Executive Summary of Divisional Plan

2001-02 to 2010-11

DIVISION OF NATURAL SCIENCES

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Executive Summary of Divisional Plan

1.0 Introduction

UCSC has entered an aggressive and fast-paced growth period that will bring significant new resources to the campus, as well as the serious challenges presented by accelerated growth. Once enrollment targets are realized we will enter a very different stage, one of steady state enrollment and resource management. In planning for this growth the Division of Natural Sciences has considered a number of critical questions: Can we envision the nature and design of the academic and research programs we want to have in place once we reach the targeted growth level? What will the division look like and how will instruction and research be different than it is today? How do we get there? I believe we are nearing the completion of a comprehensive divisional plan that provides the answers to these questions. The programs and directions we envision for the future are summarized in Section 2 of this document and presented graphically in Attachment A.

While our planning process has been ongoing for several years, the refinement of the campus planning process requires the division to adjust its plans to maximally contribute to achieving the articulated goals of the campus. Most of those campus goals, particularly doubling extramural funding, greatly expanding private gift support, and achieving membership in the AAU will not be possible without the majority contribution from the Division of Natural Sciences.

Doubling the extramural funding for the campus is an important campus goal on which most of our other goals depend. Natural Sciences is the largest campus player in providing extramural funding. While we have been successful in obtaining good levels of funding on an individual faculty basis, we have not been as successful in attracting large scale project funding. This will be critical if the campus is to meet its goals and will require two things. First, the campus must be willing to invest more of its resources into Natural Sciences and Engineering in order for us to reach the critical mass needed for large project funding. Second, the division must organize its growth into areas that will be competitive for such funding.

Investment in the sciences will not be cheap. However, it is an investment that is crucial if the campus is to meet its goals. Among the top ranked departments on campus are Astronomy, Earth Sciences, and Physics (at least high-energy physics). This is no accident. It is due to the substantial investment the campus has made in Lick, SCIPP, and the Tectonics ORUs. If the campus wants more departments in the top 25 rankings we need a similar commitment of support to other departments. We have shown that we can make these ventures pay off. It is now time to invest more broadly.

This document seeks to make the case for a major campus investment in the Division of Natural Sciences. It describes our plans for utilizing our current resources, growth funds, and extramural support to meet departmental, divisional, and campus goals.

1.1 A New Approach to Planning

As part of the on-going divisional planning process I have asked department chairs to assess both what we have accomplished to date and what programs will define the natural sciences in the future. Department chairs and faculty have worked diligently within their own departments and collaboratively across disciplines to develop academically sound and well integrated strategic plans which have produced the foundation for a strong divisional plan. This year, I again asked departments to further refine their plans, to carefully consider how growth could be phased, how interdisciplinary efforts could be leveraged, and to think about what they want their departments to be in 2010. Efforts have focused on creating plans that would allow departments to shape their programs in order to take advantage of new developments within the disciplines, to consider what academic opportunities must be available to students as the campus develops, and to have the financial flexibility to achieve their goals.

The plan presented here is a culmination of this multi-year effort. That effort has resulted in a well-articulated and well-defined set of programmatic and curricular directions that will sustain our current excellence and develop new areas of strength to address global challenges in the areas of health, the environment and technology.

The initiative process certainly catalyzed our planning efforts. The process as implemented by the campus called for a divisional planning process that insured a realistic integration of initiative planning with long-term divisional academic planning. Throughout this process we have worked to build on our foundation of academic excellence and to develop new ideas and collaborations that will lead to innovation and discovery.

2.0 General Planning Principles

Summaries of programmatic objectives, new undergraduate and graduate instructional initiatives, and initial thoughts regarding Summer Session and the Silicon Valley Regional Center are presented below. The goals reflected in these plans have been prioritized, and effective implementation strategies were developed through the continuation of the planning process. As growth occurs in the future, proposed departmental programs will continue to be integrated into the divisional plan. Divisional prioritization criteria include:

- the extent to which programs build upon or extend expertise already in the departments or in other UCSC departments
- prospects for student growth or increased funding
- the quality and comparative advantage of the program or activity
- the demand for the program or activity on the part of students, other programs, and society

Departments considered numerous questions as they developed plans:

- What are the exciting scientific areas we anticipate will shape the future of the sciences?
- What areas of science will be critical to our nation and to our state over the next ten years?
- What current strengths exist in the division that will allow us to take advantage of the emerging opportunities?
- How can we actively promote interdivisional collaboration?
- What programs will capture the interest of students pursuing careers in the sciences?

The dominant areas of science are affected by new technologies and funding patterns. It is often difficult to predict what new technologies will be developed in the coming years, but we can guess about funding patterns with more certainty. Scientific research is primarily funded by federal agencies. The investment of federal resources will generally follow the security concerns of the country. While national focus in past decades has primarily been directed to military concerns, of primary importance in the next few decades will be new security issues: the security of our health, our environment, and of our economy. Basic research directly related to improvements to the economy, public health, and the environment will be the major emphases of the division as we grow.

Accordingly, the divisional plan has identified three areas of thematic overlap within the department plans that will define our programs in the future. Strategic investments in these areas will position the division to take advantage of anticipated future opportunities and will wisely leverage the campus' limited resources:

Health: Biological Sciences; Chemistry and Biochemistry; Environmental Toxicology; Physics

The Environment: Biological Sciences; Chemistry and Biochemistry; Earth Sciences; Environmental Toxicology; Ocean Sciences

Technology: Astronomy; Chemistry and Biochemistry; Earth Sciences; Mathematics; Physics

2.1 Current State of Planning

By forecasting the distribution of divisional faculty at target growth (Attachment A), we can now understand the range of new initiatives and programs that can be fully supported as new resources are realized and also improve other areas of planning (space, staff, technical support, graduate support, etc.). In the curricular and research activities summarized below, exciting new research areas have been linked with established programs to insure the viability of our instructional programs and to promote research activities of the highest caliber.

2.2 Instructional Objectives

The Division of Natural Sciences will address the educational expectations of a growing and changing student population by sustaining and creating compelling instructional programs that will train students to be leaders and innovators in our increasingly technological society. Further, the division is committed to support of co-curricular academic activities that complement the academic programs of our departments and support students in the attainment of their academic goals.

One of the biggest challenges we currently face is enrollment management. Divisional enrollments have been relatively flat for the last three years, following a sharp decline from 94-95 to 95-96. A slight increase is expected this year. We must find ways to preserve the existing strengths of our programs while at the same time extend or leverage these enterprises to support our instructional and enrollment management objectives. Department plans include strategies for new program development and curricular enhancements designed to meet these objectives. Efforts currently underway include:

- **Health Sciences**: The Molecular, Cellular and Developmental Biology Department, in cooperation with Chemistry and Environmental Toxicology, has proposed a unique, interdisciplinary program for education in the health sciences. This program will require the hiring of additional faculty with expertise in human biology; the expansion of undergraduate and graduate course offerings; and the development of a health sciences internship and community service program. As a first step toward this goal, the department faculty have carefully constructed a plan for recruitment which leverages the Biology positions associated with the Center for Biomolecular Science and Engineering. A degree program proposal for a new undergraduate major in Health Sciences is near completion and expected to be submitted for campus review in Spring Quarter 2001.

- **Environmental Health**: The Ecology and Evolutionary Biology Department, in cooperation with Environmental Toxicology, Earth Sciences, and Chemistry, is developing a new undergraduate concentration in Environmental Health. This program will provide advanced lecture and laboratory coursework to undergraduates who will go on to pursue career/graduate studies in environmental health-related fields, such as environmental toxicology, environmental chemistry, public health, and environmental resource use and management.

- **Undergraduate Degree Options in Ocean Sciences**: The Ocean Sciences Department is currently evaluating undergraduate degree options. They seek to design a high-quality, rigorous science major in ocean sciences - a program that would be distinct in the UC system.

- **Astrophysics Degree Program**: In cooperation with the Astronomy and Astrophysics Department, the Physics Department has just completed a proposal to establish a Bachelor of Science degree program in Astrophysics. The program will provide students with experience in observational astronomy, as well as

experimental skills in the detection and processing of electromagnetic radiation from radio waves through gamma-ray radiation.

- **Applied Physics Degree Program**: The Physics Department is actively developing a program leading to a degree in Applied Physics. This program will prepare students who intend to seek work in industry after completing their degree. The program will be developed in cooperation with the School of Engineering, as it is expected that students will be required to take some courses offered by Engineering.

2.3 Research Objectives

The Division of Natural Sciences aspires to be recognized for the distinction of its scientific programs. Many of the exciting scientific questions relevant to our understanding of the physical world today extend beyond the ideas, tools, and capabilities of any single discipline and must be approached in a multi-disciplinary fashion. For this reason, we have considered our future growth not only from the perspective of current programmatic strengths but also in terms of the potential for interdisciplinary cooperation and research. A consequence of this has been that previously unexplored partnerships crossing departmental lines have been forged, and multi-disciplinary research agendas have been identified. The planned activities provide a focal point for increased funding, leverage faculty FTE investment, and serve as an aid in recruiting and retaining the best faculty and students. Further, such partnerships will facilitate major project development that will have the potential to increase institutional research capacity (e.g., new space; support for students, post-doctoral researchers and staff; major equipment).

In order to implement the new programs summarized below, the division intends to leverage the investment of new resources in a manner that meets the needs of existing and future student growth and sustains programmatic excellence while realizing the synergistic benefits of interdisciplinary efforts. The strategic plans produced by the primary participant departments have each integrated the programmatic development of these research activities into their recruitment plans. As plans are refined, essential resource requirements will be defined and implementation strategies developed in light of emergent opportunities and available funding. Because department plans are designed to be flexible, with sustainability possible within a range of resources, we envision that the full complement of proposed research programs can be successfully implemented by 2010.

- **Institute for Geophysics and Planetary Physics (IGPP)**: The mission of the IGPP Multi-Campus Research Unit is to promote and coordinate basic research on the understanding of the origin, structure and evolution of Earth, the Solar System, and the Universe, and on the prediction of future changes as they affect human life.

  The UCSC IGPP Branch now includes three interdisciplinary research centers:

  Center for Dynamics and Evolution of the Land-Sea Interface (C.DELSI)
  Center for Origin, Dynamics and Evolution of Planets (CODEP)
  Center for the Study of Imaging and Dynamics of the Earth (CSIDE)

  Subsequent expansion will include development of additional research centers:

  Center for Massive Computer Simulations (CMS)
  Center for Remote Sensing (CRS)

- **Particle Astrophysics and Cosmology**: This program is an interdisciplinary effort spanning areas in the Physics Department and the Astronomy and Astrophysics Department. Areas targeted for development are: 1) gamma ray astrophysics, and 2) an experimental program aimed at answering fundamental

questions in cosmology such as the geometry of space-time and the nature of the recently discovered "dark energy".

- **Center for Biomolecular Science and Engineering (CBSE)**: Established this year, the CBSE is a collaborative effort with the School of Engineering. The program is designed to meet the challenges of the post-genomic era, focused on the development and application of technologies that will enable an in-depth analysis of the human genome. This will require a new blend of computational analysis, micromechanical robotics, microfluidics, bioelectronic chips, imaging, and new structural and functional genomics methods. Through the development of this center UCSC is poised to make major contributions to the post-genomic effort.

- **Complex Materials**: A joint program of the Chemistry, Physics and Electrical Engineering Departments, a program in Complex Materials aspires to distinguish UCSC as a leading institution in the development, characterization, and application of complex materials. UCSC is well situated to contribute to the understanding of novel materials and the development of novel materials for new technologies. Areas proposed for future development include: organic hybrid materials and devices; nanoparticle and nanostructure devices; strongly correlated systems; interfacial interactions and degradation mechanisms; applications of complex materials.

- **Integrative Coastal Ecology**: The Ecology and Evolutionary Biology Department is developing interdisciplinary approaches to understanding and conserving coastal ecological systems. This approach conceptually unifies the current strengths of the department by integrating terrestrial and marine conservation science in the coastal environment and by linking with other relevant campus programs (e.g., Ocean Sciences, Environmental Toxicology, Environmental Studies). This program responds to the need for a deep appreciation of why conserving coastal ecological systems is important and to the recognition that future environmental policy decisions will be made by students being trained today. This program seeks to establish a nucleus for research, education, service and outreach. The integrated marine-terrestrial approach is unique and positions UCSC to be a premier research and training institution in coastal ecosystems.

- **Center for Ocean Health**: The Center for Ocean Health, through the Institute of Marine Sciences ORU, is intended to create a model structure for the integration of interdisciplinary marine sciences research, environmental policy, and public education, all focusing on the health of the world's oceans. The Center will provide a focal point for UCSC's marine sciences research programs in marine mammal biology, nearshore ecological processes, marine biogeochemistry, and environmental toxicology.

- **Center for Math/Science Education**: The Mathematics Department has proposed the development of a Science Education Center with Mathematics at the forefront of the Center's activities. This builds on the long and distinguished record of success at UCSC in the area of math education.

2.4 Silicon Valley Center

Faculty members in the Natural Sciences have been actively engaged in discussions about prospective opportunities at the Silicon Valley Center. Many departments have identified potential directions in research and instruction. The appropriateness of those directions will depend on the eventual definition of the Center's educational and research role.

Astronomy and Astrophysics envisions a research related role leveraged by their interaction with NASA Ames and the SETI Institute. Several faculty in Earth Sciences, in collaboration with colleagues in Ocean Sciences and Ecology and Evolutionary Biology, have developed two ideas for the Center: a Geobiology program and a Center for Remote Sensing of the Environment. Both of these proposals have potentially

strong ties to interests of the Center's other partners, particularly NASA Ames. Environmental Toxicology intends to be actively involved in three areas: environmental toxicology graduate curriculum and internships; pharmacology undergraduate and graduate curriculum and internships; and remote sensing and computer modeling (of contaminants).

The Mathematics Department proposes to establish a small working group of researchers dedicated both to discrete mathematics (mathematical theory concerned with the processing and understanding of discrete mathematical systems and data sets, including the combinatorial and mathematical side of Information Sciences) and to improving the knowledge base through course offerings. This area is not strongly represented by Bay Area universities nor currently represented well at UCSC. Hence, there is an opportunity to develop something unique that would be valuable to both education and industry and that has outstanding funding opportunities.

The Physics Department has considered locating part of the Applied Physics program at the Center, possibly an internship quarter for students if it could be combined with a teaching program. A masters and doctoral program in instrumentation might benefit from being located in Silicon Valley, though this would represent a major undertaking by one or more senior faculty.

2.5 Summer Quarter

Several departments have identified opportunities to make productive use of a formal summer quarter. The Chemistry and Biochemistry Department already offers introductory courses in the summer and participates in numerous outreach programs. More summer offerings might be feasible with an opportunity for considered planning. Earth Sciences will be offering an "Introduction to Computing in the Natural Sciences" course this summer, and is evaluating the feasibility of expanding its offering of introductory courses. Environmental Toxicology is considering a summer course in aquatic toxicology to capitalize on the Center for Ocean Health facilities and other resources at Long Marine Lab. Physics currently offers many of their service courses through summer session but state that a 10-week format, taught by ladder faculty, is necessary. Physics is also prepared to teach their undergraduate lab courses in the summer and to consider developing a course for physics teachers in California who do not have a physics degree. These teachers would receive guidance and disciplinary enrichment to increase their teaching effectiveness.

Its important to note that divisional planning for summer quarter is in a very preliminary phase. As planning efforts continue this year to complete the comprehensive submission due in December, it is expected that plans for summer quarter will be further refined.

3.0 General Overview of Funding Strategies and Measures of Success

3.1 Funding Strategies

It must be acknowledged that while new resources will be available to the division in relation to growth, long-range planning must include a thorough examination of the division's base budget and how resources are currently utilized. The division has made a concentrated effort to review and to assess how it is currently investing in instruction and in research. It is not clear that the funding strategies that served the division well in the past will serve the division well in the future. It is equally important to consider how current resources can be reallocated to fund critical needs.

In order to explore the various opportunities available to help secure sufficient resources and effectively re-deploy existing resources, I asked that three main projects be under taken and considered priorities for division staff:

- The Steering Committee for Academic Planning and Resource Management

- The Divisional Ad Hoc Space Committee
- The Staffing Analysis Project.

I will briefly address each of these key projects below, as they are central elements of our planning process.

Charged as an advisory body, the Steering Committee for Academic Planning and Resource Management was formed primarily to concentrate on the guidelines and intricacies of the decentralization of resources to departments. Committee members have been charged to devise a resource allocation model that stresses effective resource management by emphasizing prioritization of and accountability for expenditures. The intent of the model is to provide chairs with the authority to utilize funds to best meet student demand and enhance the work of the program.

Serious and careful divisional space planning efforts, in cooperation with the campus space planning process, need to take place at this time if the division is going to realize long term goals, as well as lead the campus in its mission to double extramural funding and increase graduate student enrollments. The sciences will need to optimize both new and released space in order to support both research and programmatic objectives. To galvanize divisional space planning efforts, the Divisional Ad Hoc Division Space Committee was formed to gather data and help formulate a divisional space plan. Each department was asked to respond to a detailed survey and to keep in mind careful consideration of the needs of their teaching programs and the anticipated growth space necessary to support these programs. This requires a clear understanding of departmental and ORU space requirements necessary for supporting existing programs, building new programs, attracting new students, and fostering research efforts. An effective plan for faculty clustering, in order to encourage such collaborative and interdisciplinary interactions, is one of the central aims of the committee.

Another significant part of forming an infrastructure that will reinforce the teaching and research mission of the division is creating and sustaining an effective administrative structure. The Division of Natural Sciences is currently conducting a comprehensive staffing analysis with the goal of providing information and plans for an administrative structure that is aligned with space and budget resources and provides for maximum investment in the instruction and research enterprise. Data are being gathered, specific concerns of divisional and academic department managers have been identified, and work is progressing on several of the associated projects.

It is clear to me that a series of strategies to insure long term financial health for the division includes efforts to systematically and carefully reallocate temporary academic staffing resources. This will allow the division to respond to areas of growth within the sciences, such as the service programs of Mathematics, Chemistry, and Physics.

Other significant ways that division finances can be leveraged include dedicated Instructional Equipment Replacement Funds to set up and enhance teaching centers. Divisional funds in the form of matching funds for major proposals such as the National Science Foundation Major Research Instrumentation will be utilized to help build vibrant research centers that will offer faculty state-of-the art equipment, and leverage individual faculty start-up packages.

3.2 Extramural Funding Opportunities

The programmatic and research directions outlined in this document, in particular the initiatives cited above, position the Division of Natural Sciences to take advantage of funding priorities that have been proposed at the national level.

Health: The National Institutes of Health (NIH) budget for FY 2001 outlines a budget plan of $18.8 billion for the NIH, an increase of $1 billion or 5.6 percent more than the FY 2000 budget. Generous increases in the last two budget cycles have allowed the NIH to begin many new programs. Acting NIH Director Ruth L.

Kirschstein, in her 2001 budget presentation to the Senate Appropriations Subcommittees on Labor, Health and Human Services, and Education, discussed three new programs that have particular relevance to our emphasis on health-related research:

- Genetic Medicine: Recent advances in the Human Genome Project have resulted in a working draft of the full human genome. Scientists can use this information to find the genes involved in heart diseases, cancer, epilepsy, Alzheimer's and psychiatric disorders. Companion activities, like developing genomic resources for organisms such as mice, rats, and fruit flies, will help speed the arrival of more precise medical interventions.

- Neurosciences: Dr. Kirschstein cites this as a particularly exciting time for expansion of research in fields of neuroscience, such as neurogenetics and imaging. In order to foster collaboration among the Institutes which support intramural research in this area, a total of $73 million is requested over two years to establish a new National Neuroscience Research Center.

- Biomedical Computing: To exploit new understanding of biological processes, there is a need for new teams of diverse and skilled researchers to overcome complex technical and research problems. In FY 2001, NIH plans to establish an Office of Bioengineering and Bioimaging. Further, NIH has developed the Biomedical Information Science and Technology Initiative to work toward an intellectual fusion of biomedicine and information technology. In FY 2001, NIH also plans to provide the infrastructure to train the next generation of interdisciplinary scientists, to develop new means for storing, managing, and accessing vast data collections, and to enhance basic research in biomedical computing.

Environment: At the request of NSF, the National Research Council sought to identify a small number of grand challenges in the environmental sciences. Their report, "Grand Challenges in the Environmental Sciences 2000", identified the following challenges: biogeochemical cycles; biological diversity and ecosystem funding; climate variability; hydrologic forecasting; infectious diseases and the environment; institutions and resource use; land-use dynamics; reinventing the use of materials. The report recommended that NSF make immediate investments in the areas of biological diversity and ecosystem funding, hydrologic forecasting, infectious diseases and the environment, and land use dynamics. One of the keystone recommendations of the National Science Board, in its report entitled "Environmental Science and Engineering for the 21st Century – The Role of the National Science Foundation", was that environmental research, education, and scientific assessment should be one of NSF's highest priorities. The report recommended that support for these areas at NSF be increased by an additional $1 billion, phased over 5 years, to reach an annual expenditure of $1.6 billion. Scientific understanding of the environment, together with an informed citizenry, is essential to improving the quality of life in the future. The excellence and strength of environmental related research at UCSC positions us to be very successful in competing for support at the national level.

Technology: The major national planning document in Astronomy and Astrophysics is the report prepared by the National Research Council, "Astronomy and Astrophysics in the New Millennium". The current survey recommends a budget of $4.67 billion for space-based initiatives such as the Next Generation Space Telescope, Constellation X (an x-ray Astronomy mission), Terrestrial Planet Finder (UCSC faculty are already involved), and the Single Aperature Far Infrared Telescope. An additional $956 million is recommended for ground-based initiatives such as the Giant Segmented Mirror Telescope; the Square Kilometer Array for SubMillimeter-wave astronomy; and the Combined Array for Research in Millimeter-wave Astronomy.

The National Nanotechnology Initiative awarded $270 million in FY 2000. This has been increased to $495 million in FY 2001, with a budget at NSF of $217 million. Availability of such funding will support the development of research in Complex Materials.

3.3 Accountability Measures

Consistent with campus goals and measures of institutional success, the main thrust of the division's accountability measures will be aimed at increasing enrollments, extramural funding, student-faculty ratios, and degrees awarded. Although the division experienced a decline in enrollments beginning in 1995-96, the downward trend is apparently reversing. The campus currently predicts an additional 3% growth for the Natural Sciences in 2001-02, and the division projects a steady incline to 2010. Enrollments for fall and winter quarters (2000-2001) show evidence that some specific curricular enhancements have resulted in increased enrollments for certain departments and for the division overall. As outlined in this summary, developing and implementing strategies to increase enrollments will continue to be a key component of the division's academic plans and measure of accountability.

In a recent white paper that profiled the characteristics of the Association of American Universities (AAU) member institutions essential criteria are outlined. These include the caliber of faculty and the number of postdoctoral appointments in science, engineering, and health fields, as well as the total research dollars awarded. Focus on these measures will serve the campus goal of achieving AAU status. With increased numbers of faculty in the sciences, come increased numbers of post-doctoral appointments. The campus benefits from these outstanding academic appointments as they contribute to the success of the research enterprise and to the potential for significantly increasing outside funding awarded to UCSC.

Through the implementation of the proposed academic plan, the division is poised to make a major impact in obtaining substantial extramural funding. In 1999-2000, the division received $26.5 million in extramural funding. To date, $22.5 million has been received with a projected $33.8 million for the total year (this would mean a 28% increase over last year's total). This increase demonstrates that the investments made in Natural Sciences' initiatives in the last few years is already paying healthy dividends. Using average per capita amounts, a conservative projection of $51 million per year from extramural awards to individual faculty can be forecasted at campus build-out, assuming we add 70 faculty to the division. Much more, however, should be possible as we create research clusters that will be effective in competing for large project funding. With increased numbers of faculty, made possible by the maximum range of growth resources, it is conceivable that the Division of Natural Sciences could exceed $60 million dollars annually in extramural receipts.

4.0 In Conclusion

It is my intention that this summary of plans for the Division of Natural Sciences conveys the excitement that exists among science faculty for the future of UCSC. Thanks in part to significant investments recently made by the campus leadership, we have been able to build on existing strengths and are ready to take these developments to the next level. Faculty are actively engaged in seeking out interdisciplinary junctures with colleagues at Santa Cruz and within the UC system. In addition, they continue to enhance collaborations with industry (e.g., IBM, Lucent Technologies, etc.) and external research facilities (e.g., NASA Ames, USGS, MBARI, Naval Postgraduate School, National Marine Fisheries Service, etc.) to capitalize on research and funding opportunities.

Departments in Natural Sciences are creating plans for instructional and research programs that will 1) be consistent with prospective directions in the disciplines, 2) make the most of cross-disciplinary opportunities, 3) effectively compete for large-project funding, and 4) provide students a valuable and stimulating education. Maximum investment in the sciences is crucial if we are to raise the profile of Santa Cruz within the UC system and forward the campus goal of AAU membership.

Attachment A

FTE Planning - Division of Natural Sciences - Executive Summary 2001

Department	Current FTE	Dept. Instructional & Research Emphases	Organized Research →	Interdisciplinary Links	Current Recruitments	Planned FTE 2010 →	Related Activity	Projected FTE 2010
Astronomy	9.4	Advanced Instrumentation Multi-wavelength astronom Theory and simulation Optical observations	rticle Astrophysics & Cosmolog CODEP	Physics arth Sciences, Physics, Chemistr Physics, SCIPP UCO Lick Observatory	Modern Instrumentation (.20) Adaptive Optics (.20) Sub mm Observer (CODEP 1.0)	Multi-wavelength (far IR) Theory High energy astrophysics .08 increase (UCO Lick appt converted)	CODEP CODEP CODEP/Particle Physics and Cosmology	14.6
EE Biology	17	Marine ecosystem studies Terrestrial ecosystem studie Integrative coastal ecolog	C. DELSI Ocean Health MBRS PISCO Center for Conservation Studies and Policy	arth, Ocean, ETOX, Env. Studies IMS, ETOX, Ocean Env. Studies IMS Env. Studies		Evolutionary theorist Mathematical biologist Plant evolutionist Population geneticist Neurophysiologist/Behaviorial Ecologist Marine vertebrate biologist Plant physiological ecologist Community ecologist Coastal ecosystem processes Freshwater ecologist Marine conservation biologist	C. DELSI C. DELSI CCSP C. DELSI CCSP	28
MCD Biology	19	Mol. biology of RNA Cell & developmental biolo Model genetic systems Neurobiology Genomics & structural biology	CBSE RNA Center	Chemistry, ETOX, Engineering Chemistry	Vertebrate Neurobiology/Genomics	Vertebrate molecular genetics Human molecular genetics Mammalian cell biology Developmental biology RNA structure and function Cell and developmental biology Neurobiology Structural Biology Virologist Neurobiology Developmental Biology Cell biology	CBSE Health Sciences	32
Chemistry	21	Organic chemistry Biochemistry Inorganic chemistry Physical Chemistry	CBSE Complex Materials Environmental Chemistry Amino Acids, Peptides,Proteins	CD Biology, ETOX, Engineering Physics, Electrical Eng. ETOX	Combinatorial Chemist (CBSE)	Synthetic inorganic chemistry Experimental physical chemistry Macromolecular design Structural dynamics of macromolecule Proteomics-mass spectroscopy Protein structure/NMR spectroscopy Protein crystallographer Synthesis organic chemistry Theoretical physical chemist	Complex Materials Complex Materials CBSE, A(2)P(2) CBSE, A(2)P(2) CBSE, A(2)P(2) CBSE, A(2)P(2) CBSE, A(2)P(2) Complex Materials Complex Materials	31

Attachment A

FTE Planning - Division of Natural Sciences - Executive Summary 2001

Department	Current FTE	Dept. Instructional & Research Emphases	Organized Research → Interdisciplinary Links	Current Recruitments	Planned FTE 2010 → Related Activity	Projected FTE 2010
Earth Sciences	19	Surface processes Earth history/global chang Solid earth system	CRS — TOX, EEB, Ocean,Eng., Env. Stud C. DELSI — TOX, EEB, Ocean, Env. Stud., IMS CODEP — Astronomy, Physics, Chemistry CSIDE — CODEP, Physics CMS — stronomy, Physics, Applied Math	Atmospheric/Climate Change (C.D	Planetary Science: Atmospheres — CODEP Geology/Geochemistry Geology/Paleobiology — C. DELSI Planetary: Atmospheric Chem. or Dyna — CODEP Remote Sensing of Active Tectonics — Ctr. For Remote Sensing Planetary Lithospheric Dynamicist — CODEP Biogeochemical Processes/Systems Mo — C. DELSI	27
Env. Toxicology	4	Biological effects Ecotoxicology Biogeochemical Transport Environmental Fate Public Policy	C. DELSI — EB, Ocean, Earth, Env. Stud., IMS CBSE — MCD Bio, Chem, Engineering Ocean Health — IMS Neurobiology	Molecular Genetic Toxicologist (C. D	Environmental Toxicologist — C. DELSI Microbial Toxicology/Bioremediation — C. DELSI Proteomics — Neurobiology Genetic Toxicology — Neurobiology Risk Assessment/Epidemiology — Neurobiolggy	10
Mathematics	16	Discrete Mathematics Non Linear Math/Science Education	tr. For Science/Math Education — Div. Of Nat. Sci, Education	Partial Differential Equations (non-lin	FTE in general areas of discrete math, non-linear, science education	20
Ocean Scienc	8	Ocean biogeochemistry Ocean circulation & clima Ocean ecology	C. DELSI — EEB, Earth, ETOX, Env. Stud., IMS Ocean Health — IMS	Phys. Oceanography/ Remote Sensing (C. DELSI)	Ocean climate dynamics — C. DELSI Oceanic food web dynamics — C. DELSI Marine sedimentary organic geochemistry Biochemical oceanography	13
Physics	18.25	Particle physics Astrophysics Condensed matter Wave propagation	rticle Astrophysics & Cosmolog — SCIPP, Astronomy Complex Materials — Chemistry, Electrical Eng.	Particle Astrophysics	Particle Astrophysics (3) Condensed Matter (4)	26.25
Total FTE:	131.65					201.85

Note: Projected FTE, plus or minus 10% = 180 to 221 science faculty in 2010, dependent on available resources.
Programmatic goals will be met by hiring of new faculty funded by growth resources as well as strategic replacements of retiring faculty.