Meeting of the Academic Senate  
Tuesday, April 30 2013  
UU 220, 3:10 to 5:00pm

I. Minutes:
   Approval of minutes for the Academic Senate meeting of April 16: (pp. 3-4).

II. Communication(s) and Announcement(s):
   Academic Senate Curriculum Appeals Committee (ASCAC) decision on AERO 402 appeal: [excerpted from
   ASCAC memo to Steve Rein on April 19 2013] “The ASCAC upholds the recommendation of the Senate
   Curriculum Committee to approve the AERO 402 proposal in connection with the rest of Aerospace
   Engineering's curriculum package.”

III. Regular Reports:
   A. Academic Senate Chair:
   B. President’s Office: [3:00-4:00] President Armstrong will be in attendance to discuss questions
      regarding educational matters.
   C. Provost:
   D. Vice President for Student Affairs:
   E. Statewide Senate:
   F. CFA:
   G. ASI:

IV. Special Reports:

V. Consent Agenda:

<table>
<thead>
<tr>
<th>Program Name or Course Number, Title</th>
<th>ASCC recommendation/ Other</th>
<th>Academic Senate (AS)</th>
<th>Term Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE/CSC 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4), 3 lectures/1 lab (existing course proposed to be offered online)</td>
<td>Reviewed 4/4/13 and recommended for approval.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Summer 2013</td>
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<tr>
<td>FSN 210 Nutrition (4), 4 lectures, GE B5 (existing course proposed to be offered online)</td>
<td>Reviewed 4/4/13 and recommended for approval.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Summer 2013</td>
</tr>
<tr>
<td>FSN 250 Food and Nutrition: Customs and Culture (4), 4 lectures, GE D4, USCP (existing course proposed to be offered online)</td>
<td>Reviewed 4/4/13 and recommended for approval.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Summer 2013</td>
</tr>
<tr>
<td>STAT 217 Introduction to Statistical Concepts and Methods (4), 4 lectures, GE B1 (existing course proposed to be offered online)</td>
<td>Reviewed 4/4/13 and recommended for approval.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Summer 2013</td>
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<tr>
<td>Printed Electronics and Functional Imaging (graduate certificate program)</td>
<td>Reviewed by Graduate Subcommittee; reviewed by ASCC on 2/14/13 and 2/21/13 and additional information was requested from the department; department response reviewed by ASCC on 3/7/13. Recommended for approval on 4/4/13.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Fall 2013</td>
</tr>
<tr>
<td>Systems Integration Engineering (graduate certificate program)</td>
<td>Reviewed by Graduate Subcommittee; reviewed by ASCC on 3/7/13 and additional information was requested from the department. Recommended for approval on 4/4/13.</td>
<td>Placed on consent agenda for 4/30/13 meeting.</td>
<td>Fall 2013</td>
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VI. Business Items(s):

A. Resolution on Proposed New Degree Program for Master of Science in Printed Electronics and Functional Imaging: Schaffner, chair of the Curriculum Committee, first reading (pp. 5-9).

B. Resolution to Change Administrative Status for Wine and Viticulture Program: Cooper, Director for Wine and Viticulture Program, first reading (pp. 10-21).

C. Resolution on Conflict of Interest in the Assignment of Course Materials: Stegner, chair of Instruction Committee, first reading (p. 22).

D. Resolution on Final Examination Overload Conflicts: Stegner, chair of the Instruction Committee, first reading (pp. 23-25).


VII. Discussion Item(s):

VIII. Adjournment:
Minutes: The minutes of March 5 and March 12, 2013 were approved as presented.

Communication(s) and Announcement(s): none.

Reports:

A. Academic Senate Chair: Rein reported that Cal Poly has a plan in place to implement online course evaluations. IT will collaborate with a task force, composed of one faculty member from each college, in evaluating potential software vendors and help construct guidelines for implementation of online evaluations and how such data will be used in conformance with Academic Senate guidelines. Chancellor White will visit Cal Poly on May 1 and 2. The Academic Senate Executive Committee will meet with the chancellor on May 1. Faculty will have the opportunity to meet with Chancellor White and ask questions on May 2 during an open forum from 4-5:30pm in Harman Hall.

B. President’s Office: Kinsley reported that an open campus reception with Chancellor White will take place on May 2 from 3-4pm in the PAC, followed by an open forum from 4-5:30pm in Harman Hall. Chancellor White is visiting all 23 campuses; he has visited 5 campuses and will visit 2 more before May 1. President Armstrong held campus conversations with faculty, staff, and students during the month of April.

C. Provost: Enz Finken provided a summary of the reorganization and changes to Academic Affairs positions. New positions include a Vice Provost for International, Extended, and Graduate Education and a Director of Graduate Education. The area of research, industry, and economic development has been divided. In addition, some positions have been eliminated and duties reconfigured resulting in a salary savings of $188,000. The review of RPT documents continues with many files demonstrating the fabulous teaching and research taking place. The CSU has chosen Cal Poly for a centers and institutes audit, which will produce reports that will be filed with the Board of Trustees. A committee has been created to address the allocation of funds to reflect the student credit hours that are actually taught in each college with respect to the new incoming freshmen. The desire is to have a formula that allows for the distribution of funds in the colleges where the students take classes.

D. Vice President for Student Affairs: Humphrey reported that Student Affairs will be moving to strategic planning process over the summer and fall quarter and will be engaging faculty leadership for input. In addition, Student Affairs is exercising the option to address off-campus violations of student behavior that are chargeable under any federal, state, or local statute. This is an opportunity to conduct educational conversations with students regarding the impact of health and safety choices they make and how it impacts their academic success.

E. Statewide Senate: Foroohar reported that the main issue discussed at the last Statewide Academic Senate meeting is the online program and Governor Brown’s allocation of $10 million. There is a major push in Sacramento to extend the offering of online courses and the availability of those courses to students. The CSU faculty is concerned about the quality of online courses and student success. Statewide Academic Senate continues to ask the Long Beach administration if a decision has been made with regards to quarter to semester conversion and the answer continues to be that no decision has been made.
Campuses who believe that their programs will be hurt if they are forced to reduced their units to 180 can submit a petition for exemption which is generated and approved at campus level. The problem is that some campuses are reporting that deans and provosts are not approving the petitions. LoCascio reported that State University Grants (SUGs) were discussed with Judith Heiman of the Legislative Analyst’s Office. The process is still not clear except that the CSU does not collect the $630 million that it calls SUGs. The cost of SUGs is spread out over all the campuses.

F. CFA Campus President: Thorncroft reported that some of the issues to be discussed at CFA’s spring assembly include quarter to semester conversion, 180-unit programs, pay, and health care.

G. ASI Representative: none.

IV. Special Reports: none.

V. Consent Agenda: CM 317 Sustainability and the Built Environment was approved.

VI. Business Item(s):
   A. Election of Chair and Vice Chair for 2013-2014: Since Rein was the only faculty member who submitted a nomination for Academic Senate Chair and since no additional nominations were received from the floor, Steve Rein was reelected Chair by acclamation. Since Stegner was the only faculty member who submitted a nomination for Academic Senate Vice-Chair and since no additional nominations were received from the floor, Stegner was reelected Vice Chair by acclamation.
   B. Resolution on Student Evaluations Policy (Instruction Committee): Stegner presented a revised resolution, which requests the approval of the Instruction Committee’s report, and that the Academic Senate permits colleges, programs, and faculty members to have the ability to design their own student evaluation questions. M/S/P to approve the resolution with the following amendments.
      Line 25: teaching and course effectiveness; and that they may also include (1) college- and/or
      Line 37: university-wide student evaluation questions in the future be subject to Academic Senate
      approval; and be it further
      Line 52: summary measures that may be calculated, from these questions, is not
      Line 57: may require the inclusion of student’s written comments to non-faculty generated
      questions in a faculty
   C. Resolution on Conflict of Interest in the Assignment of Course Materials (Instruction Committee): Due to lack of time, this resolution was not addressed.
   C. Resolution on Proposal for the Establishment of the Cal Poly Cybersecurity Center (Bik/Larson/Vakalis): Vakalis presented the resolution, which requests that the Academic Senate endorse the proposal for the establishment of the Cybersecurity Center. PowerPoint presentation is available at: http://www.academicsenate.calpoly.edu/content/meetings_calendar
      Resolution will return as a second reading item.

VII. Discussion Item(s): none.

VIII. Adjournment: 5:05 pm

Submitted by,

Gladys Gregory
Academic Senate
WHEREAS, There is an emerging field in functional printing comprising printed electronics, security
printing, active packaging, and additive manufacturing, projected to grow substantially in
the next several decades; and

WHEREAS, Functional printing uses conventional and emerging printing techniques, many of which
are already in place in the Graphic Communication Department, to produce new
electronic devices, security features, and functional packaging; and

WHEREAS, The graphic communication industry stands ready to support the Master’s degree
program with advanced laboratory technology to further Cal Poly's Learn by Doing
pedagogy; and

WHEREAS, The Graphic Communication Department has taught undergraduate coursework in
printing and imaging for more than sixty years and can leverage that expertise in graduate
education; and

WHEREAS, Cal Poly’s Graphic Communication Department is considered one of the leading
institutions in the country for undergraduate education in graphic communication; and

WHEREAS, The Graphic Communication Department is proposing a Master of Science degree in
Printed Electronics and Functional Imaging, comprised of online and face-to-face
coursework culminating in scholarly research projects; and

WHEREAS, The College of Liberal Arts Curriculum Committee and the Academic Senate Curriculum
Committee have carefully evaluated this proposal and recommend its approval; therefore
be it

RESOLVED: That the Academic Senate of Cal Poly approve the proposal for the Master of Science in
Printed Electronics and Functional Imaging and that the proposal be sent to the
Chancellor's Office for final approval.

Proposed by: Academic Senate Curriculum Committee
Date: April 9 2013
Cal Poly, San Luis Obispo

Summary Statement of Proposed New Degree Program in
Printed Electronics & Functional Imaging
for CSU Academic Master Plan Projection

1. Title of proposed program:
Master of Science in Printed Electronics and Functional Imaging

2. Reason for proposing the program:
Functional Printing encompasses academic coursework related to several emerging graphic
communication applications: Printed Electronics, which Das and Harrop (2011) project to grow
from a $2.2 billion today into a $44.25 billion industry over the next decade; Active and Intelligent
Packaging, projected by Research and Markets (2011) to grow to $23 billion per year over the next
decade; and Security Printing. The European research institute PIRA predicts the global market for
brand protection to reach a value of more than $11.4 billion by 2014 (McLoone, 2010). Further,
other additive manufacturing areas, including 3D printing, are gaining in popularity.

These fields involve the application of specialty inks to produce functional and optical devices
including a number of new high-tech printing applications. Active packaging focuses on printed
packaging that improves shelf life or enhances supply-chain tracking. Anti-counterfeiting is critical
for brand protection. Using both conductive and insulating inks, printed electronics and functional
imaging offer low-cost production of displays, lighting and energy harvesting devices on flexible
substrates.

The Master of Science in Printed Electronics and Functional Imaging will prepare graduates for
conceptual and practical electronic or functional applications, advanced research, and the
development of intellectual property related to the use of printing and coating technologies in these
emerging fields. This Master of Science degree integrates well with the undergraduate Graphic
Communication degree offered at Cal Poly, which largely focuses on graphic printing and imaging
technologies. The Master of Science degree engages students in critical thinking and conducting
seminal research using the department’s significant capital assets. The degree will further enhance
the department’s relationship with industry, allowing students to engage immediately with leading
industry professionals. This program will leverage the strengths of the undergraduate program
while developing increased research opportunities in the department.

This degree is offered as a self-support program under CSU Executive Order No. 1047.

3. Expected student learning outcomes and methods for assessing outcomes:

<table>
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<tr>
<th>SLO</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>Analyze the theoretical foundations underpinning conductive materials, optical patterning, basic electronic components and circuits, and material behavior.</td>
<td>Graduate faculty will assess theoretical foundations through projects produced in GrC 530 as well as the literature reviews associated with GrC 596 using custom evaluation rubric.</td>
</tr>
<tr>
<td>Integrate graphic design, functional design, and creative applications into expressive technologies (technologies that enhance human interaction) through compelling products.</td>
<td>Graduate faculty will assess graphic and functional integration through projects produced in GrC 530 and research projects in GrC 596 using custom evaluation rubric.</td>
</tr>
<tr>
<td>Effectively present and defend scholarly research methodologies, findings, and implications in written form.</td>
<td>Graduate faculty will assess writing skills as demonstrated through the students written summative research project paper using custom evaluation rubric.</td>
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</tbody>
</table>
Evaluate and determine the suitability for printing as a production method for specific functional and novel products.

Graduate faculty will assess evaluation ability for suitability of printing through a summative paper in GrC 530 using custom evaluation rubric.

Develop specifications and tolerances for deposition technologies for various functional products.

Graduate faculty will assess specifications and tolerance development through summative paper in GrC 530 using custom evaluation rubric.

Demonstrate knowledge related to microscale patterning and deposition including accurately measuring patterning and deposition characteristics using a variety of instruments.

Graduate faculty will assess microscale patterning and deposition through practical evaluation in GrC 530 using custom evaluation rubric.

Analyze multiple equipment technologies against required specifications and tolerances and determine appropriateness or equipment modifications required.

Graduate faculty will assess equipment technology analysis through summative paper in GrC 530 using custom evaluation rubric.

Evaluate fundamental business concepts related to starting and managing an entrepreneurial operation.

Graduate faculty will assess fundamental business concepts via a business plan developed in GrC 520 using custom evaluation rubric.

Effectively present and defend scholarly research methodologies, findings, and implications orally.

Graduate faculty will assess oral communication of scholarly research during presentation in GrC 596 using custom evaluation rubric.

4. Anticipated student demand:

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>3 years after initiation</th>
<th>5 years after initiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Majors</td>
<td>10-15</td>
<td>20-30</td>
</tr>
<tr>
<td>Number of Graduates</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>(cumulative)</td>
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A comprehensive online survey was conducted by contacting professors from around the world who may have undergraduate students interested in this type of degree program. Additionally, GrC alumni were contacted using a variety of email lists and alumni groups. Here are some key results:

- 375 individuals completed all or most of the survey
- Of those who participated, 275 where current undergraduates and 83 had completed their bachelor’s degree.
- 235 survey respondents were likely, very likely, or planning on pursuing a graduate degree in the next five years.
- 167 survey respondents expressed interest in Cal Poly’s proposed graduate program in Printed Electronics and Functional Imaging.
- Of those, 118 individuals provided contact information and requested more information about the proposed degree program.

5. If additional resources (faculty student allocations, support staff, facilitates, equipment, etc.) will be required, please identify the resources, indicate the extent of the college’s commitment.
to allocate them, and evidence that college decision-making committees were aware of the source of resource support when they endorsed the proposal. If the college expects the University to provide additional resources, please identify the resources and anticipated cost:

On startup, the degree program will use existing Graphic Communication Department laboratories, equipment, and staffing. Existing faculty will teach on an overload basis through Extended Education. As a self-support program, success may afford opportunity to add faculty to the GrC staff in the future. As additional resources become available through strong enrollments, faculty and equipment may be acquired. Additionally, the Graphic Communication Department has a strong record of development by in-kind donations, grant funding, and endowments, which will be used to strengthen the financial undergirding.

6. **If the program is occupational or professional, summarize evidence of need for graduates with this specific educational background:**

At the Printed Electronics USA 2011 conference November 30-December 1 in Santa Clara, CA, seventeen employers were asked the following questions:

1. Within the next five years, do you expect to hire employees in your company who help you develop, improve, or scale your production system(s)?

   All survey respondents indicated they will be hiring in the next five years.

2. If yes, could you see hiring an individual with a Master’s of Science degree who...
   - Generally understands deposition and patterning systems for printed electronics, smart packaging, and security printing.
   - Can measure, analyze, and optimize key variables in printing technologies
   - Can measure, analyze, and optimize web handling systems
   - Can measure, analyze, and optimize material/ink compositions
   - Can measure, analyze, and optimize morphologies (ink film surfaces)
   - Can measure, analyze, and optimize drying/annealing systems
   - And knows the issues related to scaling reproduction systems for commercial applications?

   Sixteen of seventeen (94%) indicated they could see hiring an individual with this particular background in the next five years.

There were more than 1200 attendees at the Printed Electronics USA 2011 conference, an increase of 250 attendees from the previous year. Cal Poly’s proximity to the Silicon Valley is critical, as many of the companies in this space stem from conventional electronics and are looking for the opportunity to develop new products and improve manufacturing techniques.

7. **If the new program is currently a concentration or specialization, include a brief rationale for conversion:**

Printed Electronics and Functional Imaging is not currently a concentration or specialization.

8. **If the new program is not commonly offered as a bachelor’s or master’s degree, provide compelling rationale explaining how the proposed subject area constitutes a coherent, integrated degree major which has potential value for students. If the new program does not appear to conform to the CSU trustee policy calling for “broadly based programs,” provide rationale:**

The program is a natural extension of the Graphic Communication undergraduate degree. However, it has broad appeal to students with complimentary undergraduate degrees as well, including but not limited to: Business, Graphic Design, Physics, Chemistry, Packaging, Electrical Engineering, Materials Engineering, and Mechanical Engineering. This degree will provide a coherent path into a
specialized application area for broader undergraduate degrees. While this degree may not technically qualify as a “broadly based program,” it is designed to touch on various applications of functional printing, including printed electronics, active packaging, security printing, 3D printing, and other functional print manufacturing. These emerging applications have broad interest and will shape society into the future.

9. **Briefly describe how the new program fits with the mission and/or strategic plan for the department, college and/or university:**

This degree program fits well with the Graphic Communication mission by focusing on research and discovery. The degree program leverages the equipment base along with research interests of faculty to extend the scholarship of the department and further its influence in shaping graphic communication technology. The College of Liberal Arts offers diverse, significant curricula. This program strengthens the college’s unique role in anticipating the future and defining it in light of human experience. With a focus on deployment, this degree addresses the human experience and how laboratory research can be scaled to impact the broader population. This Master’s of Science degree is focused on technology development and deployment in the context of advanced printed materials. It serves to directly meet the STEM objectives of the university as well as the college and department.

10. **Attach a display of curriculum requirements:**

    **COURSEWORK (45 Units)**

    **Core Courses (29 units)**

    | Course ID | Course Title                                                      | Units |
    |----------|-------------------------------------------------------------------|-------|
    | GrC 501  | Survey of Functional Printing                                     | 2.0   |
    | GrC 502  | Orientation to Functional Printing (Prereq or co-req GrC 501)     | 2.0   |
    | GrC 510  | Materials for Functional Printing (Prereq or co-req GrC 501)      | 4.0   |
    | GrC 512  | Printing and Coating Tech (Prereq or co-req GrC 501)              | 4.0   |
    | GrC 514  | Imaging for Electronics & Functional Printing (Prereq or co-req GrC 501) | 4.0   |
    | GrC 520  | Functional Printing Product and Business Development (Prereq GrC 512 OR GrC 514) | 4.0   |
    | GrC 530  | Functional Printing Workflows (Prereq GrC 502 AND GrC 512 AND GrC 514) | 4.0   |
    | GrC 560  | Grad Research Methods in Printed Electronics & Functional Imaging (Prereq GrC 530) | 2.0   |
    | GrC 596  | Research Project in Printed Electronics and Functional Imaging (Prereq GrC 560) | 3.0   |

    **Subtotal (core)........................................... 29.0**

    **Approved Electives (16 units)**

    Select 16 units from the following:

    | Course ID | Course Title                                                      | Units |
    |----------|-------------------------------------------------------------------|-------|
    | GrC 500  | Special Problems in GrC (Prereq Graduate standing and consent of instructor) | 2.0   |
    | GrC 551  | Current Trends in Printed Electronics (May be repeated for up to 12 units, Prereq GrC 502) | 4.0   |
    | GrC 552  | Current Trends in Active Packaging (May be repeated for up to 12 units, Prereq GrC 502) | 4.0   |
    | GrC 553  | Current Trends in Security & Anti-counterfeiting (May be repeated for up to 12 units, Prereq GrC 502) | 4.0   |
    | GrC 595  | Cooperative Experience Education (Prereq Graduate standing and consent of instructor) | 12.0  |

    **Subtotal (electives - select 16 units)........................................... 16.0**

    **TOTAL.................................................. 45.0**
WHEREAS, Wine and Viticulture is currently an interdepartmental major within the College of Agriculture, Food and Environmental Sciences (CAFES); and

WHEREAS, The mission, curricula, goals, and strategic vision for Wine and Viticulture are distinct from those of the Agribusiness, Food Science and Nutrition, and Horticulture and Crop Science Departments; and

WHEREAS, The program is operating autonomously from the Agribusiness, Food Science and Nutrition, and Horticulture and Crop Science Departments; and

WHEREAS, A change in status and name from Wine and Viticulture program to "Wine and Viticulture Department" is being proposed; and

WHEREAS, The functional modifications in changing to department status are provided in the attachment to this resolution; and

WHEREAS, Said change in status and name has been approved by the College of Agriculture, Food and Environmental Sciences department chairs/heads, the CAFES Dean, and the Academic Deans Council; therefore be it

RESOLVED: That the Academic Senate of Cal Poly endorse the change in status and name from Wine and Viticulture program to **Wine and Viticulture Department**.

Proposed by: Wine and Viticulture Program
Date: April 16 2013
State of California  
Memorandum  

To:  Kathleen Enz Finken, Provost, Cal Poly  
Via:  Dave Wehner, Dean, CAFES  
From:  James B. Cooper, Director, Wine and Viticulture Program  
Date:  March 25, 2013  

Subject:  Proposal for Wine and Viticulture Program Change to Department Status  

Overview  
The Cal Poly Wine and Viticulture Program is an integrative three-pronged program aimed at educating future leaders of the global grape and wine industry. The Program arose from a collaboration among three departments in CAFES: Agribusiness, Food Science and Nutrition, and Horticulture and Crop Science. It currently offers an interdisciplinary major in Wine and Viticulture designed to prepare students for successful careers in the complex 21st century global wine business environment. Program curriculum emphasizes the inherent connectivity between wine grape growing in the vineyard, wine making in the winery, and wine selling in the marketplaces, uniquely integrating these three fundamental components of the modern wine industry. The Wine and Viticulture faculty believe that an understanding of all three aspects is critical in the unique legal and regulatory environment in which the wine industry operates.

Compared to other academic wine programs around the country, an emphasis on all three aspects of the wine industry provides a unique advantage that distinguishes the Cal Poly program. All Wine and Viticulture majors learn the foundations of viticulture through lectures and labs that use the campus 15-acre Trestle Vineyard. Students learn winemaking through lecture and lab courses using the campus pilot winery and teaching labs in FSN and Biology. Students also learn some essentials of marketing and sales, with the potential to develop and manage the Cal Poly Wine brand. The Program incorporates Learn by Doing throughout its curriculum. All students are required to complete (at least) one internship in the grape and/or wine industry and a senior “capstone” project, and are encouraged to participate in undergraduate research. The Vines to Wines student club provides networking opportunities with industry professionals through volunteering for many local wine industry events.
BACKGROUND

History of Wine and Viticulture at Cal Poly

Courses in viticulture, sensory analysis, and wine business have been offered at Cal Poly since the 1980’s through the Agribusiness, Food Science and Nutrition, and Crop Science Departments, and through Extended Education. A wine certificate program was developed through Extended Education in the 1990’s, and continues today. (Until recently, this wine certificate program has had minimal coordination with the Wine and Viticulture Program in CAFES, though great potential exists for a more formal and extensive collaboration with Extended Education). Also during the 1990’s, Fruit Science viticulture courses, Food Science courses in sensory evaluation and fermentation, and Agribusiness courses in wine business were all heavily enrolled. Experiences in wine and viticulture through these individual courses generated a high level of student passion for wine and the wine industry, and led to the foundation of a student club, Vines to Wines, in 1996. Over the years, the V2W club has attracted scores of students to its biweekly club meetings, providing student networking opportunities with industry professionals, and student volunteers to staff many local wine events. of the Agribusiness Department, provided research supporting the establishment of a distinctive Wine and Viticulture Minor at Cal Poly. In 1999, a Wine and Viticulture minor commenced with a curriculum based on a 1988 senior project by Johnine Przybyla Talley, with Professor Phil Doub. The minor included courses from Food Science and Nutrition (taught by Montecalvo, Noyes, and Lecturers), Horticulture and Crop Science (taught by Fountain, Patterson, Costello, and Lecturers), and Agribusiness (taught by Doub, Amspacher, Wolf, and others). Enrollment in the minor grew rapidly and graduates with the minor found ample employment opportunities in the industry. Many of these Cal Poly graduates have moving rapidly into leadership positions throughout the California wine industry. In 2004 an academic major in Wine and Viticulture was approved and the Wine and Viticulture Program, headed by a Program Director, was formally founded. In 2007, Professor Ritchie was hired into the Food Science department to develop the enology and winemaking curriculum. Doub, Fountain, Montecalvo, Noyes, and Patterson all retired.

Wine and Viticulture Student and Industry Demand

When the Wine and Viticulture Major was initiated in 2004, the Minor had 222 enrolled students (Figure 1). The major rapidly grew to a high of 280 in 2008, including students with double majors from other departments in the College of Agriculture, Food and Environmental Sciences. In 2007 the Wine and Viticulture Program was serving 417 majors and minors (Figure 2). Due in part to the retirement of several key faculty members, most of the required courses became heavily impacted. To effectively serve the majors, the Program
stopped accepting applications for the minor in 2011 and stabilized the number of majors to about 250. In 2012, 166 students applied to become Wine and Viticulture majors as freshman, and 84 were accepted with 53 enrolled. In 2012, 67 transfer students applied to Wine and Viticulture, 31 were accepted and 21 enrolled. Of these 74 new majors, 50% are women and 16% are under-represented minorities. In addition there is a consistent demand to enter the Wine and Viticulture major by change of major. Working with our staff advisor (Rachel Johnson), and the faculty recently articulated clear academic expectations for the ICMA process. In addition, the WVIT faculty hope to reopen the Minor after the WVIT Department is formed and additional resources become available.

For a variety of reasons, the 4-year completion rates for WVIT majors is less than optimal. The Program encourages all majors to complete their required internship during the winegrape harvest season in Fall quarter, thus a norm for completion of the B.S. degree is 4 years plus one quarter. Second, many required WVIT courses are heavily impacted. The “hands-on” teaching capacity of the Program faculty in the pilot winery and the vineyard have limited enrollment in essential senior level viticulture and enology courses. Third, the WVIT curriculum relies heavily on specific courses, taught by other departments that are also impacted. Finally, graduation is often delayed because many students choose to work during multiple winegrape harvest seasons.

**Figure 1. Enrollments in WVIT Minor and Major since 2004**

![Graph showing enrollments in WVIT Minor and Major since 2004]

**Figure 2: Total numbers of WVIT Majors and Minors**

![Graph showing total numbers of WVIT Majors and Minors]

**Wine and Viticulture Teaching and Curriculum**

All students enrolled in the WVIT major learn the foundations of viticulture, winemaking and wine business through completion of a set of core courses (Appendix I). In addition, each student chooses to focus on one of the three fundamental areas by choosing a concentration, and completing an additional 55 units of upper division specialization courses. Course requirements for Wine and Viticulture majors have evolved significantly over the past eight years, as new courses tailored to the major have been developed and approved. Consequently, the curriculum in each new two-year catalog cycle has been significantly different, though the rapid changes in course requirements are stabilizing.

Initially, the wine business concentration had the highest proportion of graduates, in part because many early majors were originally Wine and Viticulture Minors from the Agribusiness Department. A full-time tenure-track faculty member in the Food Science Department (Ritchie) joined the program in 2007 to further develop and teach enology and sensory courses. Since that time, the proportion of students in the enology concentration has steadily increased, and this concentration now includes 45% of the majors (Figure 3). This shift heavily impacted the enology courses, and in 2011 “double concentrations” were eliminated to the disappointment of many new majors. Such significant shifts in student interest will likely exert a major impact on the needs for teaching resources within a WVIT Department. We hope that development of a dedicated WVIT Department faculty, with strong representation in all three sub-disciplines, will lead long-term stability with roughly equal numbers of students in each concentration.

![Figure 3: Proportion of Graduates by Concentration by Year](image)

Currently, there is no generally accepted terminal degree in wine education. The unique Cal Poly undergraduate program provides a tremendous opportunity to develop a new terminal Master of Science degree in Wine and Viticulture. As with the undergraduate major, three concentrations are envisioned that would leverage a number of extant campus strengths.
Enology, for example, might include courses from Biology, Chemistry and Biochemistry, and Statistics, while viticulture could include additional courses in Botany, PPSC, and Business/Management. The wine business emphasis might include additional courses from AGB, RPTA, and the Orfalea College of Business. A longer-term goal is to develop the equivalent of a "wine MBA" that might take the form of an MBA with wine business emphasis. Ample opportunities also exist for a Wine and Viticulture department to collaborate with Extended Education to develop a more formal program of short courses, on-line courses, Certificate programs, "extended field trips" both domestic and international, and international programs. Goals of the new Department include the establishment of a 1-year Professional Masters program catered to industry needs.

RATIONALE FOR A NEW DEPARTMENT
The collaboration among faculty in three cognate departments (Food Science and Nutrition, Horticulture and Crop Science, Agribusiness) was instrumental in the development of the Minor and the Major, and WVIT Program has operated as a collaborative venture among these three departments since its inception. Over the past decade, the wine industry in California and the US has grown rapidly, and enrollment in the WVIT Program has paralleled this rapid growth. Between 2006 and 2011 the dollar value of US wine sales grew by 16.1% to $34.3 billion (Euromonitor 2012), and a report by Stonebridge Research Group in 2012 indicates Napa Valley wine represents 17% of the volume and 31% of the value of wine sold in the US (Stonebridge 2012). The report estimates that the wine produced from Napa County alone has an economic impact of $13.3 billion for Napa County, $25.9 billion for California and $50.3 billion for the US economy. The Stonebridge Research Group further estimates that the Napa Appellation alone generates 46,000 full time equivalent jobs in Napa County, 102,000 in California and 303,000 in the Total US. Extrapolating from the Napa forecast generates an estimate of approximately 977,000 US jobs generated by the wine industry. Therefore, the wine industry has been a growth industry in the US, even during the significant national economic downturn, and needs well-educated and trained graduates from programs such as Cal Poly’s Wine and Viticulture Program.

The Program’s faculty members have reached a level of international prominence with presentations at leading national and international symposia and conferences, publications in peer-review journals, citations, service on editorial boards, and service on key industry boards. WVIT faculty members have received prestigious awards including two Sunkist College of Agriculture Faculty Awards, two Western Agricultural Services Outstanding Agribusiness Faculty Member Awards, and CAFES Outstanding Lecturer Award.

Obtaining departmental status is crucial for the future of Wine and Viticulture at Cal Poly. Currently, the Program Director lacks control over allocation of faculty teaching among the three wine sub-disciplines. Temporary part-time lecturers teaching many required courses in the Wine and Viticulture curriculum cannot be hired directly by the Program, but instead must be hired by each of the cognate departments adding an administrative burden on the cognate departments. Likewise, requisite performance evaluations for lecturers are conducted.
A new academic Department will enhance the visibility and independence of Wine and Viticulture at Cal Poly, allowing the department head and faculty to better manage resources and to better serve our students, alumni, and the wine industry. Wine industry leaders have actively supported the WVIT Program both by serving on the Advisory Council, and by donating equipment, wine, grapes and dollars needed for an effective learn by doing wine education. The current Program structure puzzles many members of the Advisory Council. Industry supporters have witnessed the inefficiencies of the administrative and management side of such the current arrangement, and the deleterious impacts this has had on student learning. The Program’s Advisory Council and other Cal Poly supporters in the wine industry, students, and faculty all agree that it is in the best interest of efficient resource allocation and compliance with regulations to create a new department with a budget and staff managed by a department head.

Department status is critical for the program to:

- Gain professional credibility within the California wine industry
- Demonstrate campus commitment to Wine and Viticulture at Cal Poly
- Better advocate for faculty resources to serve and support its students
- Effectively recruit outstanding new faculty dedicated to wine and viticulture
- Position itself for obtaining extramural support to serve and support its faculty
- Efficiently manage the campus vineyards
- Efficiently manage the pilot winery and development of a new winery
- Effectively conduct advancement efforts for the Cal Poly Winery and endowed chairs
- Conduct scholarly research in wine and viticulture
- Develop international programs that take advantage of the seasonal harvest/crush (northern hemisphere Summer, Fall; and southern hemisphere Winter, Spring)
- Serve on college and university committees and represent the needs of the department
- Better collaborate with other university wine and viticulture programs (e.g., UC Davis, CSU Fresno)
- Develop a visiting scholar program and a series of regional wine industry gatherings

Resource Implications of a new Wine and Viticulture Department in CAFES

The Program aspires to construct a privately funded campus wine innovation center that would include modest teaching, research, and office space. A campaign to raise ~$8.9M for
design and construction of a new winery building to house the proposed new department is underway, with ~$2.7M raised to date.

Additional resources necessary to convert the current program into a new department should be minimal. The Program currently has a small state budget that funds one full-time academic coordinator, and a working budget from College-Base-Fees based on student enrollment. Faculty resources and space provided by each of the cognate departments to teach the Wine and Viticulture curriculum over the past several years will need to transfer into the new WVIT department. Enology courses have involved one tenure-track faculty member and part-time support from several lecturers in the Food Science and Nutrition Department. The Program Director’s position is also housed in the FSN Department. Teaching space for enology includes the Pilot Winery and a classroom in the Crops Unit, and teaching laboratories in the Food Science and Biology Departments. A modest research room was also allocated to Enology in Building 11. Teaching of viticulture-related courses has recently involved ~1.3 tenure-track faculty positions together with ~0.8 temporary lecturer position devoted to viticulture lecture, lab and field courses taught in the Horticulture and Crop Science Department. In addition to the campus Trestle vineyard, viticulture courses have used classroom and laboratory space in the HCS Department. Wine business courses have been taught by many AGB faculty over the years. Two current AGB faculty members have taught WVIT-related AGB courses almost exclusively in recent years, one of whom will still be assigned to teach the 4-unit AGB 405 course for two quarters each year. Computer lab classrooms needed for the wine business classes have been provided by the AGB Department. Finally, a full-time temporary lecturer manages the internship program, and teaches a wine sales class with funding through the Horticulture and Crop Science Department.

We propose that each of the faculty members that have been teaching required courses in the WVIT curriculum be transferred into the new Department. Following these transfers, the new WVIT Department will include ~5.3 ladder-rank faculty positions, and ~2.5 temporary lecturers. Proposed teaching assignments for the WVIT courses are listed in Appendix II. The overall impact of these transfers on teaching in the former home departments will be minimal. Transfer of Ritchie, Cooper, and Brain will have no impact on teaching in the FSN Department, and transfer of the Patterson position will have no impact on teaching in the HCS Department. Wolf will continue to teach 2 AGB courses, and Costello will continue to teach his normal complement of PPSC courses (PPSC 110, 311, 421, and 431).

Most of the WVIT lecture courses will continue to be taught in general assignment classrooms throughout campus. Specialized Wine and Viticulture courses, however, are being taught in space controlled by AGB, FSN and HCS. Until construction of a new campus winery building is complete, all of this teaching space needs to be made available to the new Department. Viticulture courses have been taught in the teaching classrooms and a dedicated Viticulture “lab” housed in the Crops Unit (Building 17). Responsibility for the 15-acre Trestle Vineyard (13 acres planted) used for viticulture classes was transferred to the Program last summer, though responsibility for the smaller variety block vineyard was retained by
HCS. Specialized enology courses are currently taught in Building 24 (sensory analysis, wine analysis and amelioration), and in the campus Pilot Winery (in the Crops Unit). Computer classrooms used to teach the wine business classes are housed in Building 10. Space for a Department office should become available following the movement of the Natural Resource Management and Environmental Sciences Department into the new Science Building this spring/summer. The new Department will also need office space to assign to the many Lecturers who are hired to teach required courses.

Timing of Department Formation
For a variety of reasons, the WVIT Program is at a critical juncture in its evolution. The program faculty is hopeful that a new Wine and Viticulture Department can be formed before the start of the Fall 2013 academic quarter.

Future Growth of Wine and Viticulture
Growth of the California wine industry continues to be impressive, and both student demand for wine and viticulture courses, and wine industry demand for hiring Cal Poly graduates remain very strong. Since the Wine and Viticulture academic programs began in the late 1990s, the number of faculty involved in the Program has declined significantly. As a consequence of limited teaching resources, enrollment in the academic minor was stopped in 2011. Dual-concentration for WVIT majors, seen by both students and industry employers as excellent value-added to the WVIT degree, was stopped in 2012. Enrollment in the major, and in many required courses, remains restricted. Required viticulture courses are offered only one quarter per year, leading to large upper division enrollments and slowing student graduation rates. Several of the required enology courses are offered only one or two quarters per year, also leading to large enrollments and slowing student graduation rates. Reopening the minor, expanding the major and allowing dual-concentrations, and developing stronger industry relationships are all vital for the long-term success of Wine and Viticulture at Cal Poly. Achieving success will depend upon new campus resources, specifically new faculty positions and teaching/research space.

References


APPENDIX I. WVIT Major requirements

Core Courses (required by all three concentrations)
AGB 214 Financial Accounting
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP
BRAE 340 Irrigation Water Management
CHEM 111 Survey of Chemistry
MATH 118 Pre-Calculus Algebra
  or MATH 161 Calculus for Life Sciences I (B1)
  or MATH 221 Calculus for Business and Economics
SS 121 Introductory Soil Science
STAT 218 Applied Stats for the Life Sciences (B1)
  or STAT 217 Introduction to Statistical Investigations (B1)
WVIT 101 Orientation to Wine and Viticulture
WVIT 102 Global Wine and Viticulture
WVIT 202 Fundamentals of Enology
WVIT 210 Viticultural Practices
WVIT/FRSC 231 Viticulture 1
WVIT/FRSC 331 Viticulture 2
WVIT 339 Internship in Wine and Viticulture
WVIT 343 Branded Wine Marketing
WVIT 423 Wine Law and Compliance
WVIT 442 Sensory Evaluation of Wine
WVIT 463 Issues, Trends and Careers in the Wine Industry

Wine Business Concentration
  AGB 212 Agricultural Economics
  AGB 310 Agribusiness Credit and Finance
  AGB 323 Agribusiness Managerial Accounting
  AGB 422 Logistics and Global Agribusiness
  BIO 111 General Biology
  ECON 222 Macroeconomics
  WVIT 302 Wine Fermentation Laboratory
  WVIT 433 Wine sales and e-commerce
  WVIT 444 Wine Market Analysis
  WVIT 450 Wine Business Plan
  WVIT 460 Senior Project - Wine Business
  Advisor Approved Electives

Viticulture Concentration
  BOT 121 General Botany
  BOT 323 Plant Pathology
  CHEM 312 Survey of Organic Chemistry
  ECON 201 Survey of Economics
  PPSC 311 Agricultural Entomology
  PPSC 321 Weed Biology and Management
  SS 221 Fertilizers and Plant Nutrition
  WVIT 302 Wine Fermentation Laboratory
  WVIT 414 Grape Pest Management
WVIT 415 Grapevine Physiology
WVIT 424-427 Winegrape Growing and Vineyard Management I,II,III,IV
WVIT 461-462 Senior Project I, II - Enology and Viticulture
Advisor Approved Electives

Enology Concentration
CHEM 312 Survey of Organic Chemistry
CHEM 313 Survey of Biochemistry and Biotechnology
ECON 201 Survey of Economics
MCRO 221 Microbiology
WVIT 203 Anatomy of a Wine
WVIT 301 Wine Microbiology
WVIT 365 Wine Analysis and Amelioration
WVIT 404-406 Winemaking I,II,III
WVIT 461-462 Senior Project I, II - Enology and Viticulture
Advisor Approved Electives
APPENDIX II. Wine and Viticulture courses and teaching assignments

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RESOLUTION ON CONFLICT OF INTEREST IN THE ASSIGNMENT OF COURSE MATERIALS

WHEREAS, Section 244 (F) in the current Campus Administrative Manual (CAM) allows faculty members to accept a royalty of up to 10% of the local sale price of self-authored coursepacks; and

WHEREAS, CAM Section 244 (F) addresses print-based duplication and distribution of coursepacks through the University bookstore rather than online production, sales, and distribution of coursepacks through third-party vendors and other electronic outlets; and

WHEREAS, When a faculty member personally receives a financial benefit from the assignment of self-authored course materials, there is potential for a real or perceived conflict of interest; and

WHEREAS, Cal Poly is in the process of creating a new set of Campus Administrative Policies (CAP) and phasing out the current CAM; therefore be it

RESOLVED: That the Campus Administrative Policies (CAP) address conflicts of interest in the assignment of self-authored course materials; and be it further

RESOLVED: That faculty members are prohibited from personally profiting from the sale of self-authored course materials, such as coursepacks, study guides, or lab manuals, to Cal Poly students, in both printed and digital formats; and be it further

RESOLVED: That this restriction does not apply to published course materials such as textbooks that are published for general (that is, national or international) use and/or that have been peer reviewed; and be it further

RESOLVED: That with approval by the faculty’s department, royalties from the sale of course materials to Cal Poly students may be directly assigned to the faculty member’s college or department, student organizations, student scholarship funds, or other university-affiliated entities, as long as the faculty member does not financially benefit from doing so; and be it further

RESOLVED: That such royalties from the sale of course materials may not exceed 10% of the sale price of the self-authored course materials; and be it further

RESOLVED: That it is the responsibility of faculty members to comply with all existing and applicable copyright laws in preparation of their course materials.

Submitted by: Academic Senate Instruction Committee
Date: March 17 2013
Revised: April 2 2013
WHEREAS, There are no university policies governing the maximum number of finals a student can be required to sit in one day; and

WHEREAS, The final examination schedule is available to students before Plan A Student Schedule (PASS) opens for registration in order to inform students of potential overload conflicts (registrar.calpoly.edu/content/Calendars_Deadlines/index); and

WHEREAS, Final examinations are required, except in specific circumstances (see CAM 484.4), to be administered during finals week (CAM 484.1 and 484.2); and

WHEREAS, When courses with three or more sections hold Common Final, designated by the University Scheduling Office and with approval by the department chair/head and appropriate dean, “any student who is unable to attend the common assessment time due to a conflict with another course’s final assessment shall be permitted to arrange an alternate assessment time” for the Common Final (CAM 484.3B); therefore be it

RESOLVED: That faculty should make a reasonable effort to offer an alternative final examination time to students with more than two final examinations on the same day; and be it further

RESOLVED: That faculty schedule the alternative final examination time during finals week (except in circumstances defined in CAM 484.4); and be it further

RESOLVED: That faculty include the date and time of the final examination on the course syllabus, if the course uses an in-class examination as its final assessment, and, whenever applicable, provide students with advance notice if the final examination date and/or has been rescheduled with the written approval of the appropriate dean; and be it further

RESOLVED: That a student should notify all involved instructors in a collective email of the final examination overload conflict and request to reschedule the final examination by the end of the sixth week of instruction.

Proposed by: Academic Senate Instruction Committee
Date: April 16 2013
Revised: April 23 2013
A. Lecture Courses

The university's schedule for final examinations for lecture courses will be included in each issue of the quarterly Class Schedule. The schedule, drafted by the Associate Dean, Educational Services, and approved by the Vice President for Academic Affairs, will designate an examination time for each time block in which lecture sections are normally scheduled. Examinations will be held at the time designated in the schedule and, unless the class and instructor have been notified otherwise, at the location in which the class was assigned to meet during the quarter.

The maximum time for which a facility will be allotted for a lecture section final examination is as follows: one hour for a section meeting one or two hours per week; two hours for a section meeting three hours per week; three hours for a section meeting four or more hours per week.

8. Nonlecture Courses

Final examinations in nonlecture courses will be held during the last class meeting in the regularly assigned meeting location.

A. Courses with Lectures & Seminars (other than 1-unit courses)

Course activity, including assessments, shall continue through the week designated for final assessments for all courses with a lecture component. Faculty are required to meet with students at the scheduled final assessment period and will use the week designated at the end of the quarter for the final assessment of student work. Faculty should decide the pedagogically appropriate assessment activity: for example, exams, receipt of term papers or projects, presentations, etc.

The university's schedule for final assessment periods will be included in each issue of the quarterly Class Schedule. The schedule, drafted by University Scheduling Office and approved by the Vice President for Academic Affairs, will designate an assessment period for each time block in which lecture sections are normally scheduled and the location assigned.

Final assessments will be given in all sections of lecture and seminar courses unless exempt under the provisions contained in CAM 484.2.

The maximum time for which a facility that is normally controlled by the University Scheduling office will be allotted for final assessment is three hours.

8. Nonlecture Courses and 1-unit Courses

Final assessments in nonlecture courses (labs/activity courses) and 1-unit courses will be held during the last week of instruction in the regularly designated meeting time and location unless an alternate time and location are pedagogically necessary, do not create an academic scheduling conflict for any student, and do not have to be scheduled by the University Scheduling Office.
484.2 Final Examinations-Exempt Courses

Final examinations will be given in all sections of lecture and nonlecture courses unless exempt under the provisions contained in CAM 484.2. Examination exemptions may be granted for such reasons as uniqueness of course content or method of instruction, and/or a more appropriate procedure for establishing a final evaluation of the student's performance in the course. Exemptions in the University Catalog. In unusual circumstances, a faculty member may petition for exemption after the course has begun. Requests for such exemption will be submitted in writing to the school dean through the department head for approval.

484.3 Final Examinations-Rescheduling

Under unusual circumstances, it may be deemed advisable to reschedule a final examination to be held at a time and/or location other than that for inclusion in the University Catalog. Requests for exemptions will be submitted in writing through the department chair for approval by the dean. Exemptions ordinarily will be established at the time the course is proposed by the department for inclusion in the University Catalog. Subsequent requests for exemptions will be submitted in writing through the department chair for approval by the appropriate Dean.

484.2 Exempt Courses

Assessment exemptions may be granted for such reasons as uniqueness of course content or method of instruction, and/or a more appropriate procedure for establishing an evaluation of the student's performance in the course. Exemptions ordinarily will be established at the time the course is proposed by the department for inclusion in the University Catalog. Subsequent requests for exemptions will be submitted in writing through the department chair for approval by the appropriate Dean.

484.3 Rescheduling

A. Early Assessments

No final assessments shall be given prior to the regularly scheduled final assessment period without written approval of the appropriate Dean and notification sent to University Scheduling Office at least two weeks before the final assessment.

B. Common Assessments

Courses with three or more sections may hold assessments during "common assessment" times designated by the University Scheduling Office with approval by the department chair and appropriate Dean. Faculty who have requests approved must notify the University Scheduling Office at least two weeks before the final assessment. Any student who is unable to attend the common assessment time due to a conflict with another course's final assessment shall be permitted to arrange an alternate assessment time.

C. Alternate Assessments

Faculty may offer an additional (i.e., alternate) assessment period during the final assessment week; however, the assessment must also be offered at the original time set aside in the class schedule. Courses with alternate assessment periods during the final period must notify the University Scheduling Office at least two weeks before the final assessment.

Submitted: 11/12/2005
Revised: 4/12/2005
RESOLUTION ON
PROPOSAL FOR THE ESTABLISHMENT OF THE CAL POLY
CYBERSECURITY CENTER

RESOLVED: That the Academic Senate of Cal Poly endorse the attached proposal for the
establishment of the Cybersecurity Center.
Proposal to Establish a Cybersecurity Center
California Polytechnic State University

Submitted by: Russell Bik (President's Cabinet Member), Debra Larson, Ph.D., & Ignatios Vakalis, Ph.D.

March 26th, 2013
Introduction

“Cybersecurity includes preventing damage to, unauthorized use of, or exploitation of electronic information and communications systems and the information contained therein to ensure confidentiality, integrity, and availability. Cybersecurity also includes restoring electronic information and communications systems in the event of a terrorist attack or natural disaster.”

The Cybersecurity Center at California Polytechnic State University (Cal Poly) will provide students, faculty, and industry partners with collaborative opportunities to engage in basic or applied research, cybersecurity training, workshops, internships, and curriculum development.

“Cybersecurity” is a broad term that includes systems and practices to prevent and mitigate cyber attacks and cyber crimes aimed at global, national, organizational, or personal cyber spaces. The National Infrastructure Protection Plan identifies cyber crimes and attacks as a leading threat to national security.

Scholars, industry experts, and the media identify a pressing need for cybersecurity experts within the United States. Some experts have suggested that in the western part of the world, we still have not grasped how “unbridled” the cyber threats are. Government and industry experts estimate that we will need approximately “60,000 cybersecurity experts in the next three years” and that “There will be a shortage.”

In partnership with public and private organizations, Cal Poly is poised to become a leading supplier of cyber professionals through the development of comprehensive and collaborative programs that span our polytechnic university. Cal Poly intends to be a major contributor of qualified, cybersecurity-ready, and cybersecurity experts (i.e., defenders, warriors, innovators). The proposed Cybersecurity Center will serve as one catalyst in reaching this goal. Cal Poly is uniquely poised to provide students with Learn by Doing experiences that will prepare them to make rewarding contributions in the field of cybersecurity.

College of Engineering (CENG) department chairs and program directors ranked establishing a cybersecurity center 3rd out of 10 possible initiatives in a 2012 campaign assessment survey. In addition, Cal Poly engineers have been working for some time on an array of cybersecurity initiatives. These include: development of curriculum (currently: an undergraduate and a graduate course in computer/cyber security which has been offered multiple times during the last two years), development of the Raytheon security lab

(Bonderson #204), the establishment of an ever increasing in size student club, “white hats,” the recruitment of a new faculty member with expertise in cybersecurity, the forthcoming state of the art Northrop Grumman Cyber Lab, as well as “white papers.” The Cal Poly Cybersecurity Center will be among the primary platforms from which faculty, students, and industry partners can explore the intersectionality of a wide range of complex and varied cybersecurity issues.

**Mission**

The Cybersecurity Center will provide Cal Poly students, faculty, and industry partners with 21st century cybersecurity pedagogical and research opportunities. It will build on the multidisciplinary nature of the field of cyber security. The Cybersecurity Center will be a non-partisan, self-supporting center governed by the highest principles of academic freedom.

**Funding**

Key Cybersecurity Center personnel (i.e., Director in collaboration with the faculty and industry Council for the Cybersecurity Center) will work with Cal Poly Advancement to partially fund the Cybersecurity Center. Other funding will result from contracts, grants and participating industry partners.

**Background and Context**

One important challenge in addressing potential breaches in cybersecurity is that the threat goal post is constantly changing. Adam Vincent, CTO-public-sector at Layer 7 Technologies explains:

> "The threat is advancing quicker than we can keep up with it. The threat changes faster than our idea of the risk. It's no longer possible to write a large white paper about the risk to a particular system. You would be rewriting the white paper constantly."  

Compounding the constantly evolving nature of cyber threats is the complexity of software (let alone the complexity of hardware and networks). Robert C. Armstrong and Jackson R. Mayo explain:

> "Complexity of software is an artifact of the complex things we require computers to do. Their capacity for computation is inextricably connected to the fact that they are also unpredictable, or rather capable of unforeseen emergent behavior. Vulnerabilities are one of those behaviors."  

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Cyber-experts, then, need to navigate between emergent vulnerabilities of software, as well as vulnerabilities in hardware and networks. Additionally, a well-trained cyber-expert takes a multi-disciplinary approach to solving problems and developing defensive and protective tools. This is because the quickly emerging field of cybersecurity aims to understand and anticipate more than technological vulnerabilities. The cyber-expert needs also to understand people, both the victims and the perpetrators of cyber crimes and cyber threats. Therefore, the cyber-expert needs to understand the habits and psychology of people who, tricked by hackers and other cyber criminals, unknowingly succumb to threats. Even more challenging, the cyber-expert needs to understand the habits and psychology of a very wide range of types of cyber criminals due to the wide range of attack targets cyber criminals have.

Our dependency on information systems permeates what seem to be innumerable aspects of our lives. On personal computers we store information that, if obtained by hackers, could potentially and dramatically negatively impact our quality of life. Additionally, we all have a vested interest in ensuring that information obtained by banks, internet retail operations, Social Security, Internal Revenue Service, the military, and the government, etc., is protected with the highest levels of confidentiality and integrity.

The emphasis we place at Cal Poly on the importance of helping students to learn from their successful problem-solving experiences, but also, to learn from failure, positions our faculty and students to be among the most “cyber-educated” citizens and professionals universities can create. The Learn by Doing approach we take at Cal Poly is ideal for training savvy cyber-experts who are holistic in solving cybersecurity problems.

A holistic hands on approach is crucial to understanding just how open-textured cybersecurity problems are. For instance, sometimes, specific kinds of cyber attacks can be in part explained by national borders. Richard Bejtlich, chief security officer of the Alexandria, Virginia based cybersecurity company Mandiant explains:

“In the West ... attacks are aimed at military facilities and intelligence communities. But Chinese hackers go after civilian targets, such as media organizations, banks, defense contractors, and law firms (if a particular company is too difficult to break into, Bejtlich says, ‘they go to [their] law firm or a supplier’ for information). One reason for this difference in perspective: in China, these groups are state-owned, unlike in the West.”

Addressing cybersecurity in the global context involves more than understanding regional and national differences in attack approaches because the profile of the cyber criminal is so diverse. He or she can live in and attack from the house next door, or any home anywhere in the world, work for a major corporation, a government, an army, or a terrorist organization.

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Since the nature and identification of cyber vulnerability, cyber crimes, and cyber attacks is always evolving, cybersecurity experts can successfully develop innovative preventative and response strategies to cyber threats only if their activities are governed by clear principles of academic freedom. Thus, a basic tenet of all Cybersecurity Center activities involves a commitment to academic freedom, which includes “the protection of freedom of inquiry, research, expression and teaching both inside and beyond the classroom.”

Cybersecurity Center: Need and Activities

Cal Poly needs a Cybersecurity Center to serve as the nexus for a wide range of activities that involve faculty and students partnering and collaborating with private companies, defense industries and government agencies, research labs (Sandia National Labs, Lawrence Livermore National Labs), as well as with experts from other academic institutions. CENG is setting the groundwork to establish Cal Poly as a leading producer of cyber experts. In time, Cal Poly intends to boast thousands of cybersecurity experts, at the undergraduate and graduate level, who can serve the cyber needs of society.

The diverse academic and professional interests of Cal Poly faculty and students strongly suggest that a wide range of possible cybersecurity experts will graduate from our programs. Students in engineering, the sciences, business, and ROTC students are all potential problem solvers and innovators in the complex world of cybersecurity. The Cybersecurity Center will function as a platform and a venue for many types of activities that will allow Cal Poly faculty and students to develop and hone expertise, including:

- Grant writing for cybersecurity projects and research
- Cybersecurity workshops and conferences
- Cybersecurity competitions for students
- Curriculum development
- Applied projects that will be implemented at the Cyber labs at Cal Poly
- Innovative projects that can lead to commercialization of new technologies
- Student internships in private, defense industries, and in government agencies
- Fund raising
- Fostering industry partnerships
- Cybersecurity training

Possible subjects of interest in Cybersecurity Center activities include:

- Cybersecurity and policy
- Cybersecurity ethics
- Cyber-warfare
- Cyber-resiliency

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7AS-709-10 Resolution on Private Donors
- Cyber-crime
- Cyber-terrorism
- Cyber-responsibilities

It is important to note that the Cybersecurity Center presents, for faculty participants, an exciting opportunity to implement the teacher-scholar model at Cal Poly. There already exists a significant amount of excitement and energy for increasing our cybersecurity expertise and experiences among many of our engineers. The Cybersecurity Center, which will engage with colleagues across the University and colleagues in industry, government, and the military, promises to help our faculty “create vibrant learning experiences for students” while enjoying enriching careers that allow for a strong connection between teaching and scholarship. Additionally, through the wide range of Cybersecurity Center activities, our faculty and students will also be of service to the interests of the university and society.

**Governance and Staffing**

Please see a proposed Cybersecurity Center Organizational Chart on the following pages.

A Cybersecurity Center Director will be responsible for management and oversight of all Cybercenter activities. The Director will report to CENG Dean, Debra Larson, and indirectly to the Dean of Research, Dean Wendt.

The Cybersecurity Center Director will seek direction and support from a standing Cybersecurity Council. Professor Ignatios Vakalis and Mr. Russell Bik will serve as the initial co-chairs the Cybersecurity Council.

Professor Ignatios Vakalis has served as Chair of the Computer Science Department in CENG at Cal Poly since 2006. Prior to joining Cal Poly, Professor Vakalis served as the Coordinator of the State-wide Initiative in Computational Science at the Ohio Board of Regents and Ohio Supercomputer Center, Executive Director of the Center for Computational Science at Capital University, and professor in the departments of Math and Computer Science at Capital University. Dr. Vakalis has worked on a cadre of projects in the areas of Computational Modeling and Parallel Computing with the Ohio Supercomputer Center (OSC). He also served as the chair for three international conferences on “Teaching of Undergraduate Mathematics.” Currently he helps shape the multi-prong strategic initiatives in the Computer Science Department, serving as its chair while maintaining passion in teaching.

Mr. Russell Bik was a founding stockholder of Sun Microsystems in 1982, where he served as Sun’s original Vice President of Operations, building the organization from three people to one shipping over a billion dollars a year in revenue. He served concurrently as a member of Sun’s Executive Committee and later became President of Sun Federal, a wholly-

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8AS-725-11 Resolution on Defining and Adopting the Teacher-Scholar Model
owned subsidiary he founded focusing on sales to the CIA and NSA. Since leaving Sun, Mr. Bik has continued to work closely with the venture capital firm of Kleiner, Perkins, Caufield & Byers serving as a corporate officer, CEO, and board member of numerous portfolio companies. Prior to Sun, Mr. Bik was employed by Intel for 7 years where he was one of the first 100 employees of the company's Systems Division. He is a Cal Poly graduate. As a student at Cal Poly he founded several startup businesses. After graduation he enlisted in the navy and later served in the U.S. Naval Air Reserve. Mr. Bik continues to pursue entrepreneurship working with both University of California at Santa Barbara and Cal Poly, where he is an adjunct professor. He has been a member of the Cal Poly "President's Cabinet" advisory council for over a decade and is a licensed instrument pilot.

The Cybersecurity Council will be comprised of Cal Poly faculty and industry representatives. Regular interactions between several faculty members and industry experts on cybersecurity initiatives already occur, so these relationships are healthy and established.

Faculty, students, and industry partners, will work together to accomplish goals that are cybersecurity project specific. Cybersecurity Center participants may depend on the expertise from colleagues working at other Cal Poly centers or institutes, such as the University Center for Innovation and Entrepreneurship or the Institute for Advanced Technology and Public Policy.

The Cybersecurity Director and Cybersecurity Council will ensure that best practices are maintained in all Cybersecurity Center activities. In addition, the Cybersecurity Director will ensure that Cal Poly policies and practices are adhered to in all Cybersecurity Center Activities.

Responsibilities of the Cybersecurity Center Director may include:

- Develop and coordinate initiatives and activities of the Cybersecurity Center in cooperation with industry partners, the Cybersecurity Council, Computer Science Advisory board, Dean of Engineering and the Chair of the Computer Science Department
- Spearhead the development of mutually beneficial partnerships with industry, agencies, key national forums and other institutions
- In cooperation with the Cybersecurity Council, develop specific measurable goals and objectives in general and, in particular, the use of resources committed to the Center
- Actively seek funding to support the operations of the Cybersecurity Center including equipment, grants, and faculty endowments
- Work to secure involvement of industry experts who can deliver specialty courses
- Uphold the highest principles of academic freedom
- In collaboration with faculty, develop strategic directions for curriculum development in the cybersecurity area
- Work with industry partners to secure student internship positions
• Seek sponsored research projects in collaboration with faculty and industry partners
• Be aware and supportive of the development of entrepreneurial opportunities within the cybersecurity area
• Participate in and represent Cal Poly in key professional meetings in the cybersecurity area

Faculty members already involved in cybersecurity activities/projects

• Philip Nico
• Franz Kurfess
• David Janzen
• Hisham Assal

More faculty members will be involved soon. For instance, the Computer Science Department recently hired a new faculty member with expertise in this cybersecurity.

Companies and industry partners already interested in partnering (partial list)

Group #1

• Northrop Grumman
• Raytheon
• Parsons
• McAfee

Group #2 (Partial list of companies as potential candidates for representation)

• Lockheed Martin
• Boeing
• PG&E
• Apple
• Intel
• Symantec
• Chevron
• Cisco
• VMWare
• Sandia National Labs
• Lawrence Livermore National Labs
• US Airforce

Assessment
As required by the California State University system, the Cybersecurity Center will be reviewed regularly in accordance with Cal Poly center and institute program review policies, practices, and timelines. Assessment of the Cybersecurity Center is tied to its mission. Therefore, the primary assessment question will be: what is the center supposed to accomplish? The quality and outcomes of center activities will be reported in program review. Faculty involved with the Cybersecurity Center will develop performance metrics for student engagement that measures output (e.g., how many students involved?) and outcomes (learning achievements). In addition, faculty will develop appropriate metrics for their activities within the center, such as the number of grants developed, workshops held, industry involvement, contracts, donations, and student projects.
Cybersecurity Center Organizational Chart

- CENG Dean
- Dean of Research
- Cybersecurity Center Director
- Cybersecurity Council

- Research Associates
- Faculty
  - Graduate Students
  - Undergraduate Students
  - Industry
  - Other Cal Poly Centers and Institutes (e.g., ATPPI)

- Training
- Workshops
- Internships
- Curriculum Development
- Innovation
- Applied or Basic Research
Cal Poly CyberSecurity Center

Q&A regarding the proposal to establish a Center for Cybersecurity:

Question (submitted by Thomas D. Gutierrez):
Will the proposed Cybersecurity Center work with campus computing and ITS to address actual practical security concerns related to Cal Poly? I don't think this was the intention of the center, which seems designed to be a professional training ground to address the more general national/international cybersecurity problem. However, there were a few comments made that vaguely made me think that campus security might be involved in the center's program. At the same time, it does seem a bit funny to have a Cybersecurity Center on campus and then NOT have our own campus computer security be informed by the work done there (and vice versa).

Answer (submitted by Ignatios Vakalis):
A number of key personnel of ITS (M. Miller – CIO; R. Matteson – Information Security Office of the CIO) are fully informed, and very supportive of the formation of the proposed center. The current symbiotic relation with ITS will be amplified in the area of “security” with the establishment of the proposed center, as we will explore projects and specific initiatives of mutual benefit. (For example, we envision that as students develop more expertise in specific areas of cybersecurity, ITS will be open to provide various forms of employment opportunities for these students).

Question (submitted by Thomas D. Gutierrez):
Will there be opportunities for other departments to become involved as interest arises? For example, in physics we have a quantum information group whose work is tied to basic physics research (theory, computational, and experimental) that may indirectly impact the medium-term future of cybersecurity (quantum cryptography, etc.). I'm sure other departments on campus may have some interest in similar or related problems. Or are the cybersecurity campus partners and departments essentially fixed based on those listed in the proposal?

Answer (submitted by Ignatios Vakalis):
The information stated in the proposal, and also as presented (on April 16) at the senate meeting, reflect a very partial list of faculty currently involved with projects related to cybersecurity. The College of Engineering has circulated an informal survey (to all colleges at Cal Poly) to identify faculty interested in the “umbrella theme” of cybersecurity. Because of the multidisciplinary nature of the field of Cyber Security, we are very open to form and expand collaborations with many departments and faculty colleagues. Certainly, we will be more than willing to discuss collaborative opportunities with the quantum information group of the Physics department.