Doctoral Programs at The University of Alabama: Leadership in Developing 
Alabama’s Knowledge/Innovation Economy 

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February 18, 2008

Alabama has been very successful in attracting new industrial manufacturing jobs in recent years and is poised to record additional successes in coming years. However, virtually all economists recognize that the 21st century will be dominated by the “knowledge” or “innovation” economy (c.f., Florida, 2005; Pink, 2005). This view not only recognizes the importance of science, mathematics, and engineering literacy and workforce skills, but also the critical importance of creativity, innovation, and liberal arts skill sets:

“This is a world in which a very high level of preparation in reading, writing, speaking, mathematics, science, literature, history, and the arts will be an indispensable foundation for everything that comes after for most members of the workforce. It is a world in which comfort with ideas and abstractions is the passport to a good job, in which creativity and innovation are the key to the good life... That kind of leadership does not depend on technology alone. It depends on a deep vein of creativity that is constantly renewing itself.”


Clearly, as our world flattens and international competition increases, American creativity and economic competitiveness rely on an exceptionally well trained workforce. Numerous reports and white papers have recently reinforced the critical importance of strong graduate education programs as linchpins of U.S. economic security (Council of Graduate Schools, 2007a). Graduate education “prepares the knowledge creators and innovators of tomorrow with the skills, expertise, and cultural awareness needed to compete effectively in the knowledge-based global economy. The work of graduate students contributes directly to sustained economic growth, prosperity, and economic security” (CGS, 2007).

Graduate programs in the STEM disciplines (Science, Technology, Engineering, and Mathematics) have received most of the attention from media and policy makers in recent years – and with good reason. Biotechnology, nanotechnology, materials science, computer systems, and other emerging STEM fields are creating large numbers of new jobs in the South as well as elsewhere. But “the social sciences, humanities, and arts are also critically important to the nation’s long-term competitiveness and intellectual security; they are vital for innovation and problem solving within our communities, regions and states.... Economic competitiveness in the future will depend on a “creative class” of knowledge workers who exhibit not just the mastery of a subject area, but the creative ability and drive to reshape the boundaries of knowledge and navigate between geocultural boundaries.” (CGS, 2007a). This creative class absolutely depends on strong graduate programs that attract and retain creative people from within the state boundaries and also recruit the best and brightest from outside the state, region, and internationally.
And it is in this vein that The University of Alabama’s graduate programs, especially at the
doctoral level, (the focus of this report) are preeminent in the state, region, and in many cases
nationally. This report focuses on the UA doctoral program strengths from several perspectives:

1) As the Capstone institution for the state, UA’s doctoral programs are among the state’s oldest
and most respected and collectively graduated 30% of all PhD, EdD, and DMA students in
Alabama from 2003 through 2007. If agricultural/natural resources/veterinary PhDs from Auburn
University (127 (15%) of Auburn’s 862 total) and biomedical PhDs from the University of
Alabama at Birmingham (294 (40%) of their 739 total) are factored out, UA granted more than
35% of all doctoral degrees in Alabama from 2003 to 2007. Nearly one-half of UA doctoral
programs are either unique in the state or graduate more than 50% of all Alabama degree recipients
in their fields. Other programs (e.g., biological sciences) feature core strengths that are unique in
the state and essential to economic development and quality of life. Policy and progress in many
professions in Alabama, including K-12 education, business, communications, and social services
work, are shaped by UA doctoral graduates who dominate these professions.

2) UA doctoral programs are embedded within departments and interdisciplinary programs that are
student-focused and research-centered, both attributes essential to effective graduate training.
Doctoral education and the research base that underpins it synergistically strengthens
undergraduate education by attracting better students and faculty and by offering additional
opportunities for undergraduates to engage in research as part of their curriculum.

3) Exceptionally strong in the STEM disciplines, UA is also the only truly comprehensive liberal
arts doctoral research university in Alabama, and thus the only doctoral institution poised to help
drive Alabama’s ‘creative economy’ growth. Nearly 50% of the 6,434 UA doctoral graduates in the
current alumni database continue to live and work in Alabama, immeasurably adding to the state’s
economy and quality of life. Since the ratio of in-state to out-of-state doctoral students at UA is
approximately 60:40, this very high postgraduate retention rate demonstrates that UA effectively
retains “home-grown” creative talent while at the same time attracting large numbers of high-
ability creative people from other regions who spend their working lives in our state. Further,
among the 50% of UA doctoral alumni who have left our state, a disproportional number have
impacted the larger world outside of Alabama, an important economic multiplier in today’s ‘flat
world’ culture.

4) Aside from indirect economic benefits, UA’s strong graduate programs also produce significant,
direct economic benefit to Tuscaloosa, surrounding regions, and the state. In addition to tuition and
fee revenue, more than $18 million in graduate stipends and additional millions of dollars in grant
funds that depend on graduate student expertise are spent in the Tuscaloosa-area community
annually. The nearly 50% of all UA doctoral alumni who continue to make their home in Alabama
earn much more than if they had terminated their education at the bachelor degree level. Doctoral
degree recipients will earn at least $1.3 million more over their lifetimes than bachelor’s degree
holders (Day and Newberger, 2002). Put in simple economic terms, the “value-added” lifetime
earning potential of UA’s in-state doctoral recipients is approximately $4 billion above a similar
cohort of bachelor’s degree holders.
6) UA features numerous unique, cutting-edge interdisciplinary doctoral programs, many aligned directly with private sector industry, that drive innovation and economic growth in Alabama. Collectively, these interdisciplinary programs attract millions of dollars annually in external grants and contracts and are developing and implementing new technologies that could generate billions of dollars in economic development in Alabama and the world.

6) UA doctoral programs graduate degree recipients in a timely, efficient fashion compared with national peer research universities, both in terms of time-to-degree and percentage completion statistics.

7) UA is a national leader in attracting and retaining multicultural doctoral students and in developing a diverse, highly trained workforce in the state.

Part 1. UA Doctoral Program Degree Production Versus Other Statewide Programs

The analyses here are based on graduation statistics from degree years 2003 through 2007 inclusive, using compilations of ACHE data prepared by the UA Office of Institutional Research and Assessment. In many cases, degree programs in similar areas have different names in the ACHE inventory. Every effort was made to group cognate degrees consistently.

In the five-year time period 2003 to 2007 inclusive:

1. The 72 total doctoral program categories in the state of Alabama awarded 2774 doctoral degrees – the general trend is upward in numbers of degree per year.
2. UA awarded 831 degrees (30% of state total) in 42 degree programs, accounting for over 35% of all non-agricultural and non-biomedical doctorates statewide from 2003 to 2007.
3. Auburn and the University of Alabama at Birmingham (UAB) awarded 862 (31%) and 739 (27%) of the 2774 degrees statewide, respectively, with the University of Alabama at Huntsville (UAH), Alabama A & M University, Alabama State University, and the University of South Alabama (USA) together accounting for the remaining 12% of the statewide total.
4. Both UAB and Auburn recorded record doctoral production in 2007, while UA was atypically 3rd in doctoral graduates for that year. Evidence suggests that UA’s one-year “downturn” was an anomaly, and that UA will set a new record for doctoral degrees granted in 2008. Based on degrees granted so far for the 2008 census (August and December 2007,121 total) and applications for May 2008 commencement (116), we can project that UA will grant approximately 202 doctoral degrees in 2008, assuming an average application “melt” of 30%. Doctoral enrollment growth suggests that UA will exceed 200 doctorates per year on a consistent basis into the foreseeable future.
5. Program uniqueness (and taxonomy in general) is a difficult concept to quantify because of the various names given to functionally-similar programs statewide. Of UA’s 42 doctoral degree programs, 20 (48%) are arguably unique in the state – no other university grants that
degree. At Auburn and UAB the corresponding figures are 7 out of 32 and 4 out of 16, respectively.

6. Of UA's 42 doctoral programs, 11 have less than 2.25 graduates per year (ACHE viability threshold) over the last 4 years. Interdisciplinary studies is not subject to viability standards. Anthropology is a new program with its first PhD graduate in 2007 and should have no problem with long term viability. Other small programs serve niche markets and many are unique in the state (e.g., Accounting).

7. UA has several large "core discipline" programs that are either unique or clearly dominant in the state (e.g., English, history, and chemistry). These programs are clearly of strategic importance, not only as discrete disciplines but also as the nexus for critically-important multi-disciplinary research and graduate education priorities at UA (e.g., materials science).

8. Several UA programs are not unique in the state, but graduate significant numbers of students relative to the state total and represent core disciplines central to a preeminent, student-centered research university (e.g., many College of Arts and Sciences and College of Engineering programs).

9. UA clearly dominates Alabama in production of Education doctorates, with nearly as many graduates as all other universities combined. ACHE data suggest that the UA College of Arts and Sciences produced 33% of all "Arts and Sciences" doctorates in Alabama from 2003 through 2007. But this percentage is misleadingly low. Medical school and agricultural college PhDs at UAB and Auburn, respectively, although included in the ACHE degree taxonomy under "Biological and Biomedical Sciences" are not part of the respective Colleges of Arts and Sciences at these universities. Removing medical and agricultural school doctorates from the Arts and Sciences disciplinary tally in all universities raises UA's College of Arts and Sciences degree production to 51% of the statewide total from 2003-2007. Similarly, in College of Communication and Information Sciences and School of Social Work disciplines, which are immensely important to the Alabama economy and its quality of life, UA literally has no peer within the state.

10. UA's College of Commerce and Business Administration programs graduated nearly one-half of the doctorates statewide and are clearly differentiated from other universities in quality and focus.

11. As above, the biological sciences taxonomy deserves extended consideration. At first glance, UA would seem to be a minor player in this field, graduating only 25 of the 394 PhDs in that field in the five-year period. However, this simplified view is inaccurate. Alabama resembles many other states where strong, medical school-associated biomedical sciences programs are concentrated at one university (in our case UAB) and agriculturally-related life sciences are assigned to the land-grant institution (in our case Auburn). But modern biological sciences disciplines are incredibly diverse and well-funded and offer great opportunities for UA to exploit.

Of the 739 doctoral degrees UAB granted from 2003-2007, 313 (42% of the UAB total) were in the taxonomic category termed "Biological and Biomedical Sciences" by ACHE. Of these 313 PhDs, approximately 295 were granted in biomedical sciences disciplines allied with its Medical School, and only 18 were in non-medical-school biological sciences fields (Bryan Noe, pers. comm.). Auburn does not in fact offer a biological science PhD; its 26 PhDs under the Biological and Biomedical Science category were in fisheries, aquaculture, animal science, agricultural plant science, veterinary medicine, and forestry fields in which UA, as a non-land grant university, does not compete. Nearly all of the
University of South Alabama’s 23 PhDs were similarly in biomedical fields associated with its medical school.

Put another way, UA’s 25 biological sciences PhDs (plus an additional nine PhDs in biochemistry) represented approximately one-half of all of the non-medical/agricultural school biological sciences doctorates awarded in Alabama from 2003 to 2007. UA has no peer in the state in numerous cutting-edge biological sciences disciplines such as basic cell and molecular biology, ecology and evolutionary biology, systematics, and aquatic biology, as well as multidisciplinary programs (e.g., bioengineering and biochemistry) that require strong basic biological sciences expertise. Each of these programs has enormous capacity for growth and ‘bang for the buck’ in terms of grants, student numbers, intellectual property, and service to the state. Strategic investment to enhance UA’s position as the state leader in these areas would pay great dividends. As a guestimate benchmark, NRC Research Doctorate data forthcoming in 2008 will likely reveal that top-quartile biological sciences programs nationally produce ca. 15 PhD graduates per year.

12. A similar argument to that above can and should be made for UA’s engineering programs. Although they collectively produced 24% of the state’s doctoral graduates from 2003 to 2007, they are well-differentiated from competitive programs at Auburn, UAB, and UAH and have great capacity for strategic investment and growth.

Table 1. Breakdown of UA doctoral graduates versus statewide totals, calendar 2003-2007 inclusive. Asterisk denotes sole doctoral program in state. First number is UA total, second is statewide total

**Arts and Sciences**

<table>
<thead>
<tr>
<th>Subject</th>
<th>UA Total</th>
<th>State Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>43/62</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>49/90</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>51/109</td>
<td>(Note: does not include AU Clinical and Counseling Psych @73 degrees)</td>
</tr>
<tr>
<td>Math/Stat</td>
<td>32/71</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>27/47</td>
<td></td>
</tr>
<tr>
<td>Biol. Sci.</td>
<td>25/94</td>
<td>(includes biomedical sciences at UAB/USA + ag-related degrees at Auburn)</td>
</tr>
<tr>
<td>Biol. Sci.</td>
<td>25/55</td>
<td>(non-biomedical sciences at UAB/USA; non-ag-related degrees at Auburn)</td>
</tr>
<tr>
<td>Physics</td>
<td>22/74</td>
<td></td>
</tr>
<tr>
<td>Music*</td>
<td>20/20</td>
<td></td>
</tr>
<tr>
<td>Geol. Sci.*</td>
<td>13/13</td>
<td></td>
</tr>
<tr>
<td>Pol. Sci.*</td>
<td>15/15</td>
<td></td>
</tr>
<tr>
<td>For. Lang*</td>
<td>14/14</td>
<td></td>
</tr>
<tr>
<td>Anthro*</td>
<td>1/1</td>
<td>(first degree in 2007)</td>
</tr>
<tr>
<td>Mult/Inter.Std.</td>
<td>8/57</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL UA ARTS AND SCIENCES DOCTORAL DEGREES:</strong></td>
<td>320/967 (33%) statewide (including biomed/ag sciences)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>320/628 (51%) statewide (excluding biomed/ag sciences)</td>
</tr>
</tbody>
</table>

**Engineering**

<table>
<thead>
<tr>
<th>Subject</th>
<th>UA Total</th>
<th>State Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Eng</td>
<td>20/48</td>
<td></td>
</tr>
<tr>
<td>Mech. Eng</td>
<td>20/63</td>
<td></td>
</tr>
<tr>
<td>Elec. Eng</td>
<td>19/87</td>
<td></td>
</tr>
</tbody>
</table>
Chem. Eng  20/43
Comp/Info Sci 13/78 (includes Computer Eng @ UAB, UAH, and Auburn)
Civil Eng  9/34
Other Eng  7/92
TOTAL UA DOCTORAL DEGREES: 108/445 statewide (24%)

Human Environmental Sciences
Health/Phys  16/69 (includes joint Ph.D. in Health Ed/Health Promo w/UAB)
  Fam. Stud
Human Dev/  0/18
  TOTAL HES DOCTORAL DEGREES: 16/87 statewide (18%)

Education
  Curr/Instr*  41/41
  Public Admin  17/43
  High. Ed Ad*  37/37
  Secon. Ed  27/43
  El/Mid Adm*  54/54
  Kinesiol.*  22/22
  El. Ed  13/13
  Ed. Stat*  11/11
  Counsel Ed  15/35
  Ed Psych*  9/9
  Special. Ed  8/21
  Libr. Sci.*  2/2
  School Psych*  6/6
  Ed. Leader.  0/91
  Other Educ.  0/107
TOTAL EDUCATION DOCTORAL DEGREES: 262/535 statewide (49%)

Commerce & Business Administration
  Finance*  15/15
  Marketing*  14/14
  Manage. Sci*  10/10
  Accounting*  5/5
  Bus. Admin.  5/43
  Bus. Manage.  13/42
TOTAL COMMERCE/BUSINESS DOCTORAL DEGREES: 62/129 statewide (48%)

Social Work
  Social Work*  17/17
TOTAL SOCIAL WORK DOCTORAL DEGREES: 17/17 statewide (100%)
Communication and Information Sciences

Mass Comm* 31/31
Journalism* 14/14
TOTAL COMMUNICATION/INFO SCI DOCTORAL DEGREES: 45/45 statewide (100%)

Table 2. UA programs unique in Alabama or producing 50% or more of all doctoral graduates statewide, 2003-071

Music (100% of graduates)
Geological Sciences (100%)
Political Science (100%)
Foreign Languages/Lit/Linguistics (100%)
Curriculum/Instruction (100%)
Higher Ed Admin (100%)
El/Mid School Admin (100%)
Kinesiology (100%)
Educational Statistics (100%)
Educational Psychology (100%)
Social Work (100%)
Mass Communication (100%)
Journalism (100%)
Finance (100%)
Marketing (100%)
Elem. Ed (100%)
English (69%)
Secondary Ed (63%)
History (57%)
Chemistry (54%)

1 Programs with less than 2.25 graduates per year are not listed.

Table 3. Chronology of UA Doctoral Program Offerings

<table>
<thead>
<tr>
<th>Program (Division)</th>
<th>Date of Origination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences (Arts &amp; Sciences)</td>
<td>1950**</td>
</tr>
<tr>
<td>Chemistry (Arts &amp; Sciences)</td>
<td>1950*</td>
</tr>
<tr>
<td>History (Arts &amp; Sciences)</td>
<td>1950*</td>
</tr>
<tr>
<td>Accounting (C &amp; BA)</td>
<td>1950*</td>
</tr>
<tr>
<td>Political Science (Arts &amp; Sciences)</td>
<td>1950*</td>
</tr>
<tr>
<td>Economics (C &amp; BA)</td>
<td>1950*</td>
</tr>
<tr>
<td>Finance (C &amp; BA)</td>
<td>1950*</td>
</tr>
<tr>
<td>Doctor of Education (all; Education)</td>
<td>1950*</td>
</tr>
<tr>
<td>Doctor of Philosophy (all; Education)</td>
<td>1950*</td>
</tr>
</tbody>
</table>
English (Arts & Sciences) 1953*
Physics (Arts & Sciences) 1953**
Mathematics/Statistics (Arts & Sciences) 1957*
Romance Languages (Arts & Sciences) 1959*
Psychology (Arts & Sciences) 1959
Ed Psych, Counseling, Guidance 1959
Marketing (C & BA) 1961*
Operations Management (C & BA) 1962**
Chemical Engineering (Engineering) 1962
Electrical Engineering (Engineering) 1963
Mechanical Engineering (Engineering) 1963
Materials Engineering (Engineering) 1963
Civil Engineering (Engineering) 1966
Management (C & BA) 1970
Applied Statistics (C & BA) 1974
Social Work (Social Work) 1975*
Geological Sciences (Arts & Sciences) 1981*
Kinesiology (Education) 1987*
Mass Communication (Comm & Info. Sci) 1987*
Journalism (Comm & Info. Sci.) 1987*
Special Education 1989
Computer/Info Sciences (Engineering) 1991
Musical Arts (Arts & Sciences) 1991*
Interdisciplinary Studies (Graduate School) 1991
Human Environmental Sciences 1992
Anthropology (Arts & Sciences) 2003*

* denotes first program approved in state  ** denotes probable first program in state, although an
Auburn program may predate by a short time

1 Education Ph.D. and Ed.D. degrees were subdivided in the 1960s -1980s into current degree
structure; Ph.D. in Counselor Ed, Ed Admin., Higher Ed. Admin., Ed. Psych., Ed. Research,
Ed., and Special Ed. Ed.D.s are offered in the same fields with the exception of Ed.
Research and Kinesiology (formerly Physical Education). Similarly, the first Business Ph.D.
was the Ph.D. in Business Administration, which has since morphed into newer
designations.

Part 2. Doctoral Program Quality Indicators at UA

The University of Alabama is the largest institution in the state, both in terms of total student
enrollment and in graduate/professional enrollment and is poised to grow to approximately 28,000
students by 2010, while at the same time increasing the overall quality and diversity of its student
body. As an institution striving toward even greater national prominence as a “student-centered
research university” growth in the size and prominence of Alabama’s graduate programs,
especially those at the doctoral level, are an integral part of the UA strategic plan. In fall 2006, the
Graduate School announced its goal of growing to 4500 graduate students by 2012, with continued
growth to perhaps 5000 graduate students as UA stabilizes its total enrollment in succeeding years.
compared with 3600-3800 students in the early to mid-2000s. Much of this growth is envisioned to be in doctoral program enrollments. We project reaching 200 doctoral graduates per year beginning in 2008, with ultimate growth to perhaps 230-250 graduates per year. With approximately 4000 graduate students enrolled in fall 2007, we are on target toward the 2012 goal.

A first-tier student-centered research university requires a critical mass of talented graduate students – at least 20% of the student body. At approximately 15.6% of the student body in fall 2007, it is strategically important to the University that UA’s Graduate School continues to grow in numbers and quality.

But size alone is not the critical indicator of program quality. Innovative programs for supporting excellence in graduate student achievement and student outcomes upon graduation from the university are two key quality variables. The UA Graduate School excels in both of these measures.

- Programs have recently been instituted in the Graduate School to greatly enhance funding for doctoral student research and travel to present research at meetings. Partnering with departments and colleges/schools, more than $200,000 will be expended in 2007-08 to support approximately 360 students, a 280% increase in funding and a 220% increase in the number of students supported compared with 2005-06. A new International Enrichment travel component was added in 2008 to incentivize international education.

- New fellowship programs are in place to attract additional McNair Scholars to UA doctoral programs. The overall recruitment program, at both the department and Graduate School levels, has been upgraded with additional targeted funding designed to attract more high ability Alabama undergraduate applicants as well as double the application rate of top out-of-state doctoral students.

- Incentives have been put in place to maximize student retention and timely completion of degree programs (e.g., free business cards upon successful application for doctoral candidacy). Data revealed upon release of the 2008 National Research Council Assessment of Research Doctorate Programs will show that most if not all UA doctoral programs exceed national norms for graduation rates and time to degree.

- The Graduate School has instituted the Graduate Recruiting Enhancement (GRE) program, which partners with more than 20 UA graduate programs to fund (ca. $25,000) innovative, program-based graduate student recruiting programs within local units. The Graduate School itself has greatly expanded its formalized recruiting visits and other programs to virtually all major research and HBCU institutions in the Southeast.

- In nearly all UA doctoral programs, program graduates dominate the professions in Alabama and the rest of the Southeast. Nearly 50% (3,094 or 48.1%) of the 6,434 UA doctoral graduates currently registered in the alumni database continue to live and work in Alabama. Virtually all of the key leadership positions in Alabama education, social work, business, communications, and numerous other fields are occupied by UA doctoral graduates. Numerous UA doctoral graduates have also assumed leadership positions across the U.S. and in numerous foreign countries. No other Alabama institution has such a large (and growing) number of influential doctoral graduates. Space does not permit listing of all of these persons here, but a summary of notable UA doctoral graduates by program may be found in the Appendix. UA’s Graduate School was the spawning ground for one of the most influential biologists of the last 50 years (E.O. Wilson) and the founder of Wikipedia (Jimmy Donal “Jimbo” Wales).
• Several UA doctoral programs are recognized by peers as among the best in the U.S., including the mass communication doctoral program (ranked 7th in the nation), journalism (ranked 9th nationally) and the Manderson Graduate School of Business (perennially ranked in the top 10 nationally). The UA Center for Freshwater Studies, based in the biological sciences and engineering, is ranked among the nation’s top aquatic ecology programs. In 2000 and again in 2004, the joint UA-UAB PhD program in health education and health promotion was ranked 7th in the nation overall and ranked 1st in the category of hours spent in student mentoring.

• Similarly, the graduate faculties in these programs are nationally ranked in terms of scholarly productivity. In 1999, the finance faculty was rated as the 3rd most productive in the U.S. in publications. The 2006 Faculty Scholarly Productivity Index study (Academic Analytics, LLC) ranked the UA mass communication faculty 6th most productive in the U.S. In 2007, the UA materials engineering faculty was ranked 1st in the nation and the teacher education faculty received a top 10 ranking. In the 2004 Faculty Scholarly Productivity Index study, faculty in nine UA doctoral programs (psychology, materials science/engineering, educational leadership, physics, chemistry, mass communications, accounting, biological sciences, and economics) were ranked as significantly above the national mean as compared to programs at more than 360 U.S. institutions, and UA ranked 5th overall in the SEC (Auburn ranked 11th) in all disciplines reported.

Part 3. Comparisons to National Peers in Time-to-Degree and Degree Completions Rates

How does UA compare with national peers in the time it takes an entering PhD student to receive their degree? How does UA stack up in terms of PhD completion percentages? How many doctoral candidates run up against the UA Graduate School’s nominal 7-year time limit (8 years in several departments) for completion of degree requirements and therefore must petition for extra time? The data in the table below are from the departments that are being analyzed as part of the 2008 NRC Assessment of Research Doctorate Programs. While this group of 16 departments does not include all PhD programs at UA, it does represent a robust cross section of UA’s largest programs.

UA is better than most national peers in PhD time-to-degree and comparable in terms of degree completion percentage and attrition. Many UA departments are among national leaders in these categories.

The data are presented in Table 4. Our median time-to-degree for the PhD is ca. 2 years shorter than the national average. Over the last 10 years, 92.1% of all UA PhD recipients in the above 16 departments got their degrees within 7 years of starting their programs. Of the 51 total doctoral candidates who required 8 or more years to get their degrees, more than one-half were in departments where 8 years rather than 7 years is already the established nominal time limit (denoted with asterisks). Put another way, UA’s percentage of doctoral graduates who require 8 or more years to complete degree work (7.9%) is less than one-half the national average of ca. 20% of degree recipients (CGS, 2007b).
Table 4. PhD completion/time-to-degree statistics for a subset of UA students

<table>
<thead>
<tr>
<th>Department</th>
<th>Median time to Degree</th>
<th># getting degree 1996-2006</th>
<th>% entering students (1996-2000) who received their degree by 2006(^A)</th>
<th>% all 1996-2006 entering PhD students completing degree By 2006</th>
<th># who took 8 years or more to receive degree 1996-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>5.8</td>
<td>19</td>
<td>44</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics</td>
<td>5.4</td>
<td>35</td>
<td>37</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>4.8</td>
<td>41</td>
<td>60</td>
<td>56</td>
<td>2</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>5.8</td>
<td>46</td>
<td>46</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Political Science</td>
<td>6.8</td>
<td>25</td>
<td>26</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Materials/Metallurgical Engineering</td>
<td>5.6</td>
<td>37</td>
<td>80</td>
<td>59</td>
<td>0</td>
</tr>
<tr>
<td>English Language &amp; Literature</td>
<td>6.8</td>
<td>70</td>
<td>60</td>
<td>51</td>
<td>16*</td>
</tr>
<tr>
<td>Electrical &amp; Computer Engineering</td>
<td>6.4</td>
<td>23</td>
<td>52</td>
<td>38</td>
<td>3</td>
</tr>
<tr>
<td>Computer Sciences</td>
<td>5.8</td>
<td>23</td>
<td>15</td>
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<tr>
<td>Mass Communication</td>
<td>5.8</td>
<td>69</td>
<td>86</td>
<td>70</td>
<td>2</td>
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National Data: Ave. time to degree 8.0 years
% degree completion: 8 years 51.0%
% degree completion: 10 years 56.6%
(Survey of Earned Doctorates, 2005 and PhD Completion Study of CGS, 2007b)

\(^A\) UA completion rates are from 2008 NRC Study data, using 1996-97 through 1999-2000 entering cohorts, inclusive. This data set is comparable to 8-year graduation percentages in the 2007 National 10-Year PhD Completion Study data, because 1998-99 and 1999-2000 cohorts were in their 8\(^{th}\) and 7\(^{th}\)
Although the data sets used to generate the 2007 PhD Degree Completion Study (CGS, 2007b) are not strictly comparable to the 2008 NRC data, most UA PhD programs feature degree completion percentages comparable to or better than national peers. The time to degree data above and other NRC data suggest that, like national peers, most PhD degree attrition at UA occurs in the early years of the program, i.e., before students achieve doctoral candidacy. Intervention efforts, many of which are already in practice at UA, focus on these early program years, which will not only increase graduation statistics but could also increase overall graduate enrollments.

The above PhD completion data also reveal that more than 40% of all entering PhD students, nationally and at UA, leave programs without receipt of the PhD. Such high attrition numbers are incompatible with exemplary doctoral program success and undermine efforts to increase doctoral enrollment at UA. It is counterproductive to expend great effort and financial resources to recruit 10 excellent new doctoral candidates, only to have 4 of the 10 leave the program without a PhD. At the national level, the second phase of the PhD Completion Study now underway is designed to identify intervention efforts that are effective in reducing attrition. In truth, many of these strategies are already well known (greater financial support, better internal mentoring, etc.) and are already being implemented at UA and elsewhere.

However, research from the PhD Completion Study and other recent scholarship demonstrates that most early attrition is not due to economic concerns but rather to students leaving programs in which they have not become emotionally and intellectually vested. In their new book, The Formation of Scholars: Rethinking Doctoral Education in the 21st Century, the Carnegie Foundation’s Initiative for the Doctorate working group calls for bold initiatives by research universities to develop doctoral candidates as fully independent scholars, not only in terms of mastery of their discipline, but in the “larger set of obligations and commitments that are not only intellectual but moral” (Walker et al. 2007). Central to their theme are experiences that immerse doctoral students in the culture of research and scholarship via meaningful and relevant faculty mentorship experiences, interaction with peers, immersion in the disciplinary and campus cultures, and full utilization of campus scholarly resources.

Importantly, implementing these best practices for developing PhD students as “whole persons” in the intellectual and moral sense would address the major cause of PhD attrition – lack of program engagement and identification in the early years of enrollment. And we need not reinvent the wheel to create such forward-thinking programs for our doctoral students. Rather, the salient principles outlined in the Carnegie Foundation publication above can be met by revisiting the concept and implementation of the doctoral residency requirement in terms of 21st century needs and aspirations. In short, the new policy would focus on implementing the spirit of doctoral residency, rather than locational or temporal residency requirements, allowing more programmatic flexibility while producing a cadre of “doctoral scholar” graduates in the Carnegie Foundation mold. A white paper to develop and implement this concept at UA, beginning in the 2008-09 academic year, is being presented to Graduate Council, academic deans, and the Provost in spring 2008.
Part 4. Interdisciplinary Doctoral Programs: Wedding Training and Economic Development

In addition to departmentally-based doctoral degrees and a PhD degree in interdisciplinary studies sponsored by the Graduate School, The University of Alabama offers several joint and cooperative EdD and PhD degree programs in collaboration with UAB and UAH (UA degree recipients included with the totals in Table 1). These programs maximize faculty and logistic resources within the UA system (taxonomy of programs in Appendix). At the present time, ca. 10 - 15% of all US doctoral degrees yearly are earned in these joint/cooperative programs. Two of these programs, the joint PhD degree in materials science (UA, UAB, UAH) and the joint PhD in health education and health promotion (UA and UAB) are among the top 10 programs of their kind in the United States. Additional interdisciplinary and dual degree doctoral programs are being developed within the UA campus itself, especially those involving the School of Law, the School of Nursing and existing discipline-based doctorates programs in the Colleges of Arts and Sciences and Education.

The University of Alabama features 46 interdisciplinary research organizations and centers that, in collaboration with private sector industry and government agencies, train doctoral students and develop and disseminate technology to the state and beyond (full listing in Appendix).

For example, in summer 2007 UA announced a collaborative research and licensing agreement between Drs. Guy and Kim Caldwell in the Department of Biological Sciences and QRxPharma, a clinical stage specialty pharmaceutical company, designed to develop new clinical applications for the treatment of Parkinson’s disease and other neurological disorders. The Caldwell lab is prototypical of many at UA – a team of research faculty working with a larger team of collaborating postdocs, graduate students, and undergraduate researchers. David Cao, one of the Ph.D. candidates in the Caldwell’s lab, is co-inventor of some of the technologies patented and licensed by QRxPharma. In another example, the Center for Green Manufacturing and Center Director Dr. Robin Rogers of the Department of Chemistry have mentored numerous doctoral candidates who have created patentable intellectual property in the Center’s ionic liquid patent portfolio, including former students Drs. Rick Swatloski, Scott Spear, and Megan Turner, and current doctoral candidates Whitney Hough and Marcin Smiglak.

For the most part, research organizations and centers represent partnerships between multiple academic divisions and departments with the STEM disciplines and business, private sector industries, and federal and non-federal granting agencies. As such, large numbers of UA doctoral students in both STEM fields and the Manderson School of Business actually conduct their dissertation research within one or more of these organizations and centers. Space does not permit a full discussion of all 46 organizations but a few deserve special mention here.

The Alabama Institute for Manufacturing Excellence (AIME) is an umbrella organization comprised of several research centers with the goal of “enhancing the culture of high technology research and development at The University of Alabama by innovation, mentoring, and entrepreneurship... leading to the commercialization of intellectual property”. AIME is organized into Research and Development Centers where research and development are actually done, and
Deployment Centers, where information and technology are disseminated to Alabama industries and beyond.

Among prominent AIME-associated centers that attract large numbers of doctoral students are:

- The Center for Materials for Information Technology (MINT), an interdisciplinary group of 29 scientists and engineers from six different UA departments interested in developing new materials for information storage technology. MINT is currently in the process of recruiting the first cluster hire faculty position at UA.
- The Center for Green Manufacturing promotes fundamental and innovative technologies that prevent pollution and promote sustainable manufacturing.
- The Alabama Productivity Center is a deployment center that works to improve Alabama company quality and competitiveness through dissemination of UA research and educational resources. The Alabama Technology Network is the primary networking source within the Alabama business community for sharing of business, education, and government information.

Many other prominent centers and organizations occur outside the AIME umbrella. For example, the Center for Sedimentary Basin Studies and its affiliated Petroleum Technology Transfer program in the College of Arts and Sciences works in cooperation with the Alabama oil and gas industry in areas of applied research and technology transfer to maximize the cost efficiency of recovery of conventional and unconventional fossil fuel resources of the State and to assist in providing technologies that ensure that these resources are produced in a safe and environmentally sound manner. Alabama has already become a center for automobile manufacturing but is also trying to become a similarly prominent center for automotive innovation and design. The Center for Advanced Vehicle Technologies, established in 1998, is developing new generations of vehicles with improved energy efficiency, safety, and durability. The Enterprise Integration Laboratory (EIL) in the College of Commerce and Business Administration aids Alabama businesses with seamless integration of IT. Also in the College of Commerce and Business Administration, the Center for Business and Economic Research has become the primary think tank for Alabama industries in analyzing economic trends.

Other Alabama research centers and organizations are prominent partners in regional and national networks responsible for monitoring and ameliorating environmental degradation across the nation and world. For example, UA is home to the Southeastern Regional Center of the National Institute for Global Environmental Change, which plans jointly with the U.S. Department of Energy a balanced research program that supports DOE’s mission related to global environmental change. The Center for Freshwater Studies (CFS) includes faculty and students from the Colleges of Arts and Sciences and Engineering, and has become one of the most prominent freshwater research groups in the United States. With its NSF-IGERT program grant in collaboration with the University of New Mexico (one of the most effective IGERT programs in the nation, according to 2006 NSF report), the CFS is pioneering collaborative freshwater studies in basin systems of the Southeast and Southwestern United States. The CFS and UA have recently been named as stewards of one of 21 Core Sites for the new NSF National Ecological Observatory Network (NEON) program, which will focus on the Talladega National Forest as part of the larger Mobile River Basin system within Alabama, Mississippi, and Georgia.
Part 5. UA Doctoral Programs and Development of a Diverse, Highly-Trained Workforce

The Council of Graduate Schools, in its 2007 publication Graduate Education: The Backbone of American Competitiveness and Innovation, stated that “The expanding participation (in graduate schools) of U.S. citizens, particularly from underrepresented minority groups, should be a priority in fields that are essential to our nation’s success. Development of STEM careers should be emphasized.” Secondly, they stated that “U.S. graduate schools must be able to attract the best and brightest students from around the world.”

The evidence suggests that UA’s doctoral programs are meeting both of these challenges and poised to be even more effective in coming years.

The homepage for the Graduate School at The University of Alabama features a prominent link to a site called “Opening the Schoolhouse Door” which chronicles the immense strides toward a diverse student population made since the seminal event at Foster Auditorium in 1963:

UA has emerged to become a national leader in multicultural graduate student enrollment and graduation.

- UA leads the nation in SREB Minority Doctoral Scholar Awards, and in 2006 was presented the first ever Extra Mile Award by the SREB in recognition of outstanding accomplishments in minority graduate education.
- UA ranks 29th out of 629 institutions in the production of African-American graduate degree recipients (Black Issues in Higher Education)
- Enrollment of African-American graduate students has increased every year since 2003, and now comprises nearly 12% of the UA graduate student body; enrollment of Hispanic students is also at historic highs.
- Since 1988, the Graduate School has provided $3.5 million in minority graduate fellowships and scholarships.
- Working with Student Affairs, the Graduate School in 2007 helped found a new Native American Student Association at UA to serve the fastest growing minority graduate student group in the U.S. (Chronicle of Higher Education statistics)
- UA, under a Louis Stokes Alliance for Minority Participation grant, recruited 15 STEM doctoral students in Fall 2007 for doctoral program study.
- Working with the Ronald McNair Scholars program on campus, the UA Graduate School has created a new McNair Graduate Scholars Program, which will begin recruiting 6–10 new doctoral candidates each year in fall 2008.
- The aforementioned NSF-IGERT (Integrative Graduate Education and Research Traineeship) grant held by the Center for Freshwater Studies and GAANN (Graduate Assistants in Areas of National Need) grants from the Department of Education support minority doctoral candidates in multiple departments.

After several years of post-9/11 decline, international graduate student enrollments have now (fall 2007) rebounded to pre-9/11 levels (ca. 500 students or about 15% of total graduate enrollment) and are positioned to grow rapidly. UA is taking an aggressive stance in recruiting students from the EU under the upcoming Bologna Accords agreement. With the Office of International Programs, the Graduate School has entered into collaborative agreements with Ocean University in
China for graduate education exchanges in business, human environmental sciences and marine sciences. Preliminary work has also been done with other Chinese and South Korean partner institutions that would probably increase the number of foreign graduate students from these institutions alone by 50-100 additional students per year. We have also streamlined application procedures from foreign-based students.

Part 6. Summary and Challenges

UA doctoral programs are collectively the largest in Alabama and serve the state and nation very well. Several programs are ranked among the best in the nation. Interdisciplinary centers and joint degree programs provide a strong basis for future educational and research development, and provide a vital degree of industry and private sector involvement and collaboration. With nearly 50% of all doctoral graduates choosing to stay within the state after receipt of their degree, UA graduates are major players within the higher echelons of nearly every important Alabama community and industry. UA is uniquely poised in the state system to play a leadership role in Alabama in future economic development and increasing the quality of life for Alabama citizens. No other institution in the state offers the breadth, depth, and overall quality of doctoral programs that are essential to development of a knowledge-based, creative, and innovative economy for our citizens.

Yet the future is not without challenges. In order to grow to ca. 4500 graduate students while at the same time increasing the quality of our doctoral programs, we must identify funding sources that would raise the percentage of assistantship/fellowship-supported students from the current 37% to at least 50-55% (a benchmark for first-tier research universities) and increase stipends to nationally-competitive levels in strategically-important disciplines. As stated in a report on UA graduate student stipends completed for the Provost in August 2007, considerable progress has been made in moving toward the SUG mean for most UA disciplines since 2003-04, when no UA program was at or above the SUG or national mean for that discipline (Oklahoma State University and national surveys). By 2006-07, 6 of the 48 UA programs surveyed had achieved parity with SUG mean stipends in 2006-07, but many departments remain more than 20% below the SUG mean.

Increasing the number and average stipends of externally-supported GRAs will require a concerted effort to expand the external grant-funded research base of the university, particularly in STEM fields and other doctoral-intensive disciplines. A strong case can be made to increase the number and average stipends of GTAs in departments with high instructional demand can also be made as UA grows to 28,000 students. We also need to continue working to reduce attrition rates in doctoral programs. As noted earlier, the Graduate School has begun implementing a plan to re-envision doctoral residency at UA as a means of improving program quality and pedagogical flexibility. UA doctoral programs should exceed the national average for completion rate, a goal that will improve both quality and matriculated student numbers.

Additionally, although several doctoral programs rank among the very best in nation, UA should commit itself to moving ALL of its doctoral programs to top 50 status within the next 10 years. In that STEM discipline fields will continue to be a top national priority in U.S. graduate education and federal grant funding well into the future, UA’s department and programs in this area should
strive for top 20 status. This will require additional attention and resources for faculty recruitment as well as graduate student recruitment and support.

References

National Science Foundation. 2006. Evaluation of the initial impacts of the National Science Foundation’s Integrative Graduate Education and Research Traineeship program. Washington, D.C.

Appendices


College/School Reports on Outstanding Doctoral Graduates and Quality Indicators

2. College of Engineering
3. College of Commerce and Business Administration
4. College of Education
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