

UC Santa Cruz Silicon Valley Opportunities

Academic Senate Meeting – April 22, 2015

WHY UC SANTA CRUZ SHOULD BE IN SILICON VALLEY

UC Santa Cruz is known for its commitment to environmental stewardship, social justice, and the scientific and engineering advances that can be essential to the world's future. The impact of our research is demonstrated in citation rates and in defining academic communities worldwide. By increasing and extending our teaching to reach more diverse and international students, we can further help to shape the global future. There is no better place for us to accomplish this than Silicon Valley. This location encompasses:

- Diverse urban communities whose voices are increasingly heard all over the world, but which need better representation in Silicon Valley itself,
- A convergence of technology, science, and art museums that provide an educational canvas reaching tens of millions annually,
- Extensive support for entrepreneurial visions that have changed the way the entire world interacts with technology,
- The lower San Francisco Bay where the effects of rising sea levels will be vividly observed (Figure 1).



Figure 1: Research by the U.S. Geological Survey and others shows that if water levels in the San Francisco Bay rise 140 centimeters by the end of the century, thousands of acres (in blue) of natural tidal marshes, agricultural land, and urban areas would be vulnerable to inundation. Inset shows impact on SF Airport. [Image from San Francisco Bay Conservation and Development Commission]

Thus, a UC Santa Cruz Silicon Valley presence provides a number of academic opportunities:

- A venue for rich collaboration about issues and research questions that overlap with the academic interests of our faculty and doctoral students,
- A ready “market” for workforce and professional development training that complements existing doctoral programs thereby providing new opportunities for masters/professional enrollments,
- Opportunities to enrich educational experiences of our Santa Cruz-based students through access to Silicon Valley public and private sector people and facilities resulting from far-reaching partnerships facilitated by UC Santa Cruz’s physical presence,
- The opportunity to truly be the lead UC campus for that region, which in turn, strengthens UC Santa Cruz faculty connections with multi-campus research opportunities, and
- More visibility for Santa Cruz’s distinctiveness and direct access to philanthropic potential of the region.

Silicon Valley offers us the world's bully pulpit—a unique place that is in the best position to drive changes in social, environmental, government, and business practices needed for global prosperity (Appendix 1).

In our view, Silicon Valley also needs UC Santa Cruz—we bring to Silicon Valley cutting edge research knowledge of how to bridge racial divides, improve social equity, conserve our coasts and environment, understand the origins and future of our planet, promote sustainability through community action and social innovation, use art and games to promote discovery, and drive big science with big data, to name a few crucial themes, all under the umbrella of a public research university. Our faculty engage in cross-disciplinary thinking in their research level and likewise educate our students to think beyond boundaries. We train students to ask questions about “why” and “how,” not just “what.” We help students think about the jobs they are taking as part of whole career futures, not just train students solely to do the existing jobs of the present.

Silicon Valley is a region that celebrates Initial Public Offerings (IPOs) of stock of highly valued companies; this has driven, to some extent, a redistribution of wealth and the impacts of that are increasingly of concern. We want to contribute to Silicon Valley's evolution into a community that increasingly cares about developing enterprises that reduce exclusionary practices and social inequity to meet the needs of the world's aging population and changing environment. Silicon Valley is becoming receptive to new ways of doing business, because of the recognition that this contributes to long-term business success and sustainability. The stage is now set for us to bring our knowledge of how to meet these challenges into Silicon Valley. Moreover, support from the UC President for our potential in Silicon Valley, possible resources our management of NASA Research Park brings, and the ability to use a small fraction of the faculty FTE provided by rebenching all make it possible to have the initial resources needed to make a step change in launching successful new programs in Silicon Valley.

HISTORY OF UC SANTA CRUZ IN SILICON VALLEY

Silicon Valley has been an important part of the UC Santa Cruz education and research mission for decades. Many of our faculty have on-going research and entrepreneurial associations with Silicon Valley industries. Our students get internships with the companies, NASA's Ames Research Center, and non-governmental organizations in the area. In addition, it is a prime target for our graduates as they move into careers.

While these activities are primarily individually based, we also have a number of successful programs upon which we can build.

- **NASA's Ames Research Center** – One of NASA's ten field stations, Ames is dedicated to a suite of research missions, many of which align with those of UC Santa Cruz. The most relevant include biology, exoplanets, autonomy and robotics and human factors. In addition, research in unmanned aerial vehicles includes the critical analyses handled by many units with the Baskin School of Engineering, such as Applied Math and Statistics.

One hallmark of the successful collaboration with NASA's Ames Research Center has been the University Affiliated Research Center (UARC). Initiated about 12 years ago, this center coordinates a series of research projects under contract with NASA-Ames. The center has provided a growing research interaction particularly around air traffic control and Earth sciences, specifically in the area of remote sensing. This program also

has provided about \$4M/year into the general campus in addition to individual and group research awards.

We are currently in the process of competing for the contract for the UARC successor, the NASA Academic Mission Support program (NAMS). This proposal incorporates a collaboration with a number of other UC campuses as well as Stanford University, led by UC Santa Cruz.

Finally we have a ground lease on a sizable area of the Moffett Field location for a possible location for future campus activities. We have been working with a master developer to realize the potential of this ideally located parcel.

- **University Extension** – Through continuing and professional education, we provide extensive programs in engineering, business administration, and applied sciences. There are 12,000 individual students, drawing from the large number of Silicon Valley residents who want UC-quality courses with professional development in mind. UCSC Extension in Silicon Valley has a successful program for spouses/partners of H1-B workers. It also provides a wide suite of programs in affiliation with industry partners to meet the specific needs of these partners. Following restructuring, University Extension is now fiscally sound.
- **Games and Playable Media program** – This masters degree, started in Fall 2014, currently enrolls 22 full-time students in a one-year intensive program. It is a good example of the costs associated with mounting the academic portion of a program that has needs for special expertise and equipment (Appendix 2).
- **Senior Design Sponsorship** – The Baskin School of Engineering has, for the last few years, worked with Silicon Valley companies to sponsor the senior design program. For a relatively small investment, companies identify projects for teams of senior students to conduct. This program gives industry-direct projects to our students while simultaneously demonstrating the excellence of our students to the companies. In the last few years, the number of potential sponsors has outpaced the ability of the campus to provide courses and expansion into other areas is being contemplated.

THE CHOICES FOR UC SANTA CRUZ

UC Santa Cruz has considered many options for deployment in Silicon Valley. Our instructional mission could include a) undergraduates, b) upper division undergraduates, c) summer session, d) academic masters programs, e) professional programs, and f) doctoral students. Our initial thrust will be masters programs that can attract local residents who are living and working in Silicon Valley, as well as national and international students who are attracted by the combination of the program itself and the location. While we often classify masters programs in distinct categories (academic vs. professional), there is a continuum of approaches and we can choose how we utilize the approaches. Professional programs, however, may also have supplemental tuition that augments the program budget to provide for special needs related to their mission of training students for particular professional areas. .

It is likely that the initial programs will each become an “anchor” for additional programs. Ideally, these initial offerings would, over time, be joined by other programs, until we have a more

rounded presence in the South Bay. Some of these added programs would utilize courses from the original program while other programs would be quite different academically, yet build upon the facility and services provided.

While we can and probably should mount summer session classes in Silicon Valley, mounting significant undergraduate programs there would be difficult and would face direct competition from a number of community colleges at the lower division level and from San Jose State University and Santa Clara University for upper division students. It is possible that an alliance with Foothill-DeAnza College could allow expansion for some limited undergraduate enrollments but this would require additional infrastructure in student services and support.

Doctoral programs would add to the graduate enrollments that we would need to, in part, justify the re-benching money. However, doctoral students require significant investment of faculty time and are typically funded through campus-provided block allocations, teaching assistantships and fellowships, and externally-funded research. As UC Santa Cruz's graduate programs grow, increasing numbers of doctoral students will likely be located in Silicon Valley and will be advised by and work with ladder-rank faculty there, but they alone cannot provide a financially viable program.

THE BENEFITS FOR UC SANTA CRUZ

There are significant benefits to UC Santa Cruz from implementing masters programs in Silicon Valley. They include the overall support for graduate growth, expansion of our research impact, and access to a "power base" for policy, sponsorships, and fund-raising.

Supporting Graduate Growth

UC Santa Cruz has continually aimed to grow graduate enrollment, including a long-standing goal from the Academic Senate to grow graduate students to 15% of total enrollment. Among UC campuses (other than Merced and San Francisco), we have the lowest ratio of graduate students to faculty (Figure 2).

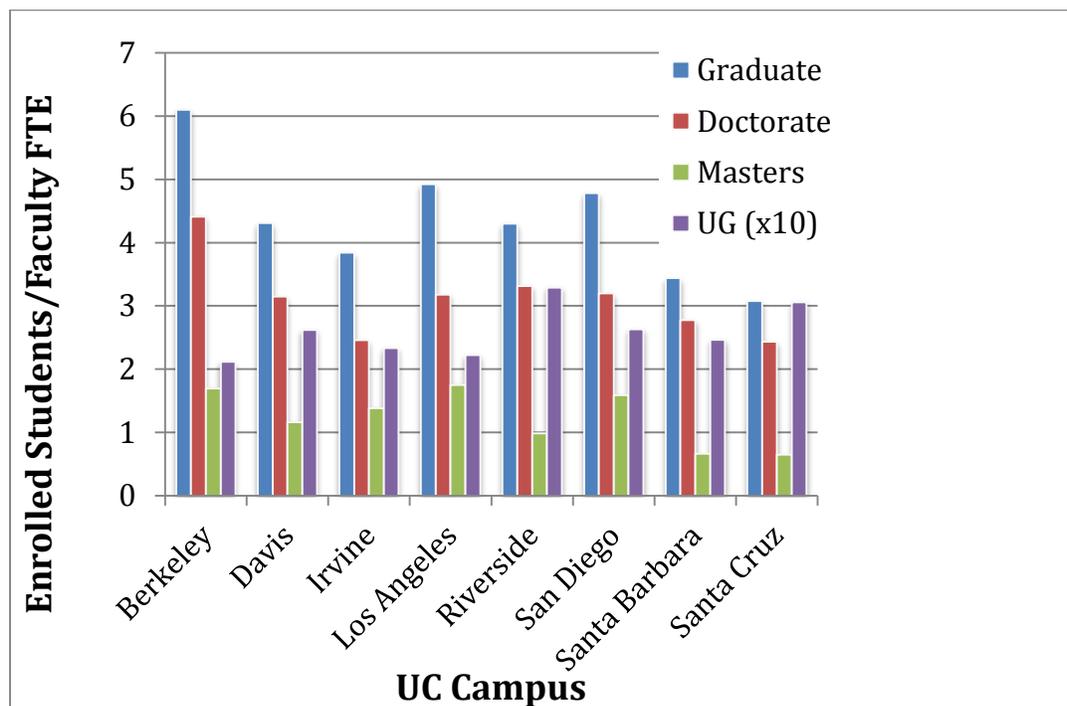


Figure 2. Enrolled Students per Faculty FTE. [Data from Fall 2014, except undergraduate from 2013]

We are notably low for both doctoral and masters students per faculty FTE. While we recognize that UC Santa Cruz has a higher undergraduate ratio per faculty FTE than most campuses, it is lower than that of UC Riverside, which is higher in all three ratios of doctoral, masters, and undergraduate students per faculty FTE.

A key component of doctoral growth in many fields is finding support to fund these students. A model used successfully at some institutions is to bring in more self-paying masters students. Our relative lack of masters students hampers our ability to grow doctoral enrollments, with masters students helping to justify graduate core curriculum and use faculty effort effectively. Simply adding faculty to be mentors for doctoral students can only work in disciplines that generate significant amounts of external funding. In other disciplines, doctoral growth is dependent on generating additional funding support, such as through masters student growth. While we can, and should, increase enrollment of masters students on the main campus, Silicon Valley provides a much higher growth potential to substantially increase our numbers of masters students who are either sponsored or able to pay for their program themselves, often through existing employment.

Expanding Research Mission

Currently a number of faculty and graduate students are involved in research in Silicon Valley. The majority focus in various engineering fields where contacts and collaborations with Valley industries are most productive ([UCSC SV Research](#)). Their interests include computer science, computer engineering, electrical engineering, data mining, technology management, and data science. These collaborations include industry sponsorship of programs, faculty research sabbaticals or leaves, and internships for graduate students.

NASA's Ames Research Center has also attracted faculty attention. Collaborations on remote sensing have been a highlight. The Advanced Studies Laboratory is an active research site located within the NASA-Ames complex which houses UC Santa Cruz faculty research facilities. It supports research in molecular and environmental biology, life sciences and astrobiology, Earth and planetary sciences, chemistry and chemical engineering, nanotechnology and materials science, and other areas. The Materials Analysis for Collaborative Sciences (MACS) facility houses advanced microscopy equipment for materials analysis in a collaboration between UC Santa Cruz and NASA.

Silicon Valley is also the research site for many other areas of academic research. Educational, economic, and environmental disparities are researched by UC Santa Cruz faculty and students. The cultural mix and diasporic changes are also areas relevant to campus research. For our students who want to engage in issues of urban living, this area is the prime location that allows both their research and classroom work to occur together—our urban extension station. Expansion of a “base” within Silicon Valley that is both an externally recognizable center for UC Santa Cruz and an internal starting point for research would be extremely beneficial for the campus. For our students, research in this area can be as rewarding as they find at programs such as UCDC in Washington or the UC Center in Sacramento.

Corporate Partnerships, Fund-raising, and Policy Impact

A greater presence in Silicon Valley will enhance the identity and reputation of UC Santa Cruz as well as advance our overall success with fundraising and alumni outreach in the region. Increased interaction between faculty and students with business and industry in the Valley will enhance the image of the campus through increased exposure of our work and greater understanding of the value we bring to the region.

Silicon Valley is home to the greatest concentration of UC Santa Cruz alumni – almost a third of whom live in the San Francisco to San Jose corridor. A more visible presence in the valley will provide significant opportunities to develop the alumni network and engage them in the life of the University where they live and work. It will also allow us an entrée into their companies and organizations. This highly developed network will aid in increasing jobs and internships for all students and newly minted degree holders.

Silicon Valley is one of the wealthiest regions in the world. The close access to a vast number of potential individual and corporate donors will increase the long-term cultivation of major gifts and significantly expand our donor base. (The tremendous philanthropic growth benefiting Stanford University and Santa Clara University over the past 30 years is a direct result of the proximity to this wealth and consistent engagement with Silicon Valley alumni and donors.) Our commitment to sustainability and social responsibility as well as our global standing provides natural links to these individuals.

UC Santa Cruz is currently a member of the Silicon Valley Leadership Group (SLVG), a major policy and advocacy group representing almost 400 of Silicon Valley's most respected employers on issues, programs, and campaigns that affect the economic health and quality of life in Silicon Valley, including energy, transportation, education, housing, health care, tax policies, economic vitality and the environment. The distance of the campus to Silicon Valley has hampered our ability to fully exploit this resource for advocacy and fundraising. The value of

an expanded presence in the Valley to enhance our visibility, impact, and external funding opportunities is enormous.

SILICON VALLEY DEGREE PROGRAMS

UC Santa Cruz will enhance our academic presence in Silicon Valley with selected masters programs. These programs will be anchors for additional programs and opportunities for doctoral, masters, and undergraduate students. We often classify masters programs by the extremes (academic vs. professional), but there is a continuum of approaches. We anticipate that most of the masters programs in Silicon Valley will be more professional in nature, whether or not they carry Professional Degree Supplemental Tuition (PDSTs), designed to train students for jobs in fields other than academic research. For the more research-focused masters programs, the classes designed for the masters students will also serve our doctoral students. Masters programs could attract local residents who are living and working in Silicon Valley as well as national and international students who are attracted by the combination of the program itself and the location. In the future, there may [certain campus program](#) areas where 3/1 programs (three years at the main campus and a final upper-division intensive year of study at SV) for a bachelor's degree or 3/2 (three years at the main campus, two years at SV) for a master's may be attractive.

Program Pre-Proposals (April 2015, Unranked)

MS in Electrical Engineering (Nanotechnology) (Sponsoring department: Electrical Engineering): This program could be mounted with a small ladder-rank faculty investment with support from adjunct faculty positions. Areas of focus in nanotechnology include data sciences, personalized medicine, and energy storage and conversion. Research requirements would include dry labs and access to wet/clean room facilities. Target students could reach over 100.

MS in Computer Engineering (Aeronautics) (Sponsoring department: Computer Engineering with faculty participation from Computer Science, Applied Math and Statistics, Electrical Engineering): Building upon the close ties to NASA's Ames Research Center, this proposed program utilizes six ladder-rank FTE to focus on the integration of Unmanned Aerial Systems into our airspace. This drive "provides engineering challenges that span across many fields, including robotics, autonomous systems, multi-agent systems, cyber-physical systems, modeling and optimization, systems analysis and integration, trajectory modeling and control, large-scale distributed simulation, cloud computing, network security, and big-data networking." Target MS students could reach 50-70 with additional doctorate students.

MS in Data Science (Sponsoring departments: Computer Science, Applied Mathematics and Statistics, Economics, and Technology Management): An intensive academic program with a six-month internship with industry would allow students to build core strength while supplementing this with foci provided by the different sponsoring departments. Core curriculum would be delivered using a combination of campus-based faculty and Silicon Valley lecturers with a program director. Target MS students could reach about 40 at steady state.

MS in Computational Media (Serious Games) (Sponsoring department: Computational Media): This program focuses on the use of games for "education, training, public policy, and crowdsourcing." The program would require a ladder-rank faculty member and staff. Target enrollment would be 50-65 students in a combination of one- and two- year tracks.

MS in Computational Media (Human-Computer Interface) (Sponsoring department: Computational Media with Psychology): This program focuses on the interactive aspects of systems – where humans utilize computational technology. The program would require an anchor ladder-rank faculty member and staff to mount. Target would be for 40-65 students over two tracks (one- or two-year tracks).

MS in Computational Media (Human Language Media and Models) (Sponsoring department: Computational Media with Linguistics): This program examines “formal modeling and applications of human language media and user interaction in such media, including automated analysis of computer-mediated communication such as found in social media.” This program would build on the Faculty Initiated Group Hire (FIGH) proposal in Natural Language Processing in Social Media. The program would require a ladder-rank faculty member to champion the program and professional staff. Target would be 45-60 students over a combined track (two-year or accelerated).

MS in Technology Management (Sponsoring department: Technology Management): This is an already approved degree program that has not been fully mounted, but received considerable interest within Silicon Valley. It aims to train engineers to “conceptualize the business environment and use that knowledge to craft the technology and business strategy in concert.” This program would utilize professional staff until such time as hiring of a ladder-rank faculty member is warranted. Target enrollment would be 65 students.

MAS/MS Global Technology and Social Innovation (Sponsoring faculty: Environmental Studies with Sociology, Physics, Computer Science): This pre-proposal is for an innovative, interdisciplinary program that examines more effective use of digital tools and technologies for social innovation. It would focus on low cost, accessible information and sustainable technologies – bringing sustainable options on a global scale. Target enrollment would be 60 students in combined one-year, two-year, and accelerated programs. Pre-proposals will be evaluated by the Academic Senate and by the Administration and feedback provided to the authors in Spring 2015. The most promising will be forwarded for a market analysis to look at 1) the prospective student demand within Silicon Valley, 2) the prospective student demand beyond Silicon Valley (potential draw to the area), and 3) the employability of graduates of the program. We will also examine the competitor field for similar programs within Silicon Valley (Appendix 3).

Resource Needs for Programs in Silicon Valley

The main campus will provide many services and resources for new programs in Silicon Valley. These include, but may not be limited to, enrollment, advising, financial services, procurement, human resources, and academic personnel. Establishment of additional programs in Silicon Valley will however, require local resources in a number of areas including support for instruction, general administration, and facilities and operations. The size and nature of the academic programs will, to some extent, determine the local resource needs.

We assume that initial masters programs will not require wet labs or other specialized facilities, which minimizes requirements for additional central staffing or oversight in Silicon Valley. The positions that will be needed to support instructional and administrative activities might include:

- a program administrator to coordinate operations with the main campus,

- an administrative assistant to provide general support for faculty and students,
- a technical staff member for office and classroom support, and
- a facilities manager consistent with models for multi-tenant campus buildings.

Of course, the actual facilities costs, whether the campus owns the facility or not, will account for a major portion of resource allocation to the Silicon Valley programs. Costs of technology infrastructure including connectivity to CENIC, voice services, and emergency communication services will also vary depending on the location and size of the facility.

Direct program costs will, at a minimum, include instructor salaries, TAships, and marketing costs. These costs will vary by program, and once programs have been selected, each program cost profile, including start-up costs, will need to be modeled on an individual basis by Planning and Budget. Templates by which these costs can be calculated for the program have already been designed (Appendix 4). The operating budget profile for PDST programs follows a format defined by UC Office of the President and is reviewed at that level.

While UC Santa Cruz may provide some housing assistance for students and employees in Silicon Valley, housing will be the responsibility of the individuals. The campus may also assist with coordinating access to transportation information and resources. We do not intend to provide routine transportation for faculty, staff or students either in Silicon Valley or between Silicon Valley and the main campus. We will coordinate with local community service, safety, and emergency management agencies for services for the Silicon Valley location.

Resources Generated by Masters Programs in Silicon Valley

Masters programs in Silicon Valley are targeted at students who do not require any financial support from the campus. Thus the tuition that these students pay (if they increase the total number of students), along with PDST and/or non-resident tuition, if applicable, represent new revenue for the campus. PDST is an augmentation above regular tuition that specifically provides for expenses needed to run the program, and it cannot be used for any other purpose. Part of the PDST is set aside as return-to-aid to assist students who may not be able to fully afford the PDST. The remainder is used to help fund the additional instructors, staff, equipment, and supplies needed by the program to fulfill its mission of professional training and placement.

Return-to-aid from tuition for academic masters is 48%; for professional masters it is 29%. Because these masters students are not receiving financial support from the campus, this return-to-aid money goes directly into supporting doctoral and MFA students across the campus, through block grants, TA tuition remissions, and other distributions by the Graduate Division. Thus masters enrollments in Silicon Valley help fund doctoral and MFA students on the main campus, across all divisions. Masters enrollments are one of the few mechanisms to bring in new money for graduate support, the other primary source being external grants received by faculty and other campus funds. In disciplines where grant support for students is difficult to obtain, the revenue from masters students is critical for the campus to provide support. Note that this return-to-aid goes into a general pool for the whole campus, it is not specific to the program or the division. As the potential for self-funded masters students is greater in Silicon Valley, growth of masters programs in Silicon Valley is our most promising approach for generating funding for supporting doctoral and MFA students.

Masters programs in Silicon Valley are still UC Santa Cruz masters programs, and we launch them for their academic value, not as an overall profit center for the campus. While the return-to-aid is an important revenue source for the campus, the rest of the tuition helps fund operations on the main campus and in Silicon Valley, without an expectation of financial profit, just as there is not an expectation for any of the main campus academic programs. That said, it is important that programs are financially viable. Appendix 4 provides a resource planning template so that PDST program proposers can work out the needed level of PDST to ensure that well-defined and limited ongoing funding is needed beyond an initial one-time investment.

CONCLUSION

Rebenching is providing funding for 100 new faculty positions over six years (2012-13 through 2017-18), and we are planning to initially use funding for 14 of those for Silicon Valley efforts. This is a reasonable initial resource allocation for what can result in substantial gains for the campus overall in our reputation, graduate enrollments, and support for doctoral and MFA students. These faculty members will be expected to be research-active, to mentor doctoral students, and to bring in external funding; they may also have greater access to funding from industrial collaborations and philanthropic communities residing in Silicon Valley. All ladder rank faculty in Silicon Valley will teach undergraduate courses regularly. We anticipate that no faculty will be hired for Silicon Valley who do not fit into the priorities of departments and divisions on the main campus because the goal is to extend our strongest and most promising programs there and to create new program areas as appropriate. If a particular program were judged not to be viable in the future based on performance, the faculty will have positions in departments on the main campus and will contribute to programs there.

The faculty in Silicon Valley will continue to contribute to the research, teaching, and service missions of the entire campus. Doctoral students will have research opportunities working with faculty in Silicon Valley, and undergraduates can have internship opportunities we develop in Silicon Valley businesses, agencies, and organizations. Faculty in Silicon Valley will contribute to the service, research, and teaching mission of the university, equivalently to the faculty from all of our divisions. Expanding into Silicon Valley allows us to serve a much wider population of students and more efficiently use faculty time to address our academic goals than we can currently do by confining our academic programs to Santa Cruz.

Appendix 1. Building Partnerships and Research Infrastructure in Silicon Valley

Since the cost of new buildings must be borne (at least in part) by the campus, our success in Silicon Valley will depend on our ability to build partnerships and leverage Silicon Valley's extensive existing infrastructure for research and teaching. These partnerships and facility access can be strengthened through adjunct appointments for researchers at these institutions who could also serve as research mentors for our students and as instructors for our courses. We can also establish internships for our students with these industrial partners so that they have facilities at which they can complete their research and training.

For engineering and science students, national facilities at locations such as NASA Ames, SLAC/SSRC, Berkeley and LBNL (including advanced Light Source and Molecular Foundry), Stanford and LANL, provide ample locations for research. Many of our students and faculty have also collaborated with scientists (and utilized facilities) at Silicon Valley industries, such as IBM Almaden, Agilent, SRI, PARC, and Google. Computational scientists could utilize the facilities managed by NASA Ames Advanced Supercomputing Division, with faster connections than would be available by accessing the computers from the main campus. Faculty and students focused on sustainability and environmental research in Silicon Valley could do research at the US National Wildlife Refuges and nature reserves such as the Don Edwards San Francisco Bay National Wildlife Refuge, the Eden Landing Ecological Research, Ravenswood Open Space Preserve, San Francisco State Fish and Game Refuge, Golden Gate National Recreational Area, and extend our partnerships with organizations such as the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, State Coastal Conservancy, US Geological Survey, US Army Corps of Engineers, the Nature Conservancy, and the extensive network of regional parks, water, and waste water management districts. Our faculty interested in STEM education and communication could collaborate with museums such as the Exploratorium, Tech Museum of Innovation, Children's Discovery Museum, Chabot Space and Science Center, and California Academy of Science.

For faculty and students working in the Social Science and Humanities, Silicon Valley has numerous libraries and ethnic and cultural museums in San Jose and San Francisco, such as the Computer History Museum, Asian Art Museum of San Francisco, Japanese American Museum of San Jose, Rosicrucian Egyptian Museum, Chinese Culture Center, Contemporary Jewish Museum, GLBT History Museum, Mexican Museum, Museo Italo Americano, Museum of Russian Culture, Museum of the African Diaspora, and the Pacific Heritage Museum. Arts faculty and students could take advantage of performing art complexes like the San Jose Center for Performing Arts, Flint Center for Performing Arts, Mountain View Center of Performing Arts, Cirque du Soleil, Yerba Buena Center for the Arts, and art museums such as the de Young Museum, San Jose Institute of Contemporary Art, San Jose museum of Quilts and Textiles, the Letterman Digital Arts Center, and the San Francisco Museum of Modern Art, to name just a few.

In addition to these facilities, UC Santa Cruz has space for faculty and lecturer offices, classrooms, and student communal space in the building that houses Silicon Valley Initiatives and University Extension. We also have a ground lease on a large parcel of land south of the historic district at NASA-Ames. We are currently working with a master developer who will use a large part of this land for mixed use of business/housing/open space and will provide the infrastructure the campus will need to develop the remaining parcel. Estimated timeframe by which we could begin a UC Santa Cruz building is approximately 5 years – but in order to begin

that development we must have a clear idea of the programming that will occupy the potential of over 300,000 square feet of space available within the building framework.

Appendix 2. Excerpts from A Proposal for a Program of Graduate Studies in Games and Playable Media for the M.S. Degree, October 2012

October 3, 2012 transmittal letter from JBSOE Dean to VPAA
Sections 6-10, Resource Requirements etc.
Appendix C, Proposal for Professional Degree Supplemental Tuition

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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October 3, 2012

HERBIE LEE
VICE PROVOST, ACADEMIC AFFAIRS

RE: Games and Playable Media M.S. Degree Proposal

Dear Herbie:

I am pleased to transmit the enclosed revised proposal from the Computer Science Department for a M.S. degree program in Games and Playable Media.

The proposed program builds on existing faculty strength in leading new technical directions for games that open new possibilities for game design. Approaching the discipline with an interdisciplinary grounding is consistent with the Baskin School of Engineering (BSOE) academic vision and aligns with campus priorities. This new graduate degree will have a strong Silicon Valley connection, offering courses at UCSC's Silicon Valley Campus (SVC) in Santa Clara and recruiting students from amongst professionals interested in living and working in the Silicon Valley region.

This professional master's program builds upon the foundation laid by the existing Computer Game Design B.S. within the Computer Science Department, and we expect to attract some of our own undergraduates into the graduate program. A professional graduate level degree represents a natural extension of our growing scholarly emphasis in the areas of Game Design and Playable Media, where BSOE has added ladder faculty positions and expanded student enrollments in recent years.

Game technology is an important component of BSOE's long-range academic plan, including objectives to:

- a) Promote and build interdisciplinary programs across department boundaries, both within BSOE and with other academic divisions at UCSC.
- b) Continue developing a substantial academic presence in the Silicon Valley through a combination of graduate instruction, technology oriented research, and employment of BSOE degree recipients.

Resources: BSOE fully commits to the financial resources necessary to launch and sustain a high quality one-year M.S. program in Games and Playable Media, as described in the attached degree program proposal. Committed financial resources include one-time start-up funds in the amount of \$742,000 to cover projected program shortfall during the first three years. This includes \$500,000

allocated by CPEVC Galloway per the attached letter and the remaining \$242,000 from BSOE funds. Other financial resources include revenues from the proposed Professional Degree Student Tuition (PDST), as outlined in the attached proposal.

Timing is right to proceed now with implementation so as to gain market share and capture attention from the gaming industry both locally and globally. The prospects for success are substantial, given that the Games and Playable Media M.S. is one of only a few graduate instructional programs of its kind anywhere, in addition to the natural locational advantage of being offered in the heart of the Silicon Valley. Program implementation will facilitate BSOE and UCSC further developing a strong foothold in this global center of technological innovation. It also is expected for this program to prove very attractive in creating opportunities for potential external funding once established, building upon BSOE's recent success in securing Silicon Valley corporate partners in support of our school-wide undergraduate Senior Design Project curriculum.

Faculty FTE: The proposed one-year program can be implemented successfully using the existing game design ladder faculty within the Computer Science Department plus the approved search (currently underway) for one additional ladder faculty FTE. This additional hire is consistent with BSOE long-range academic planning objectives to expand core disciplines.

Due to the professional nature of the Games and Playable Media M.S. program and the offering of courses at SVC, adjuncts/lecturers are a critical instructional component of program delivery. Initially, BSOE will support the hire of adjunct/lecturers through a combination of forward-funded campus support and PDST revenue. As enrollments grow, the School will fund the program from PDST revenue and existing core funds.

Student Support: Consistent with UC policy, a minimum of 33% of the PDST revenue will be allocated for student financial support. Increased aid is possible to attract underrepresented students. While some students may be eligible for TAships, we anticipate most will not be supported from TA funds.

Space: BSOE is committed to providing necessary office, classroom and laboratory space for faculty, staff and students to adequately support the Games and Playable Media M.S. program primarily at UCSC's Silicon Valley Campus (SVC) in Santa Clara (commonly referred to as the Augustine Building). The Silicon Valley Initiatives (SVI) Administration has endorsed the program and in consultation with BSOE has committed office and laboratory space as detailed in the May 8 and September 26 letters from Gordon Ringold, Senior Director of UCSC's SVI. Current space available to the Computer Science Department in the BE and E2 Buildings will accommodate any on-campus needs of the program.

Equipment: The attached proposal describes in detail the computing and other equipment program needs. Specialized equipment for the Games and Playable Media instructional laboratory located at SVC will be funded by campus temporary allocations as part of program start-up. Future equipment needs, including upgrades and expansion, will be funded by BSOE, from PDST revenues, core funds, or external donations. To ensure equipment remains current, there is a scheduled \$35,000 per year set aside for replacement.

Staffing: The M.S. program will be supported by new and existing personnel, including a new Program Director, Creative Director and Director of Professional Development, an existing BSOE-funded administrative staff position at SVC, and existing BSOE-funded CS administrative staff. The new staff will be initially funded with program start-up funds from CPEVC and BSOE, and subsequently with PDST revenues. As graduate enrollments grow, we are committed to increasing staffing support as needed, using PDST revenue that accompanies new enrollment. This includes staff

expansion both at SVC and on campus.

Under the leadership of Computer Science Department Chair Jim Whitehead and Associate Professor Noah Wardrip-Fruin, the faculty members have prepared an excellent graduate degree proposal that carefully considers important perspectives of both industry leaders and various game design faculty appointed in the arts, humanities and social sciences. I strongly endorse this proposal and urge campus approval.

The Baskin School of Engineering looks forward to launching the Games and Playable Media M.S. program as well as continuing our leadership role in increasing UCSC's academic presence in Silicon Valley.

Sincerely,

A handwritten signature in black ink, appearing to read "Arthur P. Ramirez". The signature is fluid and cursive, with the first name "Arthur" being the most prominent.

Arthur P. Ramirez
Dean

Attachments

cc: Assistant Dean G. Winans
Chair J. Whitehead

SECTION 6. RESOURCE REQUIREMENTS

6.1) FTE FACULTY

One new ladder-rank FTE faculty member will be required to launch the degree. A search for this faculty member is approved by the CPEVC and scheduled for the 2012-13 academic year. In addition, launching the degree will require a full time lecturer (the Creative Director), teaching from two staff members (the Program Director and Director of Professional Development) as well as a single course lecturer.

6.2) LIBRARY ACQUISITIONS

UC Santa Cruz currently has a strong collection of games and game systems as compared with other UC campuses. This is an important potential resource to students in this degree as they research previous games related to those they plan to build. It would strengthen the proposed degree if this collection continued to grow, so we have budgeted \$1,500 per year for this purpose. This is in addition to the fact that, with each ladder hire, \$5,000 in new library funding will be available consistent with campus practice. Please see attached letter (in Appendix B) from Robin L. Chandler, Associate University Librarian, Collections and Library Information Systems, UC Santa Cruz.

In addition, a smaller collection of uncataloged games and game development texts will be integrated into the lab in which students will work during the game development and production sequence (GAME 280-283). We have budgeted \$2,000 per year for this purpose.

6.3) COMPUTING COSTS

There are six primary areas of computing costs. First, outfitting the program lab with development workstations. Second, outfitting the program lab with specialized platforms for development targeting and game research. Third, computing resources for program personnel. Fourth, computing resources for program space. Fifth, software license costs. Sixth, the program will set aside \$35,000 per year to allow for a five-year schedule for replacement of this equipment so that it remains up to the continually-ramping needs of game development.

The first of these, outfitting the program lab with development workstations, is the most significant. This lab will need dedicated high-performance development workstations with two monitors (for showing development environment and game simultaneously). These would be equivalent to a 2012 Dell Precision T7500 with appropriate processing, memory, storage, graphics card, and monitor options, as well as ergonomic keyboards and mice. The cost per workstation is roughly \$6,000 each. Because pair programming and other collaboration is encouraged by the program, the lab will require half as many workstations as currently-enrolled students. For a full complement of 30 students this will cost roughly \$90,000. In addition, the lab will require laser printing, optical disk burning, and other network-available computing services, adding roughly \$5,000 to the lab computing costs, for a total of \$95,000.

Second, the program will need to acquire at least one of all the significant consumer and research platforms for deploying and viewing games, so that students have the option of developing games for these platforms and understanding current game design practices on these platforms. This includes game consoles (Xbox, PlayStation, Wii: \$1,000), mobile devices (iPad, iPod, Vita, DS: \$2,500), phones (iPhone, different Android and Windows Phone models: \$2,500), and more unusual devices (e.g., Microsoft Surface, RFID scanners, augmented reality viewers: \$5,000). The lab will also require a few large displays, presumably at least one of which is a 3D display (\$4,000). The initial cost of this will be roughly \$15,000.

Third, computing resources will be necessary for the Program Director, Director of Professional Development, and Creative Director. We estimate that each will require the equivalent of a current 15" MacBook Pro laptop, with a single 27" external display, appropriate external keyboard and mouse for an ergonomic work environment, and a backup system. The current total cost per person of such a setup is roughly \$4,000. For the three key personnel it is roughly \$12,000.

Fourth, there will be computing costs associated with the space. We expect that at least a network switch, wireless access point, and new network drops will be needed, for a rough cost of \$15,000. The lab will also require a high resolution projector, for a rough cost of \$3,000. Beyond this, these costs are not possible to accurately estimate at this time.

Fifth, it will be necessary to acquire software licenses for the program lab's workstations. Licenses may be necessary for 3D modeling software, 2D image editing software, sound generation software, game engines, and other purposes. We estimate the initial yearly cost to be \$1,500 per workstation, for a total of \$22,500.

Sixth, the program will set aside \$35,000 per year to allow for a five-year schedule for replacement of this equipment so that it remains up to the continually-ramping needs of game development. This is necessary, given that students in a professional program must be working with current technologies. Not only do game development technologies go out of date rapidly, but also new technologies are introduced on a regular basis, while other pass into obsolescence.

Our resource model assumes that computing technical support will be provided by personnel of the UCSC Silicon Valley Center and campus ITS support personnel.

6.4) EQUIPMENT COSTS

Our model assumes that the common office equipment (e.g., phones, photocopiers, printers) will be provided by the UCSC Silicon Valley Center.

The major cost beyond this will be furniture for the specialized program lab. This will include work tables with ergonomic mounts, ergonomic chairs, meeting tables, couches for playing at game consoles, equipment shelves, whiteboards, display mounts, and similar items. Our estimated total cost for this furniture is \$75,000. Chairs, desks, and other furniture for the

Program Director and other personnel will require an additional \$5,000 per office, for a total of \$15,000.

6.5) SPACE AND OTHER CAPITAL FACILITIES

We expect to be able to use the current facilities of the UCSC Silicon Valley Center for all needed classrooms. We believe a dedicated lab is required for the Game Development sequence, which we expect will be located within the current Silicon Valley Center building (see letters of commitment in Appendix B).

6.6) OTHER OPERATING COSTS

Operating Costs: A major operating cost for the program will be personnel. A high-profile Creative Director and Program Director will be hired as well as a Director of Professional Development.

There is not an additional need for administrative support, as this can be provided by the staff member already in place in Silicon Valley (currently Siubhan Pabst). The remaining major operating cost is staff support for essential operations, such as graduate admissions. These will require the expertise of different staff in the university (e.g., the current Computer Science Graduate Advisor will handle admissions-related work). Together with technical support we estimate that the costs will add one additional staff FTE of work to current School of Engineering needs.

Beyond this, the program will require some supplies (e.g., paper, toner), support for events (including a yearly game showcase event, playtest events, and events for prospective students), support for invited speakers (industry experts, mock interviewers, guest critiquers), support for documentation and communication (video and printed catalog of each year's projects and a resume book of current students), staff travel, and one-time class expenses. We estimate this as \$23,500 during the first year.

Marketing Costs: Our approach to marketing is primarily focused on in-person communication. The program will have a presence at two of the major game conferences each year that attract attendees of the profile of the students we wish to recruit: Game Developers Conference (the major yearly gathering for the industry) and Penny Arcade eXpo (the major yearly game culture gathering—essentially “Comic-Con for Games”). Presence at these conferences will be used not simply for recruiting, but also to raise program profile and showcase student work, raising the value of the degree and helping boost the careers of students and alumni. In addition, we plan to send program representatives on two recruiting trips each year to undergraduate programs that we hope will establish “feeder” relationships with the degree, such as that at Rochester Institute of Technology (which graduates ~200 students a year). Together, the marketing costs are \$55,000 per year.

6.1) INTENDED FUNDING SOURCES

The financial model for the degree is a combination of state funding, regular UC student tuition, and professional degree supplemental tuition (PDST). A separate PDST proposal is appended (Appendix C). The Baskin School of Engineering Dean Ramirez letter of commitment confirms the resources are in place to launch the graduate program.

SECTION 7. GRADUATE STUDENT SUPPORT

Consistent with UC policy for PDST funded graduate programs, 33% of PDST will be used for financial aid purposes. In addition, though it is not guaranteed, students will also be eligible for GSR positions to work with faculty doing research in games. There is also the potential for qualified students to receive TAs for undergraduate games courses.

Even without GSR or TA support, we plan for this program to be less expensive—both in yearly cost and in total cost to degree—than the most comparable programs, which are those at private universities USC and CMU. The proposed degree will be the least expensive of its kind offered in California and the only public degree offered in California. Here is a comparison of approximate program costs, based on the current PDST proposal:

<i>Institution</i>	<i>Yearly Cost</i>	<i>Cost to Degree</i>
Carnegie Mellon University – Silicon Valley (private)	\$44,800	\$85,354
Southern Methodist University (private)	\$32,400	\$64,800
Drexel University (private)	\$28,773	\$55,120
University of Southern California (private)	\$37,978	\$54,775
University of California, Santa Cruz	\$51,621	\$51,621
DigiPen Institute of Technology (private)	\$19,986	\$37,566
University of Central Florida (public)	\$25,988	\$33,000
University of Texas Dallas (public)	\$15,148	\$30,296
University of Utah (public)	\$14,839	\$28,972

Given that starting salaries for students in UCSC’s undergraduate games degree have been approximately \$80,000, and that students with an MS are likely to attract higher salaries, we believe that this degree will not create an inappropriate debt burden for students, especially given that 33% of PDST will go toward financial aid.

SECTION 8. CHANGES IN SENATE REGULATIONS

No changes are required.

SECTION 9. WASC APPROVAL

WASC has approved the UC Santa Cruz campus to offer degree programs at the Silicon Valley Center. Consistent with WASC requirements, the Games and Playable Media M.S. will be reported to WASC following implementation.

SECTION 10. CPEC SUMMARY

Please see appendix G.

SECTION 7. GRADUATE STUDENT SUPPORT

**Multi-Year Plan for Professional Degree Supplemental Tuition Levels
 2013-14 through 2015-16**

I. PROJECTED PROFESSIONAL DEGREE SUPPLEMENTAL TUITION

	Proposed Last Year			New Proposed Fee Levels			Increases/Decreases		
	2012-13	2013-14	2014-15	2013-14	2014-15	2015-16	2013-14	2014-15	2015-16
Prof. Degr. Suppl. Tuition (CA resident)	\$0	\$0	\$0	\$28,900	\$30,348	\$31,560	#DIV/0!	5%	4%
Prof. Degr. Suppl. Tuition (Nonresident)	\$0	\$0	\$0	\$28,900	\$30,348	\$31,560	#DIV/0!	5%	4%
Mandatory Systemwide Fees (CA resident)*	\$16,256	\$17,232	\$18,528	\$17,232	\$18,522	\$19,914	6%	7.5%	7.5%
Health Insurance**	\$2,895	\$3,050	\$3,200	\$3,050	\$3,200	\$3,350	5%	5%	5%
Campus-based Fees***	\$1,449	\$1,423	\$1,423	\$1,423	\$1,423	\$1,423	-2%	0%	0%
Nonresident Suppl. Tuition	\$12,245	\$12,245	\$12,245	\$12,245	\$12,245	\$12,245	0%	0%	0%
Other (explain below)							#DIV/0!	#DIV/0!	#DIV/0!
Total Fees (CA resident)	\$20,600	\$21,705	\$23,151	\$50,605	\$53,493	\$56,247	146%	6%	5%
Total Fees (Nonresident)	\$32,845	\$33,950	\$35,396	\$62,850	\$65,738	\$68,492	91%	5%	4%

Note that fee levels for this program include fall, winter, spring and summer quarters.

* Mandatory systemwide charges include Tuition and Student Services Fee.

**Include disability insurance fee for medicine and dentistry.

*** Include Course Materials and Services Fees but not health kits.

Additional comments, including explanation of any notable changes in 2013-14 or 2014-15 fees from the multi-year plan submitted last year:

This program includes one summer quarter. The quarterly PDST amount for 2013-14 is proposed to be \$7,225. Mandatory systemwide and campus-based fees, as well as PDST levels include all four quarters in the table above.

There are no notable changes in fees from previous years, as this is a proposal for a new PDST supporting a new degree program.

II. PROGRAM GOALS AND EXPENDITURE PLANS

Please explain why Professional Degree Supplemental Tuition increases are necessary. What goals are you trying to meet and what problems are you trying to solve with these increases? What are the consequences if proposed Professional Degree Supplemental Tuition levels are not approved? What will be the educational benefits for students given the new Professional Degree Supplemental Tuition revenue?

Education and training in the field of computer gaming is relatively costly compared to “traditional academic” computer science education programs. The supporting hardware and software change rapidly and can be expensive. The relative newness of the field, coupled with its increasing popularity, means paying higher salaries to attract qualified staff and fund specialized laboratories with the newest equipment. The field itself is evolving quickly, which requires travel for learning, dissemination and visibility. Being able to stay current and visible in this growing field will be important for our students.

UC Santa Cruz is a known leader in computer game research and education, ranking among the top ten graduate game design programs in the United States¹ – a ranking we achieved even without an established graduate degree program focused squarely on games. In order to maintain this lead, and to be recognized as *the California university* for computer game engineering and design, it will be important for us to move quickly. It is not possible to launch this high quality

SECTION 7. GRADUATE STUDENT SUPPORT

program on state funding and regular UC tuition.

Students will benefit from the following components of the program that will be made possible by the PDST:

Student services staffing: Program staff will help students progress through the program most efficiently, advising about financial aid, available resources, coursework and other degree requirements. Staff will also assist with the very important internship and career placement of students, and will help create networking opportunities for alumni and current students. PDST fees will support on- and off-campus communications regarding student projects, program highlights and current events. Students will benefit from the visibility of their own work and of the program in general.

Other staffing: We will recruit a Program Director with connections to the game industry and who is known in academic circles, as is found in similar degree. The Program Director is the lead administrative officer for the degree program. Students will benefit from a Director who is connected to local industry and can act as a conduit to Silicon Valley game firms.

Curriculum and related education and training activities: A full-time Creative Director with a strong industry background will be selected in a national recruitment, and other one-day or short-term lecturers will be recruited from the local gaming industry. This will give students a broad view of the industry, help establish contacts and keep the program fresh with regular influx of new ideas. PDST revenue will support our ability to bring in high-profile industry and academic practitioners to give talks for the students, conduct hands-on intensive workshops for them and do critiques and portfolio reviews of their projects. PDST revenue will also ensure that students can participate in industry conferences and that we have the resources to set up and staff the (very expensive) booths that people use to demonstrate student projects at these events. Students will also benefit from our ability to sponsor events at these conferences, as these provide another venue for mixing with high-profile industry people, increasing student networking for job placement.

Access to state-of-the-art equipment and facilities: PDST revenue will help support ongoing, significant equipment budgets required for student research projects, as well as general education and training. The development machines must be kept up to date and funds are necessary to purchase games and books for the lab on a regular basis. PDST will also support evolving/expanding specialized instructional facilities as the program grows. Students will benefit from being able to conduct research using current hardware and software in a modern, fully equipped environment.

Student financial aid: As required by Regental policy, we will allocate 33 percent of the M.S. PDST funds to financial aid. This will allow us to make generous financial aid offers to the most talented students which will immediately improve the quality of the peer group and over time will increase the strength of the alumni network.

Consequences for students for not adequately funding the program include fewer internship and networking opportunities; less support for project mentoring and individual feedback; an education that isn't up to date with new technologies and software; making do with outdated equipment and facilities; and fewer opportunities to go to conferences and interact with industry people. Overall, without PDST revenue, students will receive less-relevant training and fewer opportunities, and we will not have adequate funding to launch an excellent program. Not adequately funding the program also puts the campus at risk for losing our place among the top game design programs in the U.S., and prevents us from achieving our goal to be *the California university* for game engineering and design.

¹ *Top Game Design Programs, The 2012 Princeton Review*

SECTION 7. GRADUATE STUDENT SUPPORT

Please indicate how you intend to use the revenue generated by the Professional Degree Supplemental Tuition increase.

	Incremental 2013-14 PDST revenue	Incremental 2014-15 PDST revenue	Incremental 2015-16 PDST revenue	Total
Faculty Salary Increases	\$0	\$0	\$0	\$0
UCRP Contributions	\$28,950	\$10,954	\$3,334	\$43,239
Benefits Costs	\$42,479	\$46,195	\$10,541	\$99,214
Improving the Student-Faculty Ratio	\$100,000	\$15,080	\$5,318	\$120,398
Expanding Instructional Support Staff	\$71,250	\$98,700	\$18,499	\$188,449
Instructional Equipment Purchases	\$26,000	\$3,358	\$35,357	\$64,715
Providing Additional Student Financial Aid	\$143,055	107,316	\$62,073	\$312,444
Other Non-salary Cost Increases	\$0	\$0	\$0	\$0
Facilities Expansion/Renewal	\$0	\$0	\$0	\$0
Other-Game Developers Conference Attendance	\$13,096	\$15,229	\$6,685	\$35,010
Other-Operating Expenses & Marketing	\$0	\$21,864	\$42,531	\$64,395
Other-UCOP Assessment	\$8,670	\$6,504	\$3,762	\$18,936
Total projected change in revenue	\$433,500	\$325,200	\$188,100	\$946,800

Additional Comments: In addition to the amount shown under *improving the student-faculty ratio* in the table above are other planned hires funded by means other than the supplemental tuition (i.e., one tenure-track computer games faculty hire and an additional lecturer).

Similarly, one time start up investments in instructional computing equipment and facilities are being funded or subsidized through campus sources, including the Campus Provost office and the Baskin School of Engineering. The amounts shown in the PDST usage table represents a fraction of the total amount being spent.

The Game Developers Conference Attendance is for student attendance and recruitment purposes at this highly visible conference.

Please indicate how you used total actual Professional Degree Fee revenue in 2010-11.

N/A – this is a new PDST.

Please describe cost-cutting and/or fundraising efforts related to this program undertaken to avoid Professional Degree Supplemental Tuition increases even greater than proposed.

One-year program: A one-year program reduces the total cost and time to degree for students.

Existing resources: By leveraging existing resources and infrastructure, we can minimize hiring of new staff and can minimize costs associated with developing new courses.

- a) Staff: To the extent possible, we will rely on existing Baskin School of Engineering staff, including Computer Science Department graduate advisors, department managers, faculty services and instructional support staff. The new degree will require additional staff – a Program Director and a Director of Professional Development – but most of the support staff required to run the degree program is already in place.
- b) While the core of the degree program is a set of new courses, designed to provide professional training, we enable students to pursue a wide variety of specializations by building on the strong graduate and upper-division undergraduate offerings currently at UC Santa Cruz in related areas. We take advantage of 50 related courses that are already offered by the Computer Science and Computer Engineering departments. This reduces the number of elective courses that we plan to develop specifically for the degree to two.

Proposal: M.S. in Games and Playable Media, UC Santa Cruz

SECTION 7. GRADUATE STUDENT SUPPORT

Faculty and Lecturers:

- a) We have designed the program to initially require only one new ladder faculty hire, which is already approved by BSOE and will not be funded by the PDST and thus does not add additional costs to the proposed degree program.
- b) By employing a Program Director and Director of Professional Development with both administrative and teaching responsibilities, we further reduce the need to hire additional teaching staff.
- c) After the program is launched, we anticipate that industry partners will contribute guest lectures and career advising, both enriching the program and reducing costs. Hiring a Program Director with industry connections will be advantageous in this regard.

Facilities:

The program will be based at the UC Santa Cruz Silicon Valley campus and will use existing offices and laboratory space, thus reducing lease and renovation costs. One-time campus funded renovation costs for configuring a Games and Playable Media Lab have been calculated into the startup costs of the program, and do not impact student fees.

If your program proposes uneven increases (e.g., increases that are notably larger in some years than in others), please explain why. Not applicable.

Please provide degrees for which Professional Degree Supplemental Tuition will be assessed and expected enrollment by degree.

Degree	Enrollment			
	2012-13	2013-14	2014-15	2015-16
M.S. in Games and Playable Media (MSGPM) – 1-year track	0	15	25	30

SECTION 7. GRADUATE STUDENT SUPPORT**III. MARKET COMPARISONS: TOTAL CHARGES**

	2012-13	2013-14	Total Cost to Degree	% Increase
Residents				
Carnegie Mellon University – Silicon Valley (private)	\$42,667	\$44,800	\$85,354	5%
University of Southern California (private)	\$36,517	\$37,978	\$54,775	4%
Southern Methodist University (private)	\$32,400	\$32,400	\$64,800	0%
Drexel University (private)	\$27,560	\$28,773	\$55,120	4.4%
University of Central Florida (public)	\$24,750	\$25,988	\$33,000	5%
DigiPen Institute of Technology (private)	\$17,580	\$19,986	\$37,566	14%
University of Texas Dallas (public)	\$15,148	\$15,148	\$30,296	0%
University of Utah (public)	\$14,133	\$14,839	\$28,972	5%
Public Average	\$18,010	\$18,658	\$30,756	4%
University of California, Santa Cruz	N/A	\$50,605	\$50,605	N/A
Nonresidents				
Carnegie Mellon University – Silicon Valley (private)	\$42,667	\$44,800	\$85,354	5%
University of Central Florida (public)	\$41,250	\$43,313	\$55,000	5%
Southern Methodist University (private)	\$37,200	\$37,200	\$74,400	0%
University of Southern California (private)	\$36,517	\$37,978	\$54,775	4%
University of Texas Dallas (public)	\$29,008	\$29,008	\$58,016	0%
Drexel University (private)	\$27,560	\$28,773	\$55,120	4.4%
University of Utah (public)	\$26,689	\$28,023	\$54,712	5%
DigiPen Institute of Technology (private)	\$19,330	\$20,876	\$40,206	8%
Public Average	\$32,316	\$33,448	\$55,909	4%
University of California, Santa Cruz	N/A	\$62,850	\$62,850	N/A

Source(s): <http://mapp.usc.edu/mastersprograms/degreeprograms/CSCI/MSCS-GD.html>

<http://mapp.usc.edu/mastersprograms/tuitionandfees/tuitionfees.html>

<http://www.cmu.edu/ira/QuickFacts/> <http://guildhall.smu.edu/Video-Game-Development-Certifi.196.0.html>

<http://guildhall.smu.edu/Program-Outline.170.0.html>

<http://drexel.edu/catalog/GRAD/COMAD/digm-index.htm>

<http://catalog.drexel.edu/graduate/collegeofmediaartsanddesign/digitalmedia/>

<http://www.drexel.edu/grad/programs/westphal/tuition/>

<http://www.fiea.ucf.edu/joomla/index.php/admission/tuition>

<http://www.utdallas.edu/finance/bursar/11F-guaranteedtuition.html>

<https://www.digipen.edu/academics/degree-programs/computer-science/>

<https://www.digipen.edu/admissions/tuition-and-financial-aid/current-tuition/>

<https://www.digipen.edu/admissions/tuition-and-financial-aid/>

<http://fbs.admin.utah.edu/income/tuition/college-of-fine-arts/>

SECTION 7. GRADUATE STUDENT SUPPORT

Why were these institutions chosen as comparators?

Primary market comparisons were selected based on academic similarity and/or ranking by the Princeton Review of Top Graduate Game Design programs. USC, Carnegie Mellon, SMU, MIT, Drexel, the University of Central Florida, and DigiPen were ranked in the top 10. UC Santa Cruz was ranked #9. The University of Texas and the University of Utah did not make the Top 10 list, but did receive Honorable Mention.

The programs offered by USC and Carnegie Mellon-Silicon Valley provide the best true academic comparisons. Like UC Santa Cruz, their geographic location puts them in the heart of the game industry. And like UCSC's Computer Game Design program, both USC and Carnegie Mellon have achieved high visibility in the industry (including significant presence at all major industry conferences), have initiated projects with industry leaders such as Microsoft and Electronic Arts, and have consistently produced graduates who have succeeded both in larger companies and as independent developers. Both currently employ staff (analogous to our proposed Program Director and Creative Director) with significant industry experience and profile. USC's *Master of Computer Science with Specialization in Game Development* is perhaps the closest overall comparison, both in terms of its academic program and its geographic location. Carnegie Mellon offers the *Masters of Entertainment Technology* degree (MET) out of both their Pittsburgh and their Silicon Valley locations, thus the geographic proximity is also comparable.

Because of the newness of academic game engineering, development and design programs, there simply are not many comparators, particularly among public institutions. The University of Texas and the University of Utah are among the few public institutions that have launched game design degree programs with any substantive resemblance to the proposed UC Santa Cruz degree.

The University of Texas offers a two-year program leading to an M.A. in Arts and Technology, with a stronger emphasis on the creative arts than the proposed UC Santa Cruz degree.

The University of Utah offers three masters-level tracks: an Arts track through the Department of Film and Media Arts; a Game Engineering track through the School of Computing; and a Game Production track through the Department of Film and Media Arts. Of these, the Game Engineering track is the closest comparison to the proposed UCSC professional degree program, but the UCSC program will offer more courses overall, as well as more rigorous technical training in game-related software development and advanced technologies.

Southern Methodist University offers a two-year (24 month) *Professional Certificate* in Digital Game Development is considered a professional development program and is generally favored by individuals already working in game development. SMU also offers a two-year *Masters Degree*, which is generally favored by students who have recently received an undergraduate degree in a related field. In both cases, the additional year allows for two additional student team projects, which helps students build a small portfolio of projects while still in school.

SECTION 7. GRADUATE STUDENT SUPPORT

How were the projected tuition and fee increases for your comparison institutions determined?

Where available, we based projections on data and fee increases in previous years. In those cases where this data was unavailable, we used 5% as a standard increase.

- University of Southern California: Historically, tuition and fees have increased by 3.7%-4% per year.
- Carnegie Mellon-Silicon Valley: 2012-13 tuition and fees increased by 5% over 2011-12 levels. We projected the same increase in 2013-14.
- Southern Methodist University: Tuition and fees will not increase in 2013-14.
- Drexel University: 2012-13 tuition and fees increased by 4.4% over 2011-12 levels. We projected the same increase in 2013-14.
- University of Texas: Projects no increase in tuition and fees through Summer 2015.
- DigiPen: In 2012-13, tuition increased by 14% over 2011-12 rates; we don't know if this will be a persistent ramp up in their tuition levels over the next several years, or if this is a one-time increase. In the absence of better information, we've assumed a persistent increase of 14%.

Please comment on how your program's costs compare with those of the comparison institutions (public and/or private) with which you compete for students.

The *total-cost-to-degree* range is \$28K-\$85K for residents. The range for non-residents is \$39K-\$85K. At less than \$52K for residents in 2013-2014, the UCSC M.S. in Games and Playable Media is financially competitive, falling below the midpoint of the range, and – perhaps more importantly – costing substantially less overall than our closest comparisons (CMU and USC). For non-residents, the total cost to degree is just under \$64K, just slightly above the midpoint of the range.

Comparison programs are generally two-year programs, as compared to the one-year accelerated program at UCSC. As a result, UCSC students can complete the program and be in a job, earning wages, faster than in comparison programs. This results in a lower opportunity cost (greater total wages over the two-year period) for students in the UCSC program over comparison programs.

The UCSC M.S. in Games and Playable Media is cost competitive not only by virtue of the fact that the total cost to degree is at or near the midpoint of the comparison institutions and it carries a lower opportunity cost, but also due to its prime Silicon Valley location in the heart of the game industry, which enriches the program and enhances the opportunities for job placement over that of the comparison institutions.

One of our closest comparisons, CMU, does not offer any form of financial support for students in the Entertainment Technology Center, nor do they offer research assistantships, teaching assistantships or tuition waivers of any kind. Most US students who attend their program receive loan-based assistance. By comparison, the UCSC program will be able to offer relatively large financial aid packages.

IV. ENROLLMENT TRENDS AND DIVERSITY STRATEGY

Note: UCOP will provide campuses with data from the Corporate Student System that should be used to complete the table below for your program. If possible, provide comparable figures for your comparison public and private institutions in the columns shown.

N/A. This is a new program. No data is available.

How does your program compare with other programs in terms of racial and ethnic diversity, with particular attention to U.S. domestic underrepresented minorities?

As of Fall 2011, 23% of the 133 graduate students enrolled in the Baskin School of Engineering Computer Science Department were female; 5% were from underrepresented ethnic groups (Black/African-American, Latino, Mexican, and OTHR SPN-LATIN).

Of the 359 undergraduate students who have declared or proposed a computer game design major, 19% (70) are from underrepresented ethnic groups and 8.6% (31) are female. This indicates the proposed Games and Playable Media M.S. program may attract a higher percentage of underrepresented students than the existing computer science degree programs.

CMU: There are currently 190 students in the program, 30% of whom are female and 2% of whom are from underrepresented ethnic groups.

DigiPen Institute of Technology reports 0% enrollment by American Indian or Alaskan Native, 0% Black or African-American and 7% Hispanic/Latino.

The University of Utah School of Computing reports 0% enrollment by American Indian or Alaskan Native, 0% Black or African-American and 0% Hispanic/Latino.

By comparison to these programs, graduate enrollment in the BSOE Computer Science program and undergraduate enrollment in the Computer Game Design major exceed enrollment in the each of the comparison institutions for which we were able to obtain diversity data. We are especially encouraged by the enrollment by underrepresented groups in our undergraduate computer game design major.

In 2005, an International Game Developers Association report on developer demographics indicated that only 2% of developers were Black and 2.5% were Hispanic or Latino. These demographics have remained constant over the seven years since the report was issued. Combined, Latinos and African Americans currently comprise less than five percent of the game design workforce.²

According to a 2011 report by the Entertainment Software Association, adult women comprise 37% of the game-playing population.³ African Americans and Hispanics play and purchase video games more than any other ethnic group in the U.S. Yet the overwhelming majority of characters in games are young white males.⁴ Bringing women and underrepresented minorities into the field of game design and engineering will catalyze new growth, enhance game diversity, and benefit the growing pool of game players. Given that we have successfully attracted these demographic groups into both our undergraduate game design and graduate computer science programs, we feel we can play an important role in this regard.

Please comment on the trend in enrollment of underrepresented groups in your program over the past five years.

The proposed graduate program does not currently exist, and the undergraduate game design degree is very new, so it is difficult to ascertain trends. However, we can comment on specific demographics over the past several years.

In the undergraduate game design program, between 43 and 70 (15-19%) have been underrepresented minorities and between 30 and 35 (8-11%) of the undergraduates have been female. Most recent enrollments are 70/31 (19%/9%), URM/female, respectively.

Overall, for the Computer Science graduate degree, we have seen an increase from 3% to 5% of underrepresented minorities in the program; the percentage of female students in the graduate program has ranged from 18% to 23%; most recent enrollments are 23%.

We believe the field of computer game design represents significant untapped potential for underrepresented groups, given the lack of diversity in developer demographics. We further believe that we can play an important role in increasing the diversity of professionals in this field, given our proximity to Silicon Valley and our success in recruiting underrepresented minorities into our undergraduate game design program.

What is your strategy for increasing the enrollment of U.S. domestic students from underrepresented groups (African American, Chicano/Latino, American Indian), U.S. domestic students from all minority groups, and, if any, for international students in your program? What indicators of success do you monitor?

- We will recruit from our own undergraduate program.
- We will recruit from local highly diverse California state universities and junior colleges.
- We will set aside at least 40% of the return to aid for students that demonstrate financial need. This action will benefit students from underrepresented groups.
- We will be deliberately inclusive of underrepresented groups during promotional activities for the program. At major game conferences, during recruiting trips by program representatives and in our communications with colleagues, we will showcase projects by underrepresented groups.
- If after the first year the program has not accepted 10% of its students from underrepresented groups, we will consider a more proactive approach to URM recruitment: communications specifically targeted to this group and participation in the California Forum for Diversity in Graduate Education.

We will track the following indicators of success: total number of students from underrepresented groups (including females) that apply, are accepted into the program, enroll, complete the degree and obtain jobs.

Please comment on the trend in enrollment of students from low socioeconomic backgrounds (i.e., students who received Pell Grants as undergraduates).

N/A, this is a new program, no data is available.

² (http://www.npr.org/blogs/alltechconsidered/2010/03/if_youre_not_white_and_male_yo.html)

³ <http://www.theesa.com/facts/gameplayer.asp>

⁴ <http://newamericamedia.org/2011/09/gamer-to-game-makers-wheres-the-diversity.php>

V. FINANCIAL AID STRATEGY AND PROGRAM AFFORDABILITY

What are your financial aid / affordability goals for your program? How do you measure your success in meeting them?

Our goal is to ensure that the PDST charged will not deter qualified students from applying to our program. We can measure how well we are meeting this goal in part by measuring the diversity of the incoming cohorts and by tracking what percentage of PDST student financial aid is allocated to URM and financially needy applicants.

How will your financial aid strategies (e.g., eligibility criteria, packaging policy) help achieve these goals?

The fact that this is a one-year program will help ensure that any student debt will be manageable, particularly given that starting salaries for students in UCSC’s undergraduate games degree have been approximately \$80,000, and that students with an MS will attract even higher salaries.

We believe that this degree will not create an inappropriate debt burden for students, especially given that 33% of PDST will go toward financial aid.

In addition, though it is not guaranteed, students will also be eligible for GSR positions to work with faculty doing research in games. There is also the potential for interested students to receive TAs for undergraduate games courses.

Please describe any programs available to students in your program to promote public service or provide services to underserved populations, such as targeted scholarships, fellowships, summer or academic-year internships, and Loan Repayment Assistance Plans.

Each year, we will reserve at least 40% of the PSDT return to aid funds for applicants who can demonstrate financial need, which will also benefit eligible applicants from underrepresented groups. A portion of return to aid funds will be targeted to students who choose to pursue careers in areas with lower earnings potential.

Please describe your marketing and outreach plan to prospective students to explain your financial aid programs.

We will post the financial aid opportunities on the program web pages and will communicate the details of the financial aid program at in-person marketing activities as described above.

Note: UCOP will provide you with figures from the Corporate Student System that should be used to complete the table below. If possible, provide comparable figures for your comparison public and private institutions in the rows shown. N/A. This is a new program. No data is available.

Please comment on the trend in the indebtedness of students in your program. What impact do you expect your proposed Professional Degree Supplemental Tuition levels and financial aid plan to have on this trend?

Since this is a new program, there are no student enrollments, and we cannot comment on the trend of indebtedness of students.

Note: UCOP will provide you with figures from the Corporate Student System that should be used to complete a portion of the table below. However, each program is responsible for providing its own estimate of the median (or average, or typical) starting salary for its graduates. If possible, provide comparable figures for your comparison public and private institutions in the rows shown. UCOP will also provide you with a formula for you to use to calculate the last column.

	2009-10 Average Debt	Graduates with	Median Salary at	Est. Debt Payment as
	at Graduation	Debt	Graduation	% of Median Salary
This program	\$	%	\$80,000	%
Public comparisons	\$	%	\$50,852	%
Private comparisons	\$	%	\$75,000 (CMU 2011)	%

Sources: UC: Corporate data
 Comparison institutions: FIEA : <http://www.fiea.ucf.edu/joomla/index.php/media/press-releases/item/386-princeton-review-ranks-fiea-no-2-video-game-school-in-north-america>; CMU: pcgamer.com (2012)

Please describe your program's perspective on the manageability of student loan debt for your graduates in light of their typical salaries, the availability of Loan Repayment Assistance Programs, loan repayment plans, and/or any other relevant factors.

Given that the national average salary for employees in the game industry is \$90,000, that starting salaries have been approximately \$80,000 for UCSC students graduating from the undergraduate program, and that students with a professional Master's degree are likely to earn substantially more than this, we believe that any debt incurred by students will be manageable. We do not expect indebtedness to be an issue.

Do graduates of your program who pursue public interest careers (as defined by your discipline) typically earn substantially less upon graduation than other students? If so, what steps does your program take to ensure that these careers are viable in light of students' debt at graduation?

Although we expect most students who enroll in our program to pursue careers in the game industry, some may choose to apply their game design and development knowledge to careers in teaching and education; government; medical, military, or other forms of training and skills development; or to careers in health or public policy. However, even in these "public interest" careers, our students will graduate with skills that will make them eligible for more highly paid positions in this field. We believe that any debt incurred by these students will also be manageable, in light of their potential to earn relatively high incomes.

I. STUDENT AND FACULTY CONSULTATION

The Regents' Policy on Professional Degree Supplemental Tuition requires each plan to include information about the views of the program's student body and faculty on the proposed increase, which may be obtained in a variety of ways. Campuses are expected to have consulted with students and faculty during 2012-13. How did you consult with faculty and students about the PDST levels proposed for 2013-14? Check all that apply.

- Scheduled town-hall style meetings with faculty **and** students in the program to discuss the plan and solicit feedback
- Convened focus groups of faculty **and** students in the program to discuss the plan and solicited feedback
- Described the plan to faculty **and** students in the program via email, solicited their feedback, and reviewed the comments received
- Other (please describe): Distributed the MS degree and PDST proposal to Computer Science faculty and then described and discussed the plan with the CS faculty during a faculty meeting.

Describe the feedback that was received from students and faculty during the opportunities for consultation checked above and any proposal changes as a result of this feedback.

Computer Science faculty conducted student consultations with current undergraduate seniors in the game degree and current MFA and Ph.D. students studying games. Among the Ph.D. students consulted was the GSA representative for Computer Science. We asked for feedback in the following areas:

- Would you be interested in receiving such a degree?
- Do you think others would be interested in this degree?
- What is your reaction to the cost of the degree?
- Do you perceive the degree to provide good value at this price?
- What do you think about the curriculum?

Many of the undergraduate seniors said they would be interested in returning a year (or a few years) after graduation to go into the M.S. program. Among those with undergraduate loans, there was some concern about going straight into the program, but these felt that they could “potentially save up funds while working to pay for the M.S. program.” Others indicated that the idea of returning to school after having a year off to “work on a game idea” was appealing.

The graduate students surveyed all felt that there would be interest in the M.S. degree program and identified the following populations as being candidates for the proposed degree:

- undergraduates coming out of the game degree
- individuals currently working in game companies who are “frustrated with their role (e.g., managers and engineers who want to try design)”
- people caught in a “catch-22”: they need game experience to get hired into the game industry
- people from underrepresented groups who hear about the financial aid packages
- those who would like to go back to school, but a Ph.D. is too much

Many of the undergraduates felt they were unable to judge whether or not the program was priced correctly or provided good value, but of those who answered, all said that they perceived the program to be a “good value at the given price point” [estimated at the time at \$49K]. Graduate students generally felt that the “cost seems reasonable for someone who has already been in industry for a while, but seems like a lot of debt/cost for someone coming straight out of undergrad.”

The overriding concern among the undergraduates was post-degree job placement. Prior to enrolling in the program, they would want to be assured that the program will teach them skills that industry people are looking for, and that they would come out of the program with specific, leading-edge skills that will make them suitable for specialized roles in game companies.

Undergraduates also indicated that game-making courses that help them build their portfolio would be desirable.

With respect to the curriculum, graduate students commented on the benefits of having a program that could be attended either part-time or full-time. They also liked the idea of courses that include several team projects, and in particular projects in which the teams are mixed up periodically, so that students learn to collaborate with several different people on pieces of projects. They wondered about the logistics of conducting a Masters program out of Silicon Valley. One person mentioned that it would be helpful to have a professional development course that included team-building and conflict-resolution; another suggested role-playing workshops that would help teach students how to work as part of a diverse team.

We opened up the discussion for general feedback and received a number of interesting comments, which we provide here for completeness and to ensure that the input isn’t lost.

- Find ways to connect to local companies
- People might wonder why to do this rather than an MS at main Santa Cruz campus
- Might be good to aim for people “later in life” — who have families, houses, need to stay in Bay Area
- Are we thinking they’ll work in teams? What size? Team dynamics may be helped by mixing up the roles (people w/ different backgrounds)
- Very important to have 24hr lab access
- Good to do things like host Global Game Jam for program to participate, bring in outside people, etc.

The MS degree proposal has been distributed to the Computer Science faculty and the proposed degree (including its economic model) has been a topic at a CS faculty meeting. Faculty were strongly supportive of the degree academically and the PDST approach.

Proposal: M.S. in Games and Playable Media, UC Santa Cruz

In addition to consultation with program students and faculty, please confirm that this template has been shared with the following representatives from your campus before the plan is submitted to UCOP.

- Plan shared with GSA President Erik Green on May 14, 2012
- Plan shared with GSA Co-Presidents Grace and Eppel Gudgeirsson on September 26, 2012
Campus graduate student organization (i.e., your campus' GSA president)
- Plan shared with Brandon Tearse, Computer Science GSA Representative on April 30, 2012.
Program graduate student organization (i.e., your program council or department GSA)
- Plan shared with Tyrus Miller on May 14, 2012, June 7, 2012, and September 26, 2012.
Graduate Dean
- Plan endorsed by Chancellor George Blumenthal on June 7, 2012 and September 18, 2012.
Chancellor⁵

II. OTHER

Please describe any other factors that may be relevant to your three-year plan (such as additional measures relating to your program's affordability, etc.).

During the next three years, we would like to launch a two-year track as well as the currently proposed one-year track. However, given UC system wide budget uncertainties, it is difficult to know if or when resources will be available to start the two-year track. The PDST is essential to start the program with a one year track, and increase enrollments as resources permit.

III. SUPPLEMENTAL QUESTIONS FOR PROGRAMS PROPOSING TO CHARGE PROFESSIONAL DEGREE SUPPLEMENTAL TUITION FOR THE FIRST TIME IN 2013-14

Please describe the program for which you propose charging Professional Degree Supplemental Tuition, including: What unit/department houses the program? Is the program new or already offered? If new, has the program already been approved by the campus and CCGA? (CCGA approval must have been secured by May 30, 2012 and systemwide approval must have been secured by July 30, 2012.)

The Computer Science Department of the Baskin School of Engineering will house the program. The M.S. program is new. The CS Department already administers a Bachelor of Science in CS: Computer Game Design, the first in the University of California system, which officially launched in 2006. The BS degree focuses on the construction and design of interactive computer games, with an emphasis on the technical, play-oriented, narrative, and artistic components of game design. The program of graduate studies in Games and Playable Media for the M.S. degree is being proposed concurrently with this PDST proposal. We expect the degree will be approved on campus in fall 2012, and subsequently transmitted for CCGA/UCOP approval.

Please describe the rationale for charging Professional Degree Supplemental Tuition for this program, including: Why is it appropriate for this program to charge Professional Degree Supplemental Tuition? In what ways is the program "professional" rather than "academic" or "self-supporting"? Do students have elevated earning potential after earning a degree in this discipline?

Education and training in the field of computer gaming is costly compared to "traditional" computer science education programs. The supporting hardware and software change rapidly and both are expensive. The relative newness of the field, coupled with its increasing popularity, means paying higher salaries to attract qualified staff. The field itself is evolving quickly, which requires travel for learning, dissemination and visibility. Being able to stay current and visible in this growing field will be important for our students.

This is a professional degree program; we are training graduates to enter the game industry as professional game designers, engineers and developers. These graduates will have elevated earning potentials, as evidenced by the fact that graduates from our *undergraduate* program are being offered starting salaries in the \$80,000 range, and by the fact that, according to the Entertainment Software Association, the national average salary for employees in the video game industry is \$90,000 (2011 ESA Sales, Demographic and Usage Data: Essential Facts about the Computer and Video Game Industry).

⁵ Per the *Policy on Professional Degree Supplemental Tuition* section 7(B), found at <http://www.universityofcalifornia.edu/regents/policies/3103.html>

Degrees that have traditionally been academic in the past – i.e., MA and MS degrees – will be subject to a higher level of scrutiny than other programs proposing to charge Professional Degree Supplemental Tuition. How is the professional degree offered by this program different from an academic degree?

The field of engineering, design and development of games and playable media is very new, so comparison with “traditional” practices is very difficult. This one-year degree is aimed at individuals either already *in* the professional workforce or planning to *enter* the workforce as professionals, applying the skills they gain while in our program. While the program will have strong theoretical underpinnings, its primary purpose is the application of knowledge in professional practice.

Very few academic institutions offer the type of degree we are proposing, but among those who do, the professional degree program model is common. For example, Carnegie Mellon University offers the Masters of Entertainment Technology, which is defined as a unique, specialized degree program and is considered to be a professional, terminal degree. Likewise, SMU offers a Professional Certificate in Digital Game Development; and the University of Central Florida’s Interactive Entertainment Academy offers an “industry-based video game career education” not found in a traditional academic degree program. While USC does not designate their Masters in Computer Science as a “professional degree” per se, the Game Development Specialization clearly caters for those who wish to apply their knowledge immediately upon graduation in the entertainment and serious games fields.

Although students in the program will be prepared to and may elect to enroll in a PhD program to continue studies and research in the field of games and playable media, the vast majority will leave the program and enter the workforce as professional game designers and engineers.

Appendix 3. Relevant Professional Masters Degree Programs in Silicon Valley

Carnegie Mellon University

MS in Electrical and Computer Engineering
MS in Software Engineering
MS in Software Management
MS in Information Technology

Santa Clara University

M Business Administration
MS Finance
MS Information Systems
MS Applied Mathematics
MS Bioengineering
MS Civil Engineering
MS Computer Science and Engineering
MS Electrical Engineering
MS Engineering Management
MS Mechanical Engineering
MS Sustainable Energy
JD

San Jose State University

MS Software Engineering (Cloud and Mobile Computing)
MS Electrical Engineering (Wireless Communication and Mobile Computing)
MS Electrical Engineering (Multicore Programming)
MS Electrical Engineering (Analog and Mixed Signal)
MBA-MSE System Engineering
MBA-MS Software Engineering
MBA
MS Accountancy
MS Taxation
MS Transportation Management

Stanford University

MS in Aeronautics and Astronautics
MS Bioengineering
MS Chemical Engineering
MS Civil Engineering
MS Engineering
MS Computational and Mathematical Engineering
MS Computer Science
MS Electrical Engineering
MS Material Science and Engineering
MS Mechanical Engineering
JD
MBA
MSx (Accelerated MBA)

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Silicon Valley University

MS Computer Science

MS Computer Engineering

MBA

International Technological University

MBA

MS Software Engineering

MS Digital Arts

MS Electrical Engineering

MS Computer Engineering

MS Engineering Management

University of Silicon Valley

JD

Northwestern Polytechnic University

MS Electrical Engineering

MS Computer Engineering

MS Computer Science and Engineering

MS Computer Science

MBA

Herguan University

MS Computer Science

MBA

Sofia University

MS Computer Science

MBA

Takshila University

MS Computer Science

MBA

Appendix 4. PDST Program Planning Template User Guide**(Prepared by Silicon Valley Initiatives, March 2013; template will be provided on-line)**

Each proposal presents a very different array of revenues and expenses. As these pre-proposals are in the early stages of development, full implementation financial assessment has not been conducted. However, the campus has already clearly laid out the pathway by which this analysis can be initiated. The following instructions allow program developers for professional degree programs (those charging Professional Degree Supplemental Tuition) to calculate the budget for the program.

Introduction & Overview

This User Guide is designed for use by individual program planners who will be using the Program Template to input information to the overall PDST financial planning model. Along with providing this data for the overall consolidated financials analysis (multiple PDST programs over 10 years) the Template also provides a 10-year view of the financial performance of any one program (given its various revenue and cost assumptions). Just as we can do “sensitivity analysis” based on six program starts in ten years, so also can we do the same thing for one program over ten years. Given input assumptions, one can use the Template to look at PDST tuition “cash flow” in a given year (with an eye toward where to draw the line on cost); likewise, one can use it to project how different numbers of students, or ramping up of student numbers, in relation to a given PDST price point, impacts the amount of PDST revenue available for one time or ongoing program costs.

This guide, once again, however, is practical. It is mostly a simple how to guide for inputting program information. There are also suggestions about how to go about doing the basic analysis of the information in the summary tables (summary income, and detailed income statements).

PDST Program Expansion Financial Model

As mentioned above, the PDST Financials spreadsheet package represents a “financial model.” What is meant by financial model in this case? By financial model, we mean that it shows financial performance in relation to a complex set of assumptions, over a time function.

Specifically, the overall financials begin with the assumption of six new PDST program starts over a ten year period, with a three year ramp to steady state for each program beginning with its respective “year one.” It also assumes certain things (modifiable) about PDST price point and escalation, offset revenues going to the campus, start up revenue from the division, possible other revenues, and costs and their escalation (one time, and continuing, both direct cost labor, and operating expenses and capital expenses). A particularly important assumption is that in cases where we want to rely on PDST revenue to support regular faculty FTE, there must be a minimum steady state ratio of 30 students to 1 faculty FTE.

The PDST financials model was initially developed with the specific purpose of creating a customizable tool that would allow the division to quickly prepare a set of financials to backup new revisions of the Academic Plan for Silicon Valley, as assumptions about specific programs and their characteristics became available. One need only plug in the updated info, because the model, as a whole, was in place irrespective of the particular aspects of program data.

Because the system was designed to allow for a variety of kinds of analysis, at the divisional

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level, and between the division and the central campus, the present version is not very user friendly for the individual program planner (lots of distracting information).

This guide shows step-by-step how to input program information, and as a consequence, what information to ignore at the individual program level. SVI plans to update the documents overall from a PDST_program_financials_usability point of view, once a reasonable number of people have worked with the toolset. This guide is meant to bridge until that happens.

Specific Program Assumptions

Specific program assumptions are such things as: whether the program is 4 quarters per year or 3 quarters; the cost of PDST tuition, expected ratios of resident to non-resident, program start-up revenue, possible other revenues, FTE costs (regular faculty, lecturer, staff), fringe rates, escalations, Operating Expenses (OPEX) costs (non-labor operations) and Capital Expenses (CAPEX) (infrastructure).

Non-program assumptions are: state tuition and supplemental tuition rates, return to aid percentages, campus and student services fees, a variety of things that are, from the point of view of the individual program ledger, offset revenues (that go back to the campus).

New Program Planning Template

The New Program Template is simply a single program sheet from the consolidated system of financials, presented as a standalone. The next revision will include ONLY the items that are necessary for basic program planning and for inputs to the overall system (nothing extraneous or redundant to cause distraction). The larger financials package allows for customization of global system assumptions on the consolidated worksheet (e.g., regular tuition, return to aid formulas, fees, OP tax on revenue, etc.).

Customizing Revenue Side Assumptions

Modifiable parameters are identified in the Program Template with a blue highlight. The first thing that must always be input is the decision about whether the program is a three quarter or a four quarter program, as this decision drives a number of calculations (on both the revenue and cost side).

To set the number of quarters:

1. Find the quarters row at the top of the spreadsheet:
2. Enter 3 or 4 in the blue input area.
3. Note that year 2 reads as 3 when 4 is input, because the first summer is technically the first quarter of the second year from a revenue point of view.

Number of Students (ramping, and steady state)

At lines 36, 37 of the "Academic Plan Assumptions" section immediately below the "Summary Income Statement" there are blue input fields for entering information about the target number of students, both resident and non-resident, per year. In selecting these numbers, you should show a "ramp" to a desired steady state--for example, a progression over the first three years, from 15, 25, 30 students per year, with 30 per year thereafter. Note that the spreadsheet will auto calculate the percent resident and non-resident based on the numbers provided.

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To enter the target number of students per year:

1. Find the “Student in Program” area of the “Academic Plan Assumptions” section.
2. Enter the desired number of resident and non-resident students per year.

PDST Tuition (annual)

The program price point (PDST tuition) can be set at this level of the financial model system, or it can be set along with other global parameters like regular tuition and fees. It is assumed here that each program will have a specific level for PDST tuition (within allowable per policy, but tailored to what the individual market will bear).

To set level for quarterly PDST tuition:

1. Find the blue input area for PDST Tuition, line 66.
2. Input the desired price point.
3. Move up to line 53, and enter the desired escalation rate per year, beginning in column G.

Start-up Revenue

In the same area where you found the PDST tuition input, you will also find the row for program start-up revenue, on line 77.

To enter agreed upon program start-up revenue (for year 1):

1. Find the blue input field for “start-up divisional revenue contribution for first year”.
2. Enter the agreed upon amount.

Other Revenue

At line 178, there is an input field for “Other Revenue.” This is the place where one would enter any campus programmatic subsidy, matching start-up funds, etc. (up and beyond the divisional start-up). Also, if there were real external revenue sources for a program beyond the PDST tuition, one would add that here.

Customizing Cost Side Assumptions

The cost side of the program planning spreadsheet also allows for a great deal of individual program customization. There are input fields and associated automatic calculations related to direct cost labor (regular faculty FTE, lecturer FTE, and staff FTE); there are standard and custom input fields for start-up and ongoing operational costs (OPEX); there are standard and custom input fields for initial capital expenses (CAPEX).

Faculty FTE allocated to PDST

As stated in the introduction to this document, one of the things that makes the overall financials package a financial “model” is the fact that it prescribes a minimum ratio of students (at steady state enrollment) to any one new regular faculty hire, if the intent is to fund that FTE with PDST tuition revenue. That ratio, once again, is 30 to 1. The implication of this policy-level directive from the central campus is as follows: to the extent that a given program intends to recruit a regular faculty member, the program must show a ramp to a steady state of at least 30 students per year (unless there has been identified some aspect of “other revenue” that was sufficiently reliable in the out years that would cause campus stakeholders to regard this as an acceptable subsidy for this purpose). If a program intended to recruit 2 regular faculty members that would

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be paid from PDST revenue, the minimum expectation is 60 students per year at steady state.

The above requirement does not extend to include lecturer appointments. A program can hire any number of lecturers, year to year, that the PDST revenue forecast can support (along with the total set of overhead costs).

The PDST Program Planning template (functionally) allows individual program planners to customize the specific set of labor costs associated with staffing the program. It is understood that for some programs, regular departmental faculty (already paid for, so to speak) will do some portion of the teaching; some programs will start by hiring a director, or a new key faculty member; some may rely on mostly lecturers.

However, per guidance from central campus (Planning & Budget) individual program planners may not assume that they can cost shift by seeking to use PDST revenues to pay some portion of regular faculty who otherwise have their costs covered (unless the course they are teaching are PDST only offerings). Guidance on this issue is likely to evolve. Please consult with your divisional office on a regular basis.

To add regular faculty cost to the program planning template:

1. Under the "Other Program Assumptions" area, in the FTE calculations section at line 80, locate the blue input fields for Faculty Salary and Overhead.
2. Input the desired salary and fringe costs.
3. If approved to do so, pro rate the salary by inputting a percent FTE per year.
4. Note also that if 4 quarter program was selected, the model will automatically calculate summer salary, as 9/12.

FTE Lecturer

Also in the area called "Other Program Assumptions," at line 109, the PDST program planning template allows the program planner to input salary, overhead, and percent effort for up to 6 full or part-time lecturers (where the costs will be allocated to annual PDST revenue). It is generally expected that PDST programs will rely on some number of faculty lecturers to teach courses. When adding these labor costs, one should do so in the context of the total available annual PDST revenue (relative to other costs, or perhaps supplemental revenue such as campus or divisional subsidies, etc.).

To add faculty lecturer FTE:

1. In the blue input cells, enter salary and overhead.
2. Enter the desired percent FTE per year (columns F-L).

FTE Staff

The template is presently set up to include staff FTE at the divisional level, i.e., shared resources across programs for divisional accounting needs, and for student career placement (a key component for professional master's programs that rely on placement success to be able to attract future students). At the consolidated level, the model presently allocates costs for a new research accountant after every three program starts, and likewise, a new placement officer every three years (assuming new programs are added every year). As allocated costs, these don't fit very well into the individual program planning template. Please leave these areas blank for the moment. The next revision of the model will find a better way to manage allocated (shared) cost line items.

OPEX Categories

Beginning at line 266, individual program planners can insert custom one time and annual program costs. There are three pre-set annual categories (supplies, marketing, library, and software licenses). Additionally, there are ~10 undefined OPEX categories that can be defined as needed, with costs per input in blue cells per year. Use these fields to account for all the programs (non labor) operating expenses that are meant to be allocated to PDST revenue on an annual basis.

To add Operational Expense items:

1. Find the Operating Expense section, beginning at line 233.
2. Input annual cost category items in the blue input cells.
3. Name new OPEX categories as needed, and enter annual costs as needed.

CAPEX

Beginning at line 289, the template allows for the customization of CAPEX costs. There are the following pre-set capital expense categories: Instructional hardware, equipment, furniture, library allocation for new regular faculty FTE, and a catch all category, “additional start up costs.” To reiterate, this is a financial model, and not a budget tool per se; our aim here is to model costs down to a reasonable level of granularity only in order to analyze program financial performance (and the aggregate of multiple programs) over a time function.

To input CAPEX costs:

1. Locate the blue input fields in column F, beginning at line 291.
2. Input costs per year as desired.

Once all desired inputs and customizations have been entered, the document is ready, in principle, for sensitivity analysis. Again, the individual template provides financial performance information (for one program) over a ten year period, given a set of assumptions about price point, revenue, and cost information (labor, OPEX, and CAPEX). It also provides information about non-PDST revenue that the program generates that go back to campus or is returned to aid. The larger model (multiple programs rolled up into consolidation) provides this view for an entire set of PDST program starts over a 10 year period.

Summary Income Statement

The overall Program Template has the following sections: Summary Income Statement, Academic Plan Assumptions, and Detailed Income Statement.

- Summary Income Statement (gross and net revenue, net income, cumulative cash flow)
 - This table is essentially “the bottom line” for the program’s financial performance over 10 years—it shows you what to drill into at the level of the Detailed Income Statement and thus when and where to be potentially concerned about cash flow after you have entered your various program assumptions. Hopefully, it is obvious that these line items are the summary lines, for any given year of the program, from the Detailed Income Statement, which provides detailed breakdowns of these sums.

Gross & Net Revenue

The Gross Revenue figure in the Summary Income Statement is the sum of all the different flavors of revenue, at their respective price points, and at the volume indicated by the number of students. This figure, as gross, does not yet reflect any offsets/payouts, or program cost (a net revenue figure). Again, the Detailed Income Statement breaks this same figure down into PDST tuition, regular tuition, and supplemental tuition, and further disambiguates them with respect to proportion of resident or nonresident in each case, as applicable. As gross, it also includes any start-up revenue allocated to the program by either the division or the central campus. It also reflects the escalation rates that have been input into the template.

Net Income

Net income, as one would assume, is total revenue per year after offsets/payouts, and annual operating expenses. Here again, these claims on the revenue are spelled out in fine detail in the Detailed Income Statement (lines 158-286). Note that one-time CAPEX costs appear as a separate line in the Income Summary (Other Cash Flows) such that the Net Cash Flow (bottom line of summary is the difference, in any given year, between Net Income and Net Income minus CAPEX.

Cash Flow

A few words about Cash Flow are in order. In general, the activity of managing a P&L statement, which the overall set of program Financials is based upon, is first and foremost a cash flow management task. A business unit manager is watching quarterly and annual revenues across multiple products or product lines, forecasting possible perturbations, and taking steps to ensure that the unit remains “in the black.” Since we are an educational, not-for-profit organization, this is not what we are about, in the strict sense. However, there are some analogous aspects nonetheless.

Single Program Sensitivity Analysis

First, at the individual program level, program planners need to be able to insert their revenue and cost information into a format that will show how much discretionary revenue there is, year to year, in order to reinvest in new or “nice to have” items. In addition, the ability to project actual financial performance over some number of out years, and then be able to tweak these numbers by modifying price point, volume of students, and one time and recurring costs is also part of basic planning. With respect to cash flow per se, it may be that campus policy on PDST programs, or other aspects of policy require that revenues be spent in any given year by the program. Even if this is the case, knowing what is available year to year so that one can zero out without running red would seem to be important. Finally still at the individual program planning level, this is not exclusively a planning exercise. If it turns out that a program has 19 students where the plan was for 30, then it is important that divisional and campus analysts see these actual numbers so that adjustments can be made.

At the divisional or campus level, the same sensitivity analyses are available at the level of consolidated programs (how multiple programs are performing, over a time function, as a whole (given the unique assumptions of each).

The second major part of the template is the assumptions area:

- Academic Plan Assumptions—(Students in program, tuition revenue per year, revenue escalations, PDST tuition price point, other globally applied values like regular tuition cost and fees, program labor costs, and return to aid formulas).
 - This section is presently a blend of global assumption inputs and individual program revenue and cost parameters. For individual program planning, the global or campus level assumptions are for information only purposes (and thus should not be modified without direction to do so).

[Detailed Income Statement](#)

- Detailed Income Statement—(detailed gross revenue, offsets/payouts, other revenue, total net revenue, total OPEX detail, net income, total CAPEX detail, total annual and cumulative cash flow)
 - This section mirrors the major line items of the Summary Income Statement, but breaks down each summary item figure into its various components. Gross revenue, for example, shows annual tuition revenue totals broken down by tuition type per year (along with startup divisional revenue, fees, and any other revenue types). Total Tuition offsets and payouts reflects the same figure as the summary income statement (all revenues leaving the books), but breaks it down by return to aid formulas and percentages destined for the campus general fund. Total net revenue mirrors the summary income statement, but breaks out all revenues to the program per year. Operating expense and Capital expense sections are likewise accounted for in detail, resulting in a Net Income line that mirrors in the summary income statement. This is the available cash for annual program reinvestment (if any) prior to the allocation of Capital expense. The total cash flow is the cash position per year after this additional subtraction.