Academic Plan for Cal Poly Master Plan
Graduate Education Strategic Plan 2014

Graduate Education Mission Statement

Achieve excellence in practice-oriented professional graduate programs which place graduates into the workforce with advanced knowledge and the leadership skills necessary to prosper in an increasingly competitive global economy. Inspire students to innovate and achieve excellence in their educational and professional career objectives.

THE PATH FORWARD: The Future of Graduate Education in the United States

“It has been argued that in the knowledge economy, a graduate degree will become the new bachelor’s degree, the minimal education credential that high-skills employers require. If that is so, then the U.S. is in peril of losing its competitive edge, with long-term consequences for our economy, our quality of life, and our global standing.”

April, 2010
Debra Stewart, President Council of Graduate Schools
Kurt Landgraf, President of Educational Testing Service

Cal Poly currently has 45 Masters Programs, 1 Masters in Professional Study and 5 Certificate Programs that are supported under 6 Colleges as outlined below:

College of Agriculture, Food & Environmental Sciences

- Agricultural Education
- Forestry Science
- Agriculture w/specialization in
  - Engineering Technology
  - Animal Science
  - Crop Science
  - Dairy Products Technology
  - Environmental Horticultural Science
  - Food Science & Nutrition
  - Irrigation
  - Plant Protection Science
  - Recreation Parks & Tourism
  - Soil Science
- MPS in Dairy Products Technology
College of Architecture & Environmental Design

- Architecture
- Architecture w/specialization in Engineering
- City & Regional Planning
- Transportation Planning

College of Engineering

- Aerospace
- Biomedical
- Civil & Environmental
- Computer Science
- Electrical
- Engineering Management (EMP)
- Fire Protection
- Industrial
- Mechanical
- Engineering w/specialization in
  - Bioengineering
  - Biomedical
  - Integrated Technology Management
  - Water Engineering

College of Liberal Arts

- English
- History
- Psychology
- Public Policy
- Printed Electronics & Functional Imaging

Orfalea College of Business

- Accounting & Taxation
- Business Administration (MBA)
- Economics

College of Science & Mathematics

- Biological Sciences
- Kinesiology
- Mathematics
- Polymers & Coatings

School of Education

- Counseling & Guidance
- Leadership & Administration
- Special Education
Certificates

- Facilities Management & Operations
- Systems Integration Engineering
- Space Systems Technology
- Printed Electronics & Functional Imaging
- Fire Protection Engineering Science & Application

U.S. Graduate Education Stats

- 1997-2009 more than ½ the Nobel Prize Winners had graduate degrees from U.S. schools.
- By 2010 Europe surpassed the U.S. in granting doctorate degrees in Science & Engineering:
  - 29% EU, 17% U.S., 16% China
- 2007 masters degrees awarded in U.S. = 604,607 while doctorate = 60,616.
- In 2009, 665,473 master’s degrees were granted in U.S.
  - 45% Female, 55% Male
  - White 45%, 10% Black, 7% Hispanic
- Between 2008 and 2018 2.5 million new jobs will require some level of graduate degree; this correlates to an 18% growth in jobs requiring master’s degree.
- Largest growth in Masters Degrees will be in Healthcare and Education.
- Masters degrees are often the terminal degree in Engineering, Geology, Education, Healthcare and Finance.
- 2008 Public Policy Institute of CA asked parents: what is the highest level of education hoped for in their children; 46% said a graduate degree.
- 2008 Median annual US salary by degree:
  - Bachelors = $52,624, Masters = $64,116, Doctoral $81,172.

www.nsf.gov/statistics/seind08/

Cal Poly Strategic Planning for an updated Master Plan 2015-2030

Tier 1 Questions
- What forces are shaping graduate education that may come into play by 2030?

Tier 2 Questions
- Who will be our students in 2030: demographics, college-prep?
- What will we be preparing our students to do in graduate education?
- What will our students need to learn to be successful in graduate education?
- What level of education will students need in 2030?
Narrative Response

(1) How will factors affecting higher education impact graduate students?

• We are living in a global knowledge-based economy where postgraduate education is a key driver towards success.

• For research oriented doctoral schools international students can make up to 50% of the student body; there is a large potential for Cal Poly to attract international students to increase its enrollment.

• Time-to-degree rates are slower for doctoral students (typical degree 7-yr completion rates): humanities 29%, science/math 48%, social sciences 41%, life sciences 54%, and engineering 57% (Council of Graduate Schools 2008). Therefore, if we design cohort-based masters programs with short time-to-graduate rates, this would provide a more cost-effective degree path for students seeking post-baccalaureate education

• Higher education leadership struggles with how to say NO in a consensus-based culture (Report on Trends in Higher Education 2014, Society for College University Planning). This makes rapid innovation in graduate education pedagogies difficult to implement; Cal Poly suffers from this affliction.

• The primary challenge for today’s higher educational systems is to continually do more with less; the CA state budget will continue to drive a transforming academic economy.

• Explosive growth of knowledge and interdisciplinary programs require extensive foundational training; Bachelor’s + Master’s degrees may become the entry-level into the workforce requirement.

• The average age of CA residents is increasing so the taxable earners will be declining; this will put more strain on state budgets and continue to force universities to provide efficient methods of delivering an education.

• Campus facilities are aging and building projects are requiring university-private sector partnerships. This will continue to make face-to-face education expensive which will make on-line degree options financially more attractive.

• Cal Poly faculty do not have an affinity for on-line learning formats; however, we will need to develop on-line summer offerings for lecture-based courses and consider developing virtual lab experiences.

• Overall, the cost of higher education is increasing and student debt and return-on-investment is becoming challenging; this also limits diversity as lower income students can’t afford Cal Poly; however, a resident face-to-face
educational experience will continue to provide a high value to students as long as job demand remains strong in CA.

- Cost of living in CA will continue to make it difficult to hire full-time tenure track faculty; the geographic location of Cal Poly will make it difficult to find part-time lecturers. It will be critical that Cal Poly find a way to provide competitive wages to faculty and staff.

(2) Who will our graduate students be (demographics) in 2030?

- Primarily CA residents will be admitted to Cal Poly, but there may be an increasing number of out-of-state students at the master’s level.

- Probably not a large increase in international students as the culture of CP and SLO make it difficult for these students to find a socially acceptable environment.

- CA has a diverse ethnicity (majority being Latino, White & Asian) with immigration leveling-off in the next decade. Many young students are coming from a weak K-12 educational background which makes it challenging to educate them in 4-years.

- Population growth rate in CA is declining so there will be fewer students entering college and competition for these potential applicants will increase amongst CSU and UC campuses.

- Cal Poly is not positioned to attract working professionals due to our face-to-face educational pedagogy and our non-metropolitan location.

(3) How will global & national factors impact graduate education?

- We need to increase our student’s global awareness of culture, language, politics, economics and their impact on technology.

- Public Policy Institute Report (January 2014 [www.ppic.org](http://www.ppic.org)) predicts that demand for educated STEM students will outpace supply in CA thru 2025.

- Cost of education and supply/demand factors will continue to drive Cal Poly to reduce times to graduation. Offering masters programs with a 1-year graduation rate would be very attractive to students.
(4) What will future graduate students be doing?

• A master’s degree will be the entry level degree for entering a professional career.

• Graduate students will need a flexible curriculum that provides interdisciplinary studies that equip them with a breadth of knowledge along with professional skills.

• Professional certificates if offered on-line can provide specialized areas of training for working professions who want to extend the value of their undergraduate degrees. Certificates can also assist employees who need to change career paths that align with global economic forces.

(5) What do graduate students need to learn (competencies)?

• Graduate students with interdisciplinary knowledge and skills will be highly valued. This can fit well with our Polytechnic culture: combined MS ENGR & MBA program, MBA & Public Policy, 3D manufacturing (EE, GraphicD, ME, MATE, BMED, IME).

• Specialized skills that enable them to provide value added problem solving capabilities to employers immediately upon hire.

• The integration of business knowledge with technical knowledge and skills such as communication and project management will enable students to fill management level positions in industry. This could be served by a well-integrated MBA and MSEng degree program. Along this line some universities are developing a professional science master’s degree (PSM).

(6) How might graduate students engage with emerging career fields?

• National educational needs are widely predicted in the following fields:
  o Cybersecurity
  o Global Healthcare
  o Data Analytics
  o Nutrition
  o Integration of Design (ENGR), Business (MBA) & Public Policy
  o Additive/robotic Manufacturing
  o Energy, Food & Water
  o STEM Educators
  o Infrastructure: civil, environment, architecture, sustainability
Summary Recommendations

A master’s degree will become the terminal degree and universities that provide integrated and cost-effective pathways to achieving a combined bachelor’s and master’s degree will be highly desirable. CA students will need to provide a high value-added level of performance as our cost-of-living leaves them at a disadvantage in the global economic competitive market. A high value-added level of performance will include the combination of business, technical and public-policy knowledge along with communication and critical thinking skills which fit well with our polytechnic culture.

I believe our blended programs (bachelors + masters) can be leveraged to be a very cost effective educational vehicle. Cal Poly should work towards extending the number of blended programs and optimizing double-counted units along with the integration of a culminating event that satisfies both degrees.

Traditional graduate programs in single-disciplines will become obsolete. The most viable graduate programs positioned for growth will be interdisciplinary in nature, have a clear demand from industry and be well differentiated in the academic marketplace. State funding will continue to decrease and so self-funded cohort based groups of students who can complete a master’s degree in one-year will become the desired end goal. Financial assistance in the form of tuition-waivers and teaching/research fellowships will continue to be required to be competitive with other research based schools where the government grants help support these benefits. An effort should be made to attract industrial-partnerships to fund tuition waivers and fellowships; perhaps by connecting them with internship and co-op experiences for our students.

Many of our current masters programs are offered in very traditional single discipline fields. They provide a supportive structure for our faculty to develop as teacher-scholars. However they may not provide a viable sustainable level of value added to Cal Poly. The following analysis evaluates the future growth viability of our graduate programs based on the following criteria:

- Number of enrolled students’ needs to be greater than 15.
- A program should enable 50% or more of its students to graduate in 3-years or less.
- More than 50% of applicants to the program should have an undergraduate GPA of 3.0 or higher.
- More than 50% of the required courses for the program should be at the 5XX level.

The results of this analysis are tabulated in a table at the end of this report. Moreover, based on this analysis it appears that the most viable graduate programs are as follows:

CAFES

- AgEducation – critical to CA but needs to be self-support
- MPS Dairy Technology – may not be sustainable
- MPS Nutrition – best program to promote under self-support
CAED
• Architecture – but limited market demand from CA employers
• City & Regional Planning – good program that needs to be promoted

CENG
• Aerospace – static but financially sustainable
• Biomedical – good growth potential, needs promotion
• Civil – static but financially sustainable
• Computer Science – good growth potential, needs more faculty
• Electrical – static but financially sustainable
• Mechanical Engineering – static but financially sustainable
• FPE – static but may not be financially sustainable

CLA
• Psychology – may not be financially sustainable
• Public Policy – growth potential, needs promotion
• Printed Electronics – may not be financially sustainable

CSM
• Biology – static but financially sustainable
• Polymers & Coatings – static but financially sustainable

SOE
• Education – static but financially sustainable

OCOB
• Accounting & Taxation – static but financially sustainable
• MBA+MS/Eng – could have growth potential but needs promotion
• Data Analytics (new) – good growth potential but needs promotion

Out of the Box Strategy

Establish a new Graduate College of Interdisciplinary Studies:

• No departments
• No tenure track positions; all contract based
• Instructors with diverse educational backgrounds and industry experience
• No traditional teaching space: class rooms or labs
• All courses on-line or with virtual lab experiences
• One big office = think tank, learning community for all instructors, staff & students
• Competency based, assess learning outcomes to move onto next class
• Potential programs: start as certificates and move into masters
  o Digital Health Care
  o Technology Leadership: MEng, MBA + Public Policy
  o Bioinformatics
  o Design with sustainable materials
  o Design for additive manufacturing
# GradEd Programs
Cal Poly, SLO - Fall 2014

<table>
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<tr>
<th>Viability Analysis</th>
<th>Fall 2013 Enrollments</th>
<th>Fall 2014 Admits %GPA&lt;3.0</th>
<th>Fall 2011 Grad Rate 3-yr</th>
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**BMS Programs**

**Self-Support Programs**