program.

Justification

Student participation in the EI Program is usually about 30%. [A higher participation rate would exceed the capacity of the STEP staff.] The low participation could be due to lack of free time during the semester by students to set up an appointment, student’s fear/shame/lack of motivation, or need to coordinate a ride to the engineering campus. Furthermore, the current generation of students are more apt to use the EI materials digitally. By offering an eLearning option, this may improve participation so more students can complete the EI material on their own time.

First-year and sophomore students that did not pass a STEM (Science, Technology, Engineering, and Mathematics) related course in a previous semester or fall below an overall grade point average will receive an e-mail from the Associate Dean about the EI program and the two options of participating (face-to-face or eLearning). By participating in either option, the students will have the academic hold removed from their WMU account, which will allow them to register for classes.

Scaling Up and Sustainability

We aim to achieve 50 individual users of the online EI program within one year and 250 users within 5 years. Once the online EI program is created, the user analytics will be gathered by the STEP Program Director for distribution to the STEP project team and the CEAS Advising team. The STEP Program Director salary and benefit will be sustained through Differential Tuition.

Budget: Stipend and tuition = $21,441 for one GA under the supervision of STEP Program Director to create the online option.
7. Program-Specific Marketing to Admitted Female Students

Background

CEAS has revised the undergraduate catalog and recruiting in 2010 by using languages recommended by the National Academy of Engineering that appeal to high school students, particularly females and underrepresented minorities. CEAS has always engaged student members of the WMU Student Chapter of Society of Women Engineers (SWE) and the WMU Student Chapter of the National Society of Black Engineers (NSBE) in recruiting and outreach events. A student chapter of Society of Hispanic Professional Engineers (SHPE) has recently been formed, and SHPE student members are expected to be involved in CEAS recruiting and outreach activities. While there is increasing participation by the underrepresented minorities (URM) student populations in CEAS to about ~20% of first-year population, the participation of female remains flat at ~10%.

A number of females faculty joined the CEAS in 2012, leading to WMU being ranked 29th by the American Society for Engineering Education (ASEE) in 2013 in the Percent of Faculty who are Females. In fall 2014, we leveraged this ranking and created post cards highlighting the profiles of CEAS female faculty that are program specific, and send to female admitted students by major in spring 2015.

For Year 7 No-Cost Extension, we propose to update the female faculty post cards and send them to the admitted female students of 2016.

Justification

We want to test whether the post cards profiling female CEAS faculty and ASEE ranking are an effective marketing tool for the admitted female students. The 2015 class of first-year students have the largest number of female students (78), a percent of the incoming first-year class (16.4%), and percent yield (26.8%).

Scaling Up and Sustainability

All CEAS female faculty members are profiled in one of the post cards, and the cards are mailed to all admitted female first-year students. We will expand the pool of targeted students to include admitted female transfer students.

If proven effective, the costs to print and mail the post cards to the admitted female students will be included in the CEAS marketing budget. The task of creating and mailing the post cards will be carried out by the CEAS Marketing Team.

Budget: $645 = ($545 to create and print post cards and $100 to mail post cards)
8. Other requests of the use of remaining grant funds include the following:

a. Participant Support of STEP Kick-Off Event ($1000); Semester-End Celebration for ENGR 4950 ($450); and textbook purchases for CEAS-EXP in FYE 2100 ($100)

b. One GA to support data collection and project evaluation. (Stipend and tuition = $21,441)

c. One GA to continue Early Intervention and the Transfer Student Host programs. (Stipend and tuition = $21,441)

d. Stipend for the half-time STEP Program Director. 20 hrs/wk x $20.05/hr x 52 weeks = $20,852.