STRATEGIC PLAN FOR DOCTORAL EDUCATION IN TEXAS

Presented to the Texas Higher Education Coordinating Board by the Graduate Education Advisory Committee (GEAC), July 2, 2009 (Co-Chairs Sandra Terrell and Mitchell Muehsam)

I. Introduction

The Texas Higher Education Coordinating Board convened the Graduate Education Advisory Committee (GEAC) on March 11, 2005, and charged the Committee to "advise and assist the Coordinating Board staff in (1) developing parameters to implement the recommendations identified in the Board's report, *Doctoral Education in Texas*; (2) evaluating the success of the implementation of the recommendations; and (3) making suggestions for future directions the Board and institutions should take to enhance doctoral education in Texas." The report concluded that "doctoral education provides critical needs for Texas and the nation" but that it "is expensive and competes with many other higher education needs in the state." The benefits of doctoral education are clear: doctoral students will be the innovators, entrepreneurs, and leaders who will ensure that Texas and the nation continue to prosper in today's global knowledge-based economy. The research produced by these students and by the faculty in doctoral programs will shape that economy through (for example) the invention of new technology, technology transfer, and the creation of new startup companies, all of which are direct, practical benefits of that research. Without a firm commitment to graduate, and especially doctoral, education, Texas risks not only the health of its economy but also of its citizens and society.

The United States and Texas face increased competition from doctoral programs throughout the world, not just from Europe but from Australia, China, Singapore, India, Thailand, and many other nations. This competition comes in the midst of a financial crisis and at a time when Texas has fallen to 44th in the nation in total reductions in funding for higher education. Nonetheless, in spite of the reductions, Texas remains 2nd in overall appropriations. Only California ranks above Texas, but the difference is remarkable--$11,759,821,000 to $5,773,809,000 (Chronicle of Higher Education, January 16, 2009). Given the current financial crisis and the needs in the state, it is unreasonable to assume that Texas can catch up with California, but Texas can certainly continue to produce outstanding students and groundbreaking research in its doctoral programs. To do so, Texas must approach doctoral education from an entrepreneurial perspective; the state and its doctoral programs cannot settle for doing things as they have always been done. Of course, the new faculty to replace the aging faculty must be produced, but the research and

education at Texas universities must continue to work at the transdisciplinary frontiers of knowledge, and that work will require collaboration throughout the state, not only among various disciplines, researchers, and institutions but also with local businesses and governments.

To ensure future competitiveness, Texas must recruit and retain outstanding undergraduates with diverse backgrounds into its graduate programs. The state must also facilitate collaborative research. In turn, doctoral programs must rigorously review their day-to-day operations and hold themselves accountable to the citizens of Texas, especially given the aforementioned cost of doctoral education. Appendix A, Characteristics of Texas Doctoral Programs, and the Critical Indicators of Success below offer lenses through which to gauge progress toward achieving future competitiveness as well as the goals outlined in this strategic plan: Global Competitiveness, Social Impact, Ethical Leadership, Accessible Education, Economic Impact, and Affordability and Support. And the Four Strategic Initiatives-Collaborations, Outreach, Faculty Excellence, and Student Funding--outlined in this strategic plan provide a pathway to world-class doctoral education.

The economic stimulus bills being discussed at the federal level in Washington, D.C. make the timing of the adoption of a strategic plan for doctoral education a very high priority. Various reports indicate that there may be up to $3 billion for NSF (2/3 in Science and engineering), $2 billion for the NIH (largely biomedical), and $1.5 billion also for the NIH to renovate research facilities. Whatever comes of these funds, Texas universities and the Texas Higher Education Coordinating Board must be ready to be proactive rather than reactive in these difficult economic times. The initiatives in this strategic plan and the indicators of success will ensure that the State is a leading force in the creation of knowledge and the important economic benefits such as technology transfer that will accompany that knowledge.

II. Vision Statement

Texas will provide world-class doctoral education to its citizens and others seeking advanced training in the state.

III. Mission Statement

To create and support an inclusive community of research scholars and educators who will expand economic and social development in Texas and the world.

IV. Closing the Gaps Rationale

The Texas Higher Education Coordinating Board's Closing the Gaps initiative is most often associated with undergraduate education because of the dire need to increase the number of successful undergraduate students in Texas. However, the four goals, especially goals three and four, are directly related to excellent doctoral education in Texas.

- GOAL 1: *Close the Gaps in Participation*—By 2015, close the gaps in participation rates across Texas to add 500,000 more students.
- GOAL 2: *Close the Gaps in Success*—By 2015, increase by 50 percent the number of degrees, certificates and other identifiable student successes from high quality programs.
- GOAL 3: *Close the Gaps in Excellence*—By 2015, substantially increase the number of nationally recognized programs or services at colleges and universities in Texas.
- GOAL 4: *Close the Gaps in Research*—By 2015, increase the level of federal science and engineering research and development obligations to Texas institutions to 6.5 percent of obligations to higher education institutions across the nation, from 5.5 percent in FY 2000.

Since the original goal of 500,000 was set, the goal has been raised to 630,000. Enrolling 630,000 new students is no small task, and ensuring that these students are enrolled in high quality programs with world-class faculty is an even more daunting task. The sheer number of new faculty with PhDs needed to teach these students is mind-boggling: at a 25 to 1 student/faculty ratio, Texas will need 25,200 new faculty members; at a more favorable 20 to 1 ratio, Texas will need 31,500 new faculty. If one places these numbers in the context of the number of faculty needed to increase federal science and engineering funding by 50 percent, the importance of producing doctoral graduates becomes self-evident. If a science or engineering researcher is funded on average $250,000, Texas will need 2,600 faculty members, most of whom will be new, to meet goal four—raising state funding by $650 million to $1.3 billion. Obviously, research at this level is intense and cannot be done with single faculty members; a strong cadre of experienced, knowledgeable doctoral students working in laboratories throughout the State will be essential to the success of increasing research funding.

Furthermore, a strong increase in the number of excellent doctoral students will not only improve the availability of teaching assistants who can help faculty deliver an excellent quality education; the increase will also (with proper training) enlarge the number of qualified instructors for undergraduate education. The teaching associates (instructors of record) will be able to keep the class sizes smaller in order to ensure that the retention rates improve and that more students graduate from high quality programs.

Enhancing doctoral education in Texas, then, is a win-win situation. The Closing the Gaps initiative clearly requires the State and the Coordinating Board to do so if the State is to have rigor and excellence in its higher education programs and if it is going to succeed at attracting and supporting more research in Texas to provide the economic and academic stimuli and benefits that the State desires, deserves, and requires.

V. The Core Values of Doctoral Education in Texas

- ***Scholarship***: Knowledge is central to what faculty, students, and all Texans do.
  - Doctoral students receive and contribute to state-of-the-art knowledge.
  - Faculty continually generate new knowledge through their research and integrate the teaching of research skills into doctoral education.
  - Texas faculty model the use of the best contemporary knowledge in their scholarly work and professional practice.
  - Doctoral education provides critical thinking, problem-solving, and communications skills that enable alumni to work effectively in a variety of settings.

- ***Inclusiveness (Diversity and Accessibility)***: Texas colleges and universities respect all people, accept the wide range of their cultures and values, and seek to incorporate both into their institutions and programs.
  - Texas seeks to promote a broadened understanding of the full range of cultures and values of its population and provide an environment in which its students may experience them.
  - Texas' doctoral programs shall be available and affordable to all those who are capable.
  - Texas accepts an obligation to identify and assist capable individuals to enter and successfully complete doctoral education programs.
  - Texas encourages openness to new ideas among all in its academic communities.

- ***Competitiveness (Excellence)***: Texas' doctoral programs and institutions are highly competitive.
  - Texas institutions attract outstanding faculty and doctoral students.
  - Texas doctoral programs bring respect, recognition, and financial support to their institutions and the state.
  - Texas' research and alumni enable the state and the U.S. to be highly competitive in the knowledge-based economy of the 21st Century.
  - Texas embraces creativity and innovation as the basis for the discovery and application of new knowledge that ensures competitiveness.
  - Texas continually evaluates its performance with the goal of continuous improvement.
  - Texas establishes a culture of meritocracy that demands and rewards excellence at every level, especially the doctoral level.
  - Each institution is expected to seek preeminence within its peer group, join a more select one, and continuously repeat the cycle.

- ***Ethics***: Texas colleges and universities hold themselves accountable for ethical and professional behavior in all they do and accept the responsibility to monitor their own actions accordingly
  - Texas faculty and administration, especially those involved in doctoral education and research, communicate with complete openness and honesty and in a timely fashion with all constituencies.

VI. Doctoral Education Goals in Texas

- ***Global Competitiveness***: Texas will be recognized globally for the excellence of its doctoral education.
- ***Social Impact***: Doctoral students in Texas will be involved in society and in solving social problems.
- ***Ethical Leadership***: Doctoral education will produce responsible leaders who are open-minded and embody the principles of courage, respect, and integrity.
- ***Accessible Education***: Texans and members of the global community will have access to exemplary doctoral education.
- ***Economic Impact***: Doctoral programs will serve as economic engines that will impact the state, nation, and world.
- ***Affordability and Support***: Doctoral students will be adequately funded and supported so as to be able to graduate in a timely fashion.

VII. Critical Indicators of Success

- ***Global Competitiveness***
  1. Number of national awards by professional associations
  2. Number of faculty in professional leadership positions such as heads of professional organizations, editorships, membership in national academies, etc.
  3. Number of students who are:
     a) international
     b) out of state
     c) Texas
  4. Number of interdisciplinary or transdisciplinary funded research collaborations within a university
  5. Number of collaborations resulting from peer-reviewed paper publications
  6. Number of interdisciplinary or transdisciplinary funded research collaborations among universities
  7. Number of nationally ranked (top 50) doctoral degree programs
  8. Number of doctoral programs that have improved their ranking in the top 50
  9. Number of doctoral student publications in peer-reviewed journals or peer reviewed creative accomplishments
  10. Number of nationally competitive fellowships
  11. Number of new transdisciplinary programs
- ***Social Impact***
  1. Number of students involved in outreach and service learning programs
  2. Number of official recognitions of social involvement
  3. Number of outreach programs for under-represented populations
  4. Number of articles written in journals and/or newspapers about significant advances that affect society
  5. Number of students in STEM fields

6. Number of students in SBE (Social, Behavioral and Economics) programs
7. Number of students in critically under-represented fields as determined by the CB
8. Number of doctoral programs that have service learning and outreach components

- ***Ethical Leadership***
  1. Number of doctoral degree programs with an ethics component (whether in class or out of class)
  2. Percentage of positive responses in doctoral student survey qualitatively measuring doctoral students' engagement with ethical issues
  3. Number of faculty participating in programs on how to incorporate ethics and conduct responsible research
  4. Number of students participating in programs on how to incorporate ethics and conduct responsible research
- ***Accessible Education***
  1. Percentage of students from under-represented racial and ethnic populations who enter doctoral degree programs
  2. Percentage of first-generation baccalaureate students who enter from doctoral degree programs
  3. Percentage of women in STEM doctoral degree programs
  4. Number of under-represented students in STEM
  5. Number of under-represented and economically disadvantaged students and students with disabilities
  6. Number of doctoral degree programs that admit part-time students
  7. Number of part-time students financially supported in doctoral degree programs
  8. Number of students from under-represented racial and ethnic populations financially supported in doctoral degree programs
- ***Economic Impact***
  1. Amount of total licensing revenue
  2. Number of disclosures
  3. Number of licenses granted
  4. Number of patents granted
  5. Amount of total federal funding (external funding)
  6. Number of industrial-sponsored research projects
  7. Number of State-funded research projects
  8. Number of collaborative research projects with industry partners
  9. Number of new startup companies
  10. Number of doctoral students placed in industry
- ***Affordability and Support***
  1. Retention and completion rates benchmarked against national norms
  2. Percentage of fully-supported students (as determined in national discipline)
  3. Number of students with health care insurance (not OBRA)
  4. Number of students receiving need-based aid

5. Amount of dollars spent to support professional development for doctoral students
6. Amount of financial aid for part-time students in doctoral degree programs
7. Amount of financial aid for under-represented racial and ethnic populations in doctoral degree programs
8. Number of pre-professional development programs such as ABD seminars, dissertation workshops, interview preparation training, etc.

VIII. Action Items

Doctoral education is a critical component of the State of Texas' future economic, social, and cultural health and success. Doctoral education supports the research mission of Texas' universities and fuels the economic engine of the state. Further, graduate students are important mentors to undergraduate students and key members of research teams. The State, the Texas Higher Education Coordinating Board, and the Universities in Texas must act if Texas is to reach the economic goals to which it currently aspires. Attracting and retaining the best graduate students to Texas cannot be left to chance. Attention must be paid to graduate recruiting of the best and brightest, and competitive stipends and benefit packages must be provided to support these students while they complete their studies. The same principles apply to attracting the best researchers to Texas institutions, using seed grants and other incentives to ensure that innovative, ground-breaking research takes place in Texas' universities. No university will be able to accomplish on its own what needs to be done—collaboration amongst institutions and universities will be crucial for Texas to achieve excellence and competitive advantage. The following three, interlocking initiatives are designed as a pathway to ensure that doctoral education meets the needs of Texas and the nation's citizens. To be successful, the initiatives must be fully funded; at this important juncture, unfunded mandates will erode the progress that Texas' doctoral programs have made and will directly and negatively impact Texas' future.

Initiative 1: Outreach and Inclusiveness

To ensure that Texas provides inclusive doctoral education and a nurturing environment that recognizes and promotes diversity, Texas universities will actively engage in the following projects.

(1) Texas institutions providing doctoral education will *codify and publish a specific outreach policy that outlines the commitment to diversity* as a core value and requirement of the institution's strategic plan. The outreach policy should describe recruitment, accessibility, and retention efforts to diversify doctoral programs through increased participation of talented individuals (both faculty and students) from underrepresented racial and ethnic groups; individuals with disabilities; and individuals from economically disadvantaged backgrounds. Based on this policy, Graduate School staff will collaborate with doctoral program faculty and staff to devise coordinated and strategic recruitment plans for students and faculty.

- No cost to the State – Cost borne by the institution (in time spent to write and publish the policy).

(2) The Coordinating Board, System offices and independent university offices will work together to *present best-practices workshops* towards developing (a) diverse and qualified applicant pools of graduate students, (b) holistic application processes that include diversity as one of the factors considered in building each doctoral student cohort, (c) programs that graduate schools can use to monitor departmental and campus climate in order to respond proactively to challenges and issues that might affect student and faculty retention. The workshops will be broadcast as webinars, and participants can either travel to Austin or participate online.

- Two workshops per year at an average cost of $7,500 to be paid by the CB; travel to the workshops will be borne by the universities who send participants. Total cost to the CB/State: $15,000 per year.

(3) The Coordinating Board and each institution or University System or independent public institution will establish *formal, annual grants programs* to recognize proposed outstanding and innovative doctoral student and faculty diversity recruitment and outreach programs. These grants would be matching grants.

- Two $20,000 grants, each matched with $20,000 from the receiving institution or system. Total cost to the CB: $40,000/year; total cost to participating institutions or Systems whose entrants are awarded grants: $40,000/year, for a total State cost of $80,000 per year.

(4) The Coordinating Board and each institution or University System will develop and fund a *visiting teacher/scholar programs* to enhance diversity participation by faculty from underrepresented racial and ethnic groups; individuals with disabilities; and individuals from economically disadvantaged backgrounds. These visiting teachers/scholars will be required to either teach a minimum of one class at the host university or participate in some other public manner to the intellectual life of the campus during the semester in which they participate in the program. They will also collaborate in research with colleagues while visiting.

- Five participants annually at 50% of the participant's salary up to a maximum of $40,000. Total cost to the CB/State: up to $200,000/year.

(5) Each doctoral institution will include in doctoral program directors' duties the responsibility as a *diversity advocate*, including overseeing development efforts (developing funding for fellowship and other support of students and faculty), and meeting with recruitment and admissions committees to provide their diversity sensitive charge.

- No cost to the State

Initiative 2: Research Competitiveness
To achieve faculty excellence and stimulate high-quality research throughout Texas universities and colleges, the state will institute the following actions.

(1) Through the Coordinating Board, the State will fund a *competitive grant program aimed at recruiting and retaining high caliber faculty*. This competitive grant program would be used to supplement institutional resources for the purpose of recruiting and retaining the very best faculty by, for example, creating attractive start-up or retention packages. Such faculty should show evidence of the potential to add significantly to building an area of national distinction. The program would focus on high-caliber junior and senior faculty, where the resources required for recruitment or retention are above and beyond the normal amount that would be available through routine institutional funding sources. Institutions would be expected to align and justify their requests with the areas of current and emerging strength and distinction that have been identified through campus strategic plans and accountability processes.

- 50 awards per year. Total cost to the CB/State: $50,000,000/year, with the amount determined by _____.

(2) The State will establish and provide funding for *collaborative, inter-institutional research grants to foster collaborative research amongst faculty* from different Texas institutions to enhance opportunities for external research funding at these institutions. Based on current priorities, the seed grants will be focused on particular research topics (often in STEM fields), development of specific types of institutions (such as border schools), or promotion of research clusters across institutions. These competitive grants will support leave time for a researcher at a Texas university to spend one semester with a colleague at another Texas university to initiate a research project. This project might involve collecting pilot data and writing a grant proposal, working on a patentable invention, or producing the first draft of a book. Proposals for these awards will spell out the planned activities and define a concrete product to be produced (e.g., a grant proposal, a book draft, or a patent application) and the costs. The Coordinating Board will establish the process for awarding these grants and will engage faculty in various disciplines to referee the submissions.

- 20 seed grants per year. Total cost to the CB/State: $3,000,000

(3) The Coordinating Board will facilitate *consortial arrangements among universities* in a region and will work with the State Legislature to remove the funding barriers that are detrimental to such collaborations. The consortia will allow students to cross-register and promote the development of both faculty and students within and between disciplines. The consortia may collaborate to offer seminars, graduate student research symposia, and other types of faculty and student development activities.

- No cost to the CB/State

(4) The State will provide funding and incentives for the establishment of matching *cooperative doctoral programs* in order to meet demand in statewide areas of educational and technological need. The Coordinating Board will facilitate the establishment of these doctoral programs so that institutions desiring to provide access to students in areas where doctoral degree programs do not currently exist can team with quality established doctoral programs. Specific money will be set aside for travel amongst institutions, and the Coordinating Board will establish equitable funding mechanisms for the institutions as well as the doctoral programs.

- 5 initiatives per year at $25,000, matched by another $25,000 per recipient. Total cost to the State: $250,000 per year.

Initiative 3: Doctoral Student Enhancement and Support

To provide Texas and the nation with the next generation of first-rate researchers and faculty and to ensure access and affordability for doctoral education, Texas will establish the following programs for doctoral students.

(1) The Coordinating Board will work with the State Legislature to allow both in-state and out-of-state *tuition remission for supported students* holding assistantships and fellowships. These tuition waivers will greatly increase the competitiveness of Texas universities' recruiting packages. The Coordinating Board will also work with the State to provide funding to cover the lost tuition funding. The money freed up by this direct support of doctoral education will then be used to further support graduate students through additional fellowships, increased stipends, or funding for the payment of student fees.

- <u>Formula to be used to calculate the total cost: Statutory tuition + designated tuition + grad tuition x 24 SCH x FTE (50%) or the number of doctoral students who hold assistantships.</u>

(2) The State will develop and fund the *Future Texas Scholars Program*. This fellowship program will be exclusively for Texas students wishing to pursue a graduate degree in STEM fields. Modeled after the highly prestigious and successful NSF Graduate Research Fellowship Program, this program will recognize and support outstanding students in the relevant science, technology, engineering, and mathematics disciplines who are pursuing research-based doctoral degrees. With a focus on keeping the most talented aspiring graduate students in Texas, preference in awards will be given to students who have received an honorable mention distinction under the NSF fellowship program. Appendix B contains additional details regarding the program.

- 60 awards of $30,000 in the initial year; 60 additional awards in the second year also at $30,000 (the awards will run for two years). Total cost for the CB/State in the initial year: $1, 800,000; total cost to the CB/State thereafter: $3,600,000/ year.

(3) The State will provide *health insurance benefits for graduate assistants*. To do so, the State Legislature must change the wording in the 2003 legislation that mandated that for employees who work less than 100%, the maximum contribution allowed for health insurance would be 50% of the full-time employee benefit (The legislation specifically mentioned that half-time graduate assistants are not full-time employees.). Historically, half-time graduate assistants have been considered to be full-time employees since, in addition to their work assignment, they also were required to carry a full-time academic load that in total comprised a full-time work load. The best students in Texas are receiving substantial incentives in the form of benefits and stipends to leave the state and study elsewhere. Providing full health insurance benefits is essential to offering competitive recruitment packages.

- $1,000 per all doctoral assistantships. Total cost to the CB/State: Formula to be used: total number of doctoral students who hold assistantships x $1,000.

(4) The State will fund and the Coordinating Board will work with institutions to establish a state-wide *"Pathways to the Doctorate."* This program will be modeled after the NSF LSAMP program that supports undergraduates to build the necessary academic "toolkit" to succeed in a competitive graduate program. These programs include but are not limited to summer as well as academic year research opportunities, participation in learning communities, internships and faculty and peer mentoring. The program will help to develop alliances between undergraduate and graduate programs across the state within and between the various college and university systems and will create the "pipeline" of Texas undergraduate students who are prepared to pursue an advanced degree within the state.

- 5 initiatives per year at $25,000. Total cost to the CB/State: $125,000/year.

IX. Appendix A—Characteristics of Texas Public Doctoral Programs

The following chart represents the approved "Characteristics of Texas Public Doctoral Programs."

Characteristics of Texas Public Doctoral Programs[1]

Measure	Operational Definition
Number of Degrees Per Year	Rolling three-year average of the number of degrees awarded per academic year
Graduation Rates	Rolling three-year average of the percent of first-year doctoral students[2] who graduated within ten years
Average Time to Degree	Rolling three-year average of the registered time to degree[3] of first-year doctoral students within a ten year period
Employment Profile (in field within one year of graduation)	Percentage of the last three years of graduates employed in academia, post-doctorates, industry/professional, government, and those still seeking employment (in Texas and outside Texas)
Admissions Criteria	Description of admission factors
Percentage Full-time Students (FTS) with Financial Support	In the prior year, the percentage of FTS (≥ 18 SCH) with support/the number of FTS
Average Financial Support Provided	For those receiving financial support, the average financial support provided per full-time graduate student (including tuition rebate) for the prior year, including research assistantships, teaching assistantships, fellowships, tuition, benefits, etc. that is "out-of-pocket"
Student-Core Faculty[4] Ratio	Rolling three-year average of full-time student equivalent (FTSE) /rolling three-year average of full-time faculty equivalent (FTFE) of core faculty
Core Faculty Publications	Rolling three-year average of the number of discipline-related refereed papers/ publications, juried creative/performance accomplishments, book chapters, notices of discoveries filed/patents issued, and books per year per core faculty member.
Core Faculty External	Rolling three-year average of the number of core faculty

[1] Programs included only if in existence 3 or more years. Program is defined at the 8-digit CIP code level.

[2] First-year doctoral students: Those students who have been coded as doctoral students by the institution and have either completed a master's program or at least 30 SCH towards a graduate degree.

[3] Registered time to degree: The number of semesters enrolled starting when a student first appears as a doctoral student until she completes a degree, excluding any time taken off during graduate study. The number of years is obtained by dividing the number of semester by three.

[4] Core Faculty: Full-time tenured and tenure-track faculty who teach 50 percent or more in the doctoral program or other individuals integral to the doctoral program who can direct dissertation research. (A faculty member may be counted only once within an institution's program inventory.)

Measure	Operational Definition
Grants	receiving external funds, average external grant $ per faculty, and total external grant $ per program per academic year[5]
Percentage Full-Time Students	Rolling three-year average of the FTS (≥ 9 SCH)/number students enrolled (headcount) for last three fall semesters
Number of Core Faculty	Number of core faculty in the prior year
Faculty Teaching Load	Total number of semester credit hours in organized teaching courses taught per academic year by core faculty divided by the number of core faculty in the prior year
Faculty Diversity	Core faculty by ethnicity (White, Black, Hispanic, Other) and gender, updated when changed
Student Diversity	Enrollment headcount by ethnicity (White, Black, Hispanic, Other) and gender in program in the prior year
Date of Last External Review	Date of last formal external review, updated when changed
External Program Accreditation	Name of body and date of last program accreditation review, if applicable, updated when changed
Student Publications/ Presentations	Rolling three-year average of the number of discipline-related refereed papers/ publications, juried creative/performance accomplishments, book chapters, books, and external presentations per year per student

NOTE: In the online system, a "comments" field will be available in which the institution may explain any anomalies

[5] All external funds received from any source including research grants, training grants, gifts from foundations, etc.

X. Appendix B—Future Texas Scholars Program

Objective: To strengthen U.S. and Texas competitiveness and to sustain a leadership role in innovation by ensuring a domestic base of science and engineering expertise

Program Description: We propose a graduate student fellowship program for Texas students wishing to pursue a graduate degree in STEM fields. Modeled after the highly prestigious and successful NSF Graduate Research Fellowship Program, this program would recognize and support outstanding students in the relevant science, technology, engineering, and mathematics (STEM) disciplines who are pursuing research-based master's and doctoral degrees. With a focus on keeping the most talented aspiring graduate students in Texas, preference in awards will be given to students from Texas institutions seeking a STEM graduate degree, who have received an honorable mention distinction under the NSF fellowship program. In 2008, there were 48 honorable mention designations bestowed to student applicants from Texas universities. Texas needs to keep this brain trust in the state. The recent Perryman Report indicates that the availability of engineering and scientific talent is a major factor in economic growth, with states that can meet this demand for human resource expertise having a competitive economic advantage. The proposed Future Texas Scholars Program will significantly contribute to Texas' leadership in research, teaching, commercialization, and innovations in science and engineering.

Justification / Benefit to State / Results: Numerous studies at the state and national level report the need for more STEM and technology-oriented workers to keep Texas and the nation economically competitive. The latest indicators and studies such as the 2005 *Rising Above the Gathering Storm* report sponsored by the National Academies have increased the nation's focus on this critical issue. More recent reports show Texas lagging other states in relative size of its technologically-oriented workforce at the same time that economic trends show an increased need for engineers and scientists.

Recent reports point to the critical need to strengthen U.S. graduate programs in order to maintain our leadership position in science, engineering and technology. *Doctoral Education: The Backbone of American Competitiveness and Innovation*, published last year by the Council of Graduate Schools, highlights the fact that although U.S. scientific and technological leadership has been sustained by the combination of strong graduate programs and the steady supply of the world's finest students, other countries are increasingly making investments in doctoral education in order to compete with the United States. This disturbing trend is further amplified by the fact that around 34 percent of doctoral degrees in natural sciences and 56 percent of engineering PhDs in the United States are awarded to foreign-born students. This year, NSF reported that the increase in enrollment for first-time, full-time science and engineering

graduate students who were U.S. citizens and permanent residents was much smaller than that of foreign students, rising slightly more than 1 percent in 2006.

Possible Selection Criteria: There will be three eligibility requirements for this program

1. Citizenship - applicants must be U.S. citizens or nationals, or permanent resident aliens of the United States and reside in the state of Texas.
2. Degree Requirements - Fellowships are intended for individuals in the early stages of the graduate study. Applicants are eligible to apply during their senior year of college or prior to completing their first year of graduate school.
3. Field of Study - Fellowships are awarded for graduate study leading to research-based masters or doctoral degrees in the fields of science, technology, engineering and mathematics offered at any of the state's graduate degree granting institutions.

Requested funding: $1,800,000 in FY 2012 (60 awards of $30,000); $3,600,000 (sustain 60 awards for a second year and 60 new awards)