

## College Planning Form

College:

Science and Mathematics

Planning Coordinator:

Jerry Stinner

### **1. Briefly explain how your plans relate to your college's mission/vision.**

*Click on shaded area to begin.*

The College of Science and Mathematics is committed to excellence in teaching, research, and service. At the same time, the College recognizes that higher education is changing at a pace much faster than it ever has, largely owing to external factors beyond its control. Quoting from our Vision Statement, "The College of Science and Mathematics strives to lead in a system of higher education that is redefining itself to meet the challenges of a changing student population, shifting globally driven market forces, increasingly complex technologies, rising costs, and eroding state fiscal support." To meet these challenges and to achieve our goals of excellence the College recently identified five key objectives: 1) Improve Teaching Quality 2) Increase Scholarship 3) Increase Enrollment 4) Expand K-12 Activities, and 5) Increase efficiency. For each objective, the departments developed strategies. These strategies form much of the text for the templates that follow.

Emerging from this planning were consistent themes that cut across all departments. As their number one priority, all identified the need to hire first-rate faculty with strong interests in teaching and outstanding backgrounds in research. This is consistent with the College's philosophy that teaching is a blend of classroom instruction and research. Good scholars are engaged teachers. It is also consistent with our vision of achieving "the highest standard of excellence in scholarship." The Vision statement describes the "teacher-scholar model, where faculty members are effective skilled teachers, understand how students learn, integrate teaching with research, and are committed to the creation of new knowledge for its own sake and its application to solving problems." That is why we are committed to offering competitive salaries, start-up, and research space. Funds from the College, departments, and Provost's office are being used for this purpose.

Another theme is that we are committed to growth because we recognize our responsibility to educate the citizens of the region and that growth is the only source of new money from the state. Given the realities of state funding, this means that we must offer more large class sections, more online lectures, and more hybrid laboratories. A major problem is the lack of large classrooms on campus. Chaparral Hall will help ameliorate this serious problem. Departments are also planning for smart classrooms as funding permits, and the College recently hired two additional IT support personnel. We are however concerned that campus IT support will not be adequate to meet the needs of more online offerings.

A third common theme is that we are dedicated to improving and growing graduate programs by stepping up recruitment efforts, offering tuition waivers, Research Assistantships, and higher salaries for Teaching Assistantships. A joint PhD program is being developed. The College finished developing a new Graduate Fellowship Program to aid in student recruitment and research productivity. Four fellowships of \$5,000 each are awarded annually. Growing graduate programs now makes especially good sense because of the recent re-benching of graduate ftes.

A fourth common theme is converting part-time positions into full-time Lecturers in order to improve the quality of instruction, especially in the large introductory general education and service courses. Quoting the College's Mission Statement, "the College must share with other colleges at CSUN in the creation of a scientifically literate and informed public" and "there is a need to offer exciting, up-to-date general education courses for non-majors." G E courses such as Microbes and Society, Life In The Sea, Fun With Physics, and Living with Earthquakes are being considered.

The last common theme from this year's planning is renovation of space. All five departments will be dramatically impacted by the opening of Science 5 in summer '09. We must carefully plan ahead in order to prevent disasterous disruptions in teaching and research. Timing (i.e., the sequencing of moves) is critical. A major concern of the College is finding sufficient funds (estimated at over \$1M for renovation). We are working closely with Academic Resources on this most urgent matter. The Dean, Associate Dean, MAR, and Department Chairs meet on a regular basis to plan the details of the move.

## 2. ACADEMIC QUALITY

### a) Assessment

Explain the progress that the college has made—and will make—in assessment: Identifying performance outcomes, setting benchmarks, assessing against them, using results, etc.

**Goals:** Assessment of the academic quality of the curricular and co-curricular programs supports the two main pillars of the College vision: (1) provide programs of distinction in undergraduate and graduate education that foster the highest standards of excellence for student learning and performance, and (2) promote the highest standard of excellence in scholarship, including enriching research opportunities and experience for faculty and students. Four key elements form our strategic assessment plan, which are designed to yield and convey compelling evidence of student learning and achievement to the University, potential donors, and external accreditation and funding agencies. It is important that efforts on all goals advance simultaneously. (1) Assessment must primarily be based on direct student performance; (2) Assessment must be longitudinal through out the program: i.e., lower division, upper division, capstone/graduation for undergraduates and for course work and culminating experiences for graduate students; (3) Assessment must include the impact of the research experience and other co-curricular activities on student learning; (4) Assessment data must be stored in a secure electronic database that is accessible to instructors, University officials, and external accreditation and funding agencies.

#### **Progress in 2007-08 and Plans for 2008-09**

**Biology** coalesced its assessment and curriculum committees into a single committee to facilitate the smooth transfer of assessment finding into curriculum change. Biology has a five-year assessment plan in place that covers GE courses and the undergraduate (BA and BS) and graduate (MS) programs. Assessment tools include pre-and post-testing, area assessment, and portfolios (MS students), the latter being implemented in 2008-09. Additional evaluation instruments include faculty review of research projects, correcting papers and exams against rubrics, and exit surveys of alumni. These are collectively used to guide curriculum changes that will improve student interest, graduation, rate, and success.

Recognizing their growing reliance on non-tenure-track faculty, **Chemistry and Biochemistry** postponed their curriculum assessment plans to develop a formal review process to evaluate their non-tenure-track instructors. The new procedures clarify department expectations, standardize the review process and provide instructors with feedback that can be used to improve teaching. In addition, this department initiated assessment of two SLOs (1 and 4) for their majors and have nearly completed rubrics for the evaluation of written lab reports, undergraduate research reports, and classroom presentations (SLOs 2 and 3).

The disruption of faculty turnover (loss of senior faculty via retirement and the addition of three new assistant professors) and absence (sabbatical or leave), coupled with frequent changes in leadership (four chairs in five years) stalled progress in assessment in **Geological Sciences**, while the department tended to these needs. Nevertheless, they developed SLOs and designed assessment rubrics for their two largest GE courses (GEOL 101 and 102) which aligned their course objectives with the new SLOs for the University's GE subject exploration in Natural Sciences. Faculty are currently gathering data on their majors programs for the department's five-year program review, which will be evaluated in 2008-09. As mandated by the new guidelines, this self-study will have a strong assessment focus.

**Mathematics** is currently completing their assessments of MATH 462: demonstrate command of content usually associated with an undergraduate degree in mathematics (SLO1); MATH 262 and 462: present clear and rigorous proofs (SLO 3); MATH 340 and 370: build mathematics models and demonstrate problem-solving skills, including proper use of mathematical software (SLO4). In 2008-09, they will assess MATH 311 (a course in the Teacher Preparation Option of the Liberal Studies Program) for alignment of course content with Math Content Standards for California Public Schools, the Standards of the National Council of Teachers of Mathematics, and the students' mathematical background and capabilities. In the process, they will also assess the mathematical knowledge acquired by students who have taken the prerequisite courses of MATH 311 (MATH 210 and 310).

**Physics and Astronomy** undertook a rather ambitious (in breadth and depth) assessment of curricular and co-curricular programs. They tested both their minors and majors, implemented a tutoring program to address deficiencies in mathematics and the foundations of physics, and adopted an evaluation rubric for oral presentations within the modular laboratories. They have assessed their GE courses (PHYS 100A, 100BL, 220A, and ASTR 152) with respect to the GE SLOs using embedded questions, oral exams, or evaluation of experimental skills. In 2008-09, they will develop methods for assessing oral and written communication for their MS students (SLOs 5 and 6) and assess a large number of courses and labs in their major (fall: PHYS 301, 365,431,451,600,650; spring: PHYS 366,375,402,410,466,610) using a variety of assessment tools (exams with embedded questions, grading rubric, written and oral exams). Additionally, they will test juniors and seniors in fall and spring, respectively using an Exam developed by the faculty that covers material in freshman and sophomore courses (ETS Majors comprehensive test).

## 2. ACADEMIC QUALITY *(continued)*

### b) **The Learning-Centered University**

CSUN faculty and staff have developed pedagogies and learning objectives that take into account the different ways and paces by which students learn, as well as the different media and formats that suit different disciplines and levels of instruction. Recently, we have especially encouraged the replacement of seat time—hours as a measure of learning—with indices and supplementary experiences which allow students to proceed faster, if they can. Record the major ways in which the college has implemented—and will implement—several principles of a learning-centered and/or innovative university. Indicate, too, the extent to which funds have been redeployed to these ends.

The College has a tradition of replacing seat time with other ways to learn. Most faculty are research active and involve undergraduate and graduate students in their labs. Students receive course credit and summarize their results in final reports, theses, poster/oral presentations, and peer reviewed publications. Numerous field courses are offered in biology and geology. Many courses in the College have a laboratory component where students learn from doing experiments. There is aggressive development of online courses throughout the college.

Geological Sciences: 1) Change semester sequence of field courses into an intensive summer field experience. 2) Change the culminating BS experience to include an Honors theses. 3) Submit proposals for BS and MS Options in Geophysics. 4) Incorporate and integrate new faculty expertise into the curriculum. 5) Change course requirements and clarify program admission into MS Geology Option I Geology. 6) Institute TA orientation for all new and continuing TAs, with a mid-semester check-up. 7) Provide support to faculty to coordinate multiple laboratory sections. 8) Explore ways in which Hanna funds can support field instruction and enrich co-curricular field activities.

Mathematics: 1) Offer hybrid labs to better prepare students in 102, 103, 104, 105, and 150A/B. 2) Improve tutoring center. 3) Develop teaching guidelines for Instructors. 4) Convert some part-time positions to full-time Instructors. 5) Seek funding for developing labs, hybrid courses, online courses, and large class sections. 6) Offer more large section classes. 7) Offer more online and hybrid courses.

Physics and Astronomy: Offer to majors tutoring and help sections starting in their first semester when they are still not in official contact with the department. 2) Meet with freshmen and sophomores six times during the semester to discuss academic, research and practical issues and promote student-teacher exchange. 3) Explore converting PHYS 100A lab to a hybrid. 4) Consider widespread use of Student Response Systems in GE and service courses. 5) As part of the renovation plan, develop an undergraduate and graduate student study area and computer laboratory equipped with the necessary software. 6) Discuss the proposed student questionnaire, incorporate the selected changes, and submit for consideration. 7) Offer more online and hybrid courses. 8) Offer more large section classes.

Chemistry and Biochemistry: 1) Convert part-time positions to full-time Lecture positions. 2) Ensure good teaching by laboratory Teaching Assistants. 3) Ensure quality teaching by part-time faculty and Lecturers. 4) Update and increase instructional equipment. 5) Add smart classrooms. 6) Improve Chem 100 to better prepare students for upper level courses. 7) Increase the number of large sections. 8) Develop online instructional activities. 9) Streamline curriculum, e.g., by separating lectures from laboratories.

Biology: 1) Add smart classrooms and laboratories (especially in Science 5). 2) Renovate teaching and research space in Science 2 and 4 for marine biologists and microbiologists after Science 5 opens. 3) Improve graduation rate through improved teaching skills, curriculum revision (e.g., in 106/L and 107/L), mentoring, and technology. 4) Upgrade laboratory instrumentation. 5) Develop online lecture and hybrid laboratory for BIO281/L and 325/L. 6) Offer more large class sections, especially after Science 5 opens.

## 2. **ACADEMIC QUALITY** *(continued)*

### c) **Research and Creative Activity**

Colleges and other units should report initiatives that will: (1) “incentivize” research, (2) require matches, in-kind support, or enhancements to facilities, (3) respond to regional needs, (4) revamp the delivery of the curriculum and/or the involvement of students as research/creative apprentices, and (5) or require reforms in RPT that, for instance, clarify the standards for early promotion and specify how alternatives to publication will be appraised. Pay special attention to opportunities, through grants and contracts, to enhance the General Fund support of units and the total compensation of faculty.

The College is the recognized campus leader in external grant awards and student involvement in research. Only faculty with exceptionally promising backgrounds in research are hired, and they are expected to establish productive research programs at CSUN. They teach half-time for the first two years, and are provided the necessary start-up packages. All personnel guidelines were recently reviewed, with special attention to scholarship and early promotion. Increasingly, departments require MOUs.

Geological Sciences: 1) Continue to host annual AAPG EXPO to strengthen funding opportunities from oil companies and to showcase our students as prospective employees. 2) Re-organize existing space so that current and incoming hires have at least minimal necessary space for research needs. 3) Submit renewal proposal for NSF Catalyst Program involving eight faculty. 4) Recruit graduate students for LS-AMP Bridges to Doctorates. 5) Provide support, if possible, for preparation of external funding proposals. 6) Explore ways in which Hanna funds can support field research.

Mathematics: 1) Hire two tenure-track faculty per year with demonstrated ability to teach and with strong backgrounds in research. 2) Increase the number of peer reviewed publications. 3) Increase the number of applications to external funding agencies. 4) Increase the number of faculty and student presentations at professional meetings. 5) Provide reassigned time and travel dollars based upon research productivity. 6) Develop a visiting scholars program. 7) Recruit high quality graduate students.

Physics and Astronomy: 1) Provide reassigned time to new and research active faculty. 2) Start steps for the process establishing a joint PhD program. 3) Hire two new faculty with excellent research backgrounds and qualifications that will strengthen plans to pursue eventual joint PhD program. 4) Provide appropriate start-up funds and space for all new hires. 5) Increase quality and output of research. 6) Renovate research space for new hires, postdoctoral fellows and graduate students. 7) Expand graduate program by active recruiting and offering research assistantships, tuition waivers, and better advertising. 8) Search for support from foundations and other donors for educational and research activities.

Chemistry and Biochemistry: 1) Hire two tenure-track faculty per year with excellent research backgrounds. 2) Provide adequate start-up for new hires. 3) Provide adequate laboratory facilities for new hires. 4) Recruit high quality graduate students. 5) Provide travel dollars for new and research active faculty, and for students. 6) Step up recruitment of both in-state and out-of-state graduate students through campus visits, tuition waivers, and increased Teaching Assistant stipends.

Biology: 1) Hire two tenure-track faculty over the next two years with strong research backgrounds. 2) Provide adequate start-up and laboratories for new hires. 3) Increase the number of faculty publishing papers and the total number of peer reviewed publications. 4) Increase the number of grant proposal submissions. 5) Increase external funding. 6) Increase the number of faculty presentations at professional meetings. 7) Expand the graduate program by offering limited number of Research Assistantships and increased TA stipends. 8) Develop an equitable system for awarding independent study units to faculty.

## 2. ACADEMIC QUALITY *(continued)*

### d) On-Going Programs

What changes do you anticipate? In particular, how will academic change entail more than growth? Will it entail experiential learning, reduce seat time, reinforce GE, and/or respond to regional needs or accreditation reviews? Will it reflect an entrepreneurial direction to enhance General Fund and total compensation? **How will you reduce costs to students? How are you engaging in partnerships with the community?**

Many changes are occurring in the College. Most profoundly, enrollment is increasing as never before, and the rise in student-to-faculty ratio is alarming. In 2000/01 ftes was about 2,400, and now it is close to 3,500. The number of tenure-track faculty has not changed, largely because attrition dollars are being repurposed centrally. State funds are shrinking. Over the last four years the College cut \$1,000,000 from its budget, and is cutting over \$1,000,000 this year. Marginal dollars for growth do not cover the cost of growth. As an example, faculty are being hired at \$70,000, but the state provides only \$64,000. Faculty understand these dismal statistics, and are responding with large class sections and more online course offerings. They are also aggressively pursuing external funding for research and instrumentation. There is renewed attention to expanding GE courses and developing new "popular" GE courses.

Geological Sciences: 1) Submit proposals for two new GE courses, one is Lifelong Learning ("Living with Earthquakes"), and one in Natural Sciences offered only in online format for lecture and lab ("Geology goes Hollywood"). 2) Increase number of hybrid labs by changing all evening, Friday, and Saturday GEOL 102 labs to hybrid format. 3) Institute TA orientation for all new and continuing TAs, with a mid-semester check-up. 4) Provide support to faculty to coordinate multiple laboratory sections. 5) Offer 110+ student GE lecture sections. 6) Grow graduate program.

Mathematics: 1) Careful scheduling to avoid low enrollment sections. 2) Offer more large section classes in 102, 103, and 140. 3) Offer more online and hybrid courses (131 and possibly 140). 4) Improve calculus courses and calculus preparatory courses.

Physics and Astronomy: 1) Extend online and hybrid courses (154LOL, 152OL, PHYS 100A). 2) Offer more large section classes (PHYS 100A). 3) Careful scheduling to avoid low enrollment sections, including during summer session. 4) Continue to use TAs in teaching laboratories. 5) Enforce that the mathematical material previously in PHYS 389 is taught in the two-semester course sequences for classical, electromagnetism and quantum. 6) Seriously study economic implications of offering another graduate elective and a graduate seminar course every year. 7) Revisit the idea of developing the GE course "Physics of Renewable Energy" in the context of the sustainability institute. 8) Start analysis and discussion on offering a more applied undergraduate degree with strong ties to the local industry.

Chemistry and Biochemistry: 1) Increase the number of large sections. 2) Develop online instructional activities. 3) Streamline curriculum, e.g., by separating lecture from laboratories. 4) Expand "bottleneck" courses (100, 101, 102, 103, 104, 235, 321, 333, 334, 355, 365, 461) by hiring additional faculty and adding/renovating teaching laboratories as resources permit.

Biology: 1) Develop online lecture and hybrid laboratory for BIO 281/L and 325/L. 2) Offer more large class sections, especially after Science 5 opens. 3) Carefully monitor class scheduling to improve efficiency. 4) No longer financially support Genetic Counseling Program after 08-09. 5) Expand and improve online BIO100 lecture and hybrid BIO100L laboratories. 6) Improve retention rates in BIO 106/L and 107/L. 7) Continue developing strong partnerships with Santa Monica Mountains National Recreation Area, UCLA-Stem Cell Research Center, and AMGEN.

### 3. STUDENT ENGAGEMENT

Describe how your unit will contribute to the CSUN effort to engage, retain, stimulate, and graduate its students. Specifically, concentrate on plans to improve first to second year retention, reach out to K-12 pupils and teachers, make advising more consistent in practice and policy, and improve the support structures for students in courses with high failure rates. Finally, if pertinent, describe plans to mentor and channel undergraduates into post-baccalaureate study.

Geological Sciences: 1) New faculty hire (start F'09) with expertise in geosciences education will assist in pedagogy improvement across sectors of curriculum, 2) Reduce all 2-unit lecture, 2-unit lab core classes to 3-unit lecture and 1-unit lab to ease scheduling burden on students and department, 3) increase depth of undergraduate student research through institution of Honors thesis, 4) increase mentored research opportunities for under-represented groups through external funding (e.g., NSF Catalyst, LS-AMP Bridges to Doctorate, NSF Africa Array).

Mathematics: 1) Explore increasing the math requirement for Liberal Studies majors. 2) Revise the curriculum in Secondary Teaching Option BA. 3) Increase enrollment in four year integrated and junior year integrated programs. 4) Continue seeking funds for summer programs for teachers and high school student enrichment. 5) Addition of online recitation sections for pre-Calculus and Calculus. 6) Working with math Department Chairs at seven community colleges to develop an articulation agreement. 7) Improve advising at all levels in tutoring center.

Physics and Astronomy: 1) 1) Meet with freshmen and sophomore six times during the semester to discuss academic, research and practical issues and promote student-teacher exchange. Consider making these meetings a requirement. 2) Offer "Physics and Astronomy Saturdays" in which K-12 students, teachers and parents are invited to the department for demonstrations, presentations and laboratory tours. 3) Send graduate students to local area high schools to visit classes and tell about their experience as physics and astronomy students. 4) Offer summer research opportunities to HS students. 5) Continue dialogue with HS teachers to identify possible collaborations. 6) Hire a TNE lecturer that can take lead in the K-12 effort. 7) Offer second Workshop on Nanotechnology for High School teachers.

Chemistry and Biochemistry: 1) Chem 100 redesigned to improve student success. 2) Adding discussion and recitation sections for gatekeeper courses. 3) Most of the programs in the department have a requirement for independent research study with a faculty member. Develop a plan to increase the number of lower division courses taught by full-time faculty. 4) A TNE full-time Instructor was recently hired.

Biology: 1) Biology is well represented in K-12 teacher training through faculty involvement (SCALE and TNE). 2) High enrollment (35 FTES per year) in independent study courses reflect the faculty's strong commitment to research opportunities for undergraduate and graduate students. A system for awarding independent study units directly to faculty will be a further incentive. 3) Biology Advising Center is being expanded, especially in the pre-health area, as funds permit. Will ask Provost for matching funds to convert part-time to full-time pre-health advising position.

SSC/EOP: 1) Outreach to high school honors, AP classes, and other high school populations to heavily promote the Student Health Profession and Pre-Entry Program (SHP-PEP) Math Placement Test (MPT) and Chemistry Placement Test (CPT). 2) Continue SHP-PEP focusing on assessment, program enhancement & sustainability. 3) Freshman Connection Health Professions Cohort continues. We need student assistants to help support the peer advising program. 4) Mandatory Priority Advisement Workshops for the first year of a freshmen's academic career. 5) Science and Math, Facilitated Study Sessions (Tutorial Program). Funding is needed to provide tutoring in Math, Chemistry, Physics, and Biology.

#### 4. SHARED VALUES

Enumerate and explain your major projects. What philosophy—what thread—ties together these efforts? Indicate how they respond to assessment reports. **What efforts are underway in your college to articulate and incorporate sustainability as a core value that underlies your college's academic programs?**

During the planning process, each department identified four to seven strategies in each of the areas of teaching quality, scholarship, enrollment management, K-12, and efficiency. Out of this emerged five core strategies common to all departments: 1) Hire first-rate tenure-track faculty members. 2) Increase enrollment in graduate programs. 3) Change instructional delivery to meet growth and accommodate new technologies. 4) Convert part-time to full-time faculty. 5) Renovate space and upgrade facilities. These five core strategies are all critical to the future of the College. They are all aimed at Improving Academic Quality and Enhancing Student Engagement as defined by the planning templates.

1) Hire first-rate faculty. This is the single most important strategy since it is the foundation of the College. Hiring exceptional tenure-track faculty ensures high quality classroom instruction and vigorous research programs. We recognize that to do this requires competitive salaries, adequate start-up packages, and modern laboratory facilities. The College, the Provost's Office, and the departments are combining funds to provide start-up. Reassigned time is being given to all new faculty during their first two years so that they can set-up their laboratories, prepare manuscripts for publication, and submit grant proposals. Minor capital outlay, College funds, and department funds are being used to renovate and upgrade laboratories. 2) The College seeks to increase enrollment in its graduate programs. Because of the national need for scientists and mathematicians, the prospects for growth appear to be very good. Departments will offer research assistantships, higher salaries for Teaching Assistants, and tuition waivers as resources permit. Better recruitment efforts through brochures, websites, campus visits, and advertising at professional meetings will be targeted. Expanding our graduate programs will provide more revenue to the university, enhance faculty scholarship, and help with teaching in the large undergraduate courses. 3) All five departments are aggressively pursuing the development of large class sections and more online lectures and hybrid laboratories. We are doing this in order to accommodate future enrollment growth, recognizing that marginal funds from the state do not cover growth, and that traditional teaching laboratories are increasingly costly to run. Without these efforts, it will be impossible to maintain and enhance scholarship in the College. 4) With the dramatic increases in enrollment since 2000, there has been an alarming rise in the reliance upon part-time faculty instruction. With this there is an unavoidable decline in teaching quality owing to the large number of individuals involved, many of whom teach at other colleges/universities. This problem is especially acute in the large introductory general education and service courses, which frequently run numerous sections. Uniformity of course content and standards are major issues. 5) The College is in the midst of a major building and renovation phase. This has happened because of the construction of Science 5, the hiring of new faculty (8-10 per year), and the need for smart classrooms. The basement of Science 2 was recently renovated at a cost of close to \$1,000,000, providing additional classrooms and laboratories. When Science 5 opens this summer, most of Biology will move there, leaving vacant space behind which will need to be renovated for occupancy by the other departments. In addition, the faculty and staff in the Math department will leave Santa Susanna Hall and move into Science 1. The Department Chairs, Dean, Associate Dean, and MAR meet regularly to discuss and map out the renovations, including locations, timing, and costs. We estimate between \$1.0 and \$1.5M dollars will be needed for renovation of Science 1 and 2. The move to Science 5 and subsequent renovation in Science 1 and 2 is the major priority for the College.

