2014 Overview of the College

Amr Elnashai
“Every institution has its unique set of irrational and difficult constraints, yet some make a leap while others facing the same environmental challenges do not.”

– Jim Collins in ‘Good-to-Great and the Social Sector’
State of the College
Undergraduate Enrollment

<table>
<thead>
<tr>
<th>Year</th>
<th>University Park</th>
<th>Commonwealth Campuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALL 2009</td>
<td>5937</td>
<td>2440</td>
</tr>
<tr>
<td>FALL 2010</td>
<td>6227</td>
<td>2464</td>
</tr>
<tr>
<td>FALL 2011</td>
<td>6466</td>
<td>2556</td>
</tr>
<tr>
<td>FALL 2012</td>
<td>6800</td>
<td>2587</td>
</tr>
<tr>
<td>FALL 2013</td>
<td>7220</td>
<td>2721</td>
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</table>
Graduate Enrollment

<table>
<thead>
<tr>
<th>Year</th>
<th>Masters</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALL 2009</td>
<td>473</td>
<td>878</td>
</tr>
<tr>
<td>FALL 2010</td>
<td>433</td>
<td>893</td>
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<tr>
<td>FALL 2011</td>
<td>473</td>
<td>904</td>
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<tr>
<td>FALL 2012</td>
<td>438</td>
<td>917</td>
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<tr>
<td>FALL 2013</td>
<td>449</td>
<td>920</td>
</tr>
</tbody>
</table>
Baccalaureate Degrees Conferred

AY 2008-09: 1216
AY 2009-10: 1316
AY 2010-11: 1345
AY 2011-12: 1391
AY 2012-13: 1456
Graduate Degrees Conferred

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Masters</th>
<th>Doctorate</th>
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<tbody>
<tr>
<td>AY 2008-09</td>
<td>341</td>
<td>137</td>
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<tr>
<td>AY 2009-10</td>
<td>322</td>
<td>141</td>
</tr>
<tr>
<td>AY 2010-11</td>
<td>321</td>
<td>155</td>
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<tr>
<td>AY 2011-12</td>
<td>328</td>
<td>118</td>
</tr>
<tr>
<td>AY 2012-13</td>
<td>317</td>
<td>146</td>
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</table>
## Enrollment - University Park Colleges

<table>
<thead>
<tr>
<th>College</th>
<th>% Change</th>
<th>Change</th>
<th>Fall 2013</th>
<th>Fall 2012</th>
<th>Fall 2011</th>
<th>Fall 2010</th>
<th>Fall 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>12%</td>
<td>201</td>
<td>1911</td>
<td>1965</td>
<td>1904</td>
<td>1861</td>
<td>1710</td>
</tr>
<tr>
<td>Arts and Architecture</td>
<td>-17%</td>
<td>-243</td>
<td>1228</td>
<td>1291</td>
<td>1365</td>
<td>1411</td>
<td>1471</td>
</tr>
<tr>
<td>Business</td>
<td>-6%</td>
<td>-368</td>
<td>5405</td>
<td>5092</td>
<td>5029</td>
<td>5164</td>
<td>5773</td>
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<tr>
<td>Communications</td>
<td>-7%</td>
<td>-206</td>
<td>2691</td>
<td>2618</td>
<td>2672</td>
<td>2720</td>
<td>2897</td>
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<tr>
<td>Division of Undergraduate</td>
<td>27%</td>
<td>691</td>
<td>3256</td>
<td>3152</td>
<td>3079</td>
<td>2814</td>
<td>2565</td>
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<tr>
<td>Earth, Mineral Sciences</td>
<td>49%</td>
<td>640</td>
<td>1959</td>
<td>1801</td>
<td>1617</td>
<td>1457</td>
<td>1319</td>
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<td>Education</td>
<td>-22%</td>
<td>-414</td>
<td>1482</td>
<td>1589</td>
<td>1743</td>
<td>1837</td>
<td>1896</td>
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<tr>
<td>Engineering</td>
<td>22%</td>
<td>1283</td>
<td>7220</td>
<td>6800</td>
<td>6466</td>
<td>6227</td>
<td>5937</td>
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<tr>
<td>Health, Human Dev.</td>
<td>-1%</td>
<td>-43</td>
<td>4572</td>
<td>4427</td>
<td>4544</td>
<td>4547</td>
<td>4615</td>
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<tr>
<td>Information Science, Tech.</td>
<td>-18%</td>
<td>-181</td>
<td>823</td>
<td>775</td>
<td>817</td>
<td>910</td>
<td>1004</td>
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<tr>
<td>Liberal Arts</td>
<td>2%</td>
<td>111</td>
<td>5111</td>
<td>5197</td>
<td>5196</td>
<td>5074</td>
<td>5000</td>
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<tr>
<td>Nursing</td>
<td>18%</td>
<td>75</td>
<td>496</td>
<td>483</td>
<td>443</td>
<td>427</td>
<td>421</td>
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<tr>
<td>Science</td>
<td>2%</td>
<td>71</td>
<td>3201</td>
<td>3255</td>
<td>3235</td>
<td>3251</td>
<td>3130</td>
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<tr>
<td><strong>TOTAL UP Colleges</strong></td>
<td><strong>4%</strong></td>
<td><strong>1617</strong></td>
<td><strong>39355</strong></td>
<td><strong>38445</strong></td>
<td><strong>38110</strong></td>
<td><strong>37700</strong></td>
<td><strong>37738</strong></td>
</tr>
</tbody>
</table>
UP Colleges – Research Expenditure

Percentage of UP Total
Endowment Comparisons

Annual Average of 5 Years

<table>
<thead>
<tr>
<th>College</th>
<th>Endowment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$26,750,243</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>$12,834,999</td>
</tr>
<tr>
<td>Eberly Science</td>
<td>$9,472,507</td>
</tr>
<tr>
<td>AG Sciences</td>
<td>$6,995,656</td>
</tr>
<tr>
<td>Smeal Business</td>
<td>$9,299,819</td>
</tr>
<tr>
<td>EMS</td>
<td>$11,579,311</td>
</tr>
</tbody>
</table>
Comparison of Academic Units

Dollars per Donor

- Engineering: $465,207
- Liberal Arts: $328,527
- Eberly Science: $311,223
- AG Sciences: $179,150
- Smeal Business: $312,821
- EMS: $387,705

Average of 5 Years

PennState
College of Engineering
Campaign Goal $200 Million

Endowments Received-to-Goal

- Received: $187,047,631.28
- Pledged: $12,952,368.72

PennState
College of Engineering
Departmental Ranking

UNDERGRADUATE RANKINGS

GRADUATE RANKINGS

UNDERGRADUATE RANKINGS

GRADUATE RANKINGS

GRADUATE RANKINGS

UNDERGRADUATE RANKINGS

GRADUATE RANKINGS
<table>
<thead>
<tr>
<th>College of Engineering</th>
<th>UG Ranking</th>
<th>Grad Ranking</th>
<th>T/TT Faculty</th>
<th>UG Students</th>
<th>MS</th>
<th>UG/Fac.</th>
<th>MS/Fac.</th>
<th>PhD</th>
<th>PhD/fac.</th>
<th>Research $</th>
<th>$/faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT</td>
<td>1</td>
<td>1</td>
<td>371</td>
<td>2706</td>
<td>1071</td>
<td>7</td>
<td>2.9</td>
<td>1740</td>
<td>4.7</td>
<td>$332,463,000</td>
<td>$896,127</td>
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<tr>
<td>Stanford</td>
<td>2</td>
<td>2</td>
<td>217</td>
<td>2914</td>
<td>1479</td>
<td>13</td>
<td>6.8</td>
<td>1770</td>
<td>8.2</td>
<td>$197,409,000</td>
<td>$909,719</td>
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<tr>
<td>Berkeley</td>
<td>3</td>
<td>3</td>
<td>225</td>
<td>3469</td>
<td>330</td>
<td>15</td>
<td>1.5</td>
<td>1466</td>
<td>6.5</td>
<td>$192,495,000</td>
<td>$855,533</td>
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<tr>
<td>CalTech</td>
<td>3</td>
<td>4</td>
<td>92</td>
<td>489</td>
<td>22</td>
<td>5</td>
<td>0.2</td>
<td>565</td>
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<td>$88,955,000</td>
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<td>GT</td>
<td>5</td>
<td>5</td>
<td>462</td>
<td>8597</td>
<td>1142</td>
<td>19</td>
<td>2.5</td>
<td>1958</td>
<td>4.2</td>
<td>$195,419,000</td>
<td>$422,985</td>
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<tr>
<td>UIUC</td>
<td>5</td>
<td>5</td>
<td>403</td>
<td>7558</td>
<td>1114</td>
<td>19</td>
<td>2.8</td>
<td>1696</td>
<td>4.2</td>
<td>$236,410,660</td>
<td>$586,627</td>
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<tr>
<td>UMich</td>
<td>7</td>
<td>9</td>
<td>366</td>
<td>5665</td>
<td>1360</td>
<td>15</td>
<td>3.7</td>
<td>1561</td>
<td>4.3</td>
<td>$196,024,000</td>
<td>$535,585</td>
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<td>CMU</td>
<td>8</td>
<td>5</td>
<td>153</td>
<td>1722</td>
<td>1001</td>
<td>11</td>
<td>6.5</td>
<td>780</td>
<td>5.1</td>
<td>$204,380,028</td>
<td>$1,335,817</td>
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<tr>
<td>Cornell</td>
<td>8</td>
<td>13</td>
<td>242</td>
<td>3192</td>
<td>768</td>
<td>13</td>
<td>3.2</td>
<td>922</td>
<td>3.8</td>
<td>$132,414,000</td>
<td>$547,165</td>
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<td>UT Austin</td>
<td>10</td>
<td>11</td>
<td>274</td>
<td>5276</td>
<td>519</td>
<td>19</td>
<td>1.9</td>
<td>1295</td>
<td>4.7</td>
<td>$163,883,000</td>
<td>$598,113</td>
</tr>
<tr>
<td>Purdue</td>
<td>10</td>
<td>8</td>
<td>297</td>
<td>7497</td>
<td>790</td>
<td>25</td>
<td>2.7</td>
<td>1499</td>
<td>5.0</td>
<td>$222,250,000</td>
<td>$748,316</td>
</tr>
<tr>
<td><strong>Averages</strong></td>
<td></td>
<td></td>
<td><strong>282</strong></td>
<td><strong>4462</strong></td>
<td><strong>872</strong></td>
<td><strong>16</strong></td>
<td><strong>3.1</strong></td>
<td><strong>1387</strong></td>
<td><strong>5.2</strong></td>
<td><strong>$196,554,790</strong></td>
<td><strong>$763,899</strong></td>
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<tr>
<td>Penn State</td>
<td>16</td>
<td>25</td>
<td>335</td>
<td>8523</td>
<td>521</td>
<td>25</td>
<td>1.6</td>
<td>1091</td>
<td>3.3</td>
<td>$152,322,978</td>
<td>$454,695</td>
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<tr>
<td><strong>Percent Comparison</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>60%</td>
<td>161%</td>
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<tr>
<td><strong>Target Change</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40%</td>
<td>-61%</td>
</tr>
</tbody>
</table>

*Note that to compare similar numbers, PSU Engineering includes engineering degrees in other colleges and Commonwealth campuses - 2012*
Observations and Implications

Undergraduate Program Size

Faculty Size

Graduate Program

Research Expenditure

Technical Fields

Intellectual Footprint

Quo vadimus?
Academic Management Through Strategic Planning and Implementation
“We must strive to be sure that research universities fulfill their promise as a learning environment that is remarkably well suited to the coming era – one in which undergraduates, graduate students, and faculty alike share in the discipline, joy and continual renewal of original research and scholarship.”

– Chuck Vest, late president of the National Academy of Engineering, past president of MIT, from ‘Pursuing the Endless Frontier’
Academic Management

THE USUAL

- Most of academe have no multiyear budget planning
- Strategy documents are not turned into plans
- Funds are historically and reactively allocated
- No relationship between goals and expenditure

BENEFIT OF OPERATIONAL MODEL

- Support academic strategy through investment
- Increase transparency and accountability
- Plan for investment and contingencies

Metrics

Academic Plan

Budget Model

COE
Coupled Academe and Finance
**Metrics**

**INPUTS**
The resources (human, space, infrastructure, finance) and management (policies, oversight) required to operate the academic unit

- e.g., students, professors, staff, funds, guidelines

**OUTCOMES**
The results that fulfill the mission and objectives, and contribute to stakeholders and society

- e.g., graduates, scholarship (i.e., publications, inventions), ranking, recognitions

**IMPACTS**
Positive change over time (10+ years) resulting from the outcomes above

- e.g., healthier population, abundant water, safer optimized societal system of systems
• Existing 11 strategy documents
• Strategy Snapshots
• High Level College Strategy
• Priority Goals – College, Departments
• Implementation Plan
  – Goals
  – Responsibilities
  – Resources
  – Time lines and Metrics
• Implementation-steered budget
• Finalize, share, implement, continuously review, and refine
Short-term Stimuli and Enablers
“The core business of the university is learning, and the most fundamental aspect of that learning is the education of undergraduates.”

– Frank Rhodes, President Emeritus, Cornell University, in ‘The Creation of the Future’
Enrichment and Invigoration

Projects

Opportunities for efficiencies

Enabling mechanisms for initiatives

Accountable business culture

Streamlined, efficient organization capable of implementing academic initiatives

<table>
<thead>
<tr>
<th>Space Utilization</th>
<th>Functional Budget</th>
<th>Spendable Resources</th>
<th>Dean's Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Teams</td>
<td>Leadership Committees</td>
<td>External Reviews</td>
<td>Assessment Metrics</td>
</tr>
<tr>
<td>Professional Masters</td>
<td>Online Degrees</td>
<td>College/Unit Strategies</td>
<td>Media Presence</td>
</tr>
<tr>
<td>Responsive Action</td>
<td>Communications Plan</td>
<td>Social Calendar</td>
<td>Staff Development</td>
</tr>
<tr>
<td>Community Retreats</td>
<td>M+N Global Outreach</td>
<td>International Internships</td>
<td>Alumni Engagement</td>
</tr>
<tr>
<td>International Alumni</td>
<td>Baseline Corporate</td>
<td>Corporate Partners</td>
<td>Department Needs</td>
</tr>
</tbody>
</table>

PennState
College of Engineering
Enrichment and Invigoration

**Initiatives**

- Strengthening the Undergraduate Program
- Expanding the Graduate Program
  
  Broader UG experience; Larger and higher-quality Grad program

PennState
College of Engineering
Enrichment and Invigoration

**Distinguished Teaching Fellowships**

- Ten fellowships for senior Ph.D. students
- Teach one regular course under professional supervision
- Engage with award-winning educators
- Better prepared, more competitive Ph.D. graduates
Enrichment and Invigoration

Frontier Faculty Lines

- Six interdisciplinary hires on frontier topics
- At the intersection of societal challenges, faculty interests, and existing/short term research infrastructure
- To create further synergies between departments, centers, institutes, Penn State colleges, and other universities

Uniquely branded UG and Grad programs; Better S/F Ratio
Enrichment and Invigoration

Innovation Grants

- Twenty one-year research grants
- Interdisciplinary topics meshing with Penn State priorities
- Research gems nearing completion

Increased competitiveness of Penn State engineering faculty
Enrichment and Invigoration

Excellence Graduate Fellowships

- Twenty-five full 3-year offers
- Targeted at top incoming graduate NSF fellowship-caliber
- Accompanying specific academic and social programs
- Enhanced Ph.D. program quality
Enrichment and Invigoration

One-year Course-based Masters

- Ten grants for complete proposals
- Non-thesis residential M.S. degrees
- August-to-August format

Enlarged M.S. program; Feeder into Ph.D. program; Revenue generation
Enrichment and Invigoration

Research Experience for Undergraduates

- Fifty+ eight-week embedded opportunities
- Attendance in research methods seminars
- Participation in professional conferences

Broader UG experience; Feeder to Grad program
Enrichment and Invigoration

**Instructional and Research Equipment Grants**

- Fifteen grants for instruction and research
- Innovative content on both education and investigation
- State-of-the-art instruction; Top research infrastructure
Human Resources

Job Description Updates
• Review and complete Job Review Worksheets
• Track JRW completion and updates
• Work with Department Heads to assess job needs
• Create final inventory for compensation review
• Communicate final outcome to staff

Compensation Analysis
• Develop timeline with Compensation Analyst
• Compile data to conduct salary analysis of all positions
• Develop plan for communication to staff upon completion
Human Resources

Staff Career Development
- Collect input from Department Heads
- Communicate support for training to supervisors
- Make training part of review process
- Communicate available resources
- Develop annual tracking mechanism

Staff Awards
- Review current programs
- Conduct staff survey to determine what is of value
- Develop new programs based on feedback
First E-Newsletter sent March 13-14, 2014

- Branding on World-Class Engineering
- Sent monthly
- Five highlighted accomplishments
- Monthly features

Mailing List (55,000) Includes

- Alumni
- Deans and department heads of ABET-accredited engineering programs
- Corporate contacts
- Industry CEOs
- PSU senior administration
- College of Engineering faculty and staff
CoE e-Newsletter - Design

- Familiar magazine Engineering Penn State header for brand recognition
- Powerful College of Engineering branding and references – through color, graphics, and content
- Clean format using white space, engaging photos, and attractive colors in order to maximize readability and engagement
- Clear calls to action
- Powerful College of Engineering branding and references – through color, graphics, and content
- Clean format using white space, engaging photos, and attractive colors in order to maximize readability and engagement
- Clear calls to action

Five Penn State Faculty Earn 2014 NSF CAREER Awards

Students Implement Defenses Against Drone Attacks

In the News

Recognition and Awards

Penn State College of Engineering

Engineering

World-Class Engineering

Learn more
CoE e-Newsletter - Statistics

Open rates by audience segment
- Faculty: 67%
- Staff: 67%
- Penn State administration: 64%
- Deans: 36%
- Department Heads: 35%
- Alumni: 23%
- CEOs: 22%
- Corporate contacts: 14%

Top five links
- NSF CAREER Awards: 1,093 clicks
- Drone Attacks: 229 clicks
- Graduate Students Win $10,000: 177 clicks
- A Grand Experiment: 116 clicks
- Patent Issued: 107 clicks
The National Science Foundation (NSF) recently recognized these outstanding Penn State College of Engineering faculty members with the NSF Early Career Development (CAREER) Award. This prestigious award, which provides each awardee with five years of research funding, is designed to support junior faculty who have shown exceptional promise in teaching and research.

**Kyle Bishop**
Assistant Professor of Chemical Engineering
Bishop’s $437,000 CAREER award focuses on Contact Charge Electrophoresis for Mobile Microfluidics, which explores a novel method where a particle or droplet oscillates continuously between two electrodes. This ability to manipulate small particles could have an impact on a number of technologies, including electronic displays and DNA sequencing. Bishop has been on faculty since 2008.

**Hosam Fathy**
Assistant Professor of Mechanical Engineering
A member of the Penn State faculty since 2010, Fathy will use his $490,000 grant for Identifiability Optimization in Electrochemical Battery Systems. The ultimate goal of his research is to improve the useful life, health, and safety of lithium-ion batteries by building better algorithms for battery testing and health diagnosis. A key portion of Fathy’s project includes developing educational modules for STEM education.

**Scarlett Miller**
James E. Will Career Assistant Professor of Industrial & Manufacturing Engineering
Assistant Professor in the School of Engineering Design, Technology & Professional Programs
Miller’s $400,000 grant is titled From Risk Aversion to Innovation: Transforming the Concept Selection Process to Maximize Product Success and seeks to explore the balance between an organization’s need to innovate to avoid economic failure and the desire to reduce risk associated with creativity and novel ideas. She joined Penn State in 2011.

**Gordon Warn**
Assistant Professor of Civil Engineering
A Performance-Based Multi-Objective Optimization Framework to Define Innovative Structural Concepts and Support the Seismic Design of Critical Buildings earned Warn a $400,000 NSF CAREER award. His work seeks to develop a computational framework that simultaneously identifies innovative structural concepts and trade-offs between conflicting design objectives to support decision making.

**Tak-Sing Wong**
Assistant Professor of Mechanical Engineering
Wong, a Penn State faculty member since 2013, received a $400,000 grant for Nature-Inspired Moisture-Adaptive Surfaces and Their Multi-Functional Characteristics, which looks to design and develop a new class of biologically inspired liquid-repellent materials with multi-functional characteristics that have various industrial and medical applications.

First widely distributed announcement of College-wide award winners

- Sending to over 1,000 deans of ABET-accredited engineering programs
- Most clicked-on story in March e-newsletter
- Repetition will reinforce this important and news-worthy message
- Beginning of a series of messages that will call attention to the excellent faculty, programs and research across the College
Ongoing Communications Projects

- Redesign all College websites
- Redesign Penn State Engineering magazine
- Create e-newsletters for departments
- Expand College mementos and souvenirs
- Expand persistent social media presence
- Expand and reconfigure Communications team
- Commission promotional videos
Closure
“Being a university president is no way for an adult to make a living.”

– Bartlett Giamatti, late president of Yale, from ‘The University and the Public Interest’
Objectives

Expansion of Faculty Size

Enlargement of Graduate Programs

Renovation of Laboratories

Enhancement of Faculty, Students, Staff Diversity

Approaching, Breaching Academic Frontiers

EXCELLENCE IN EVERYTHING!
Development of a business model for the College is underway

Exceptional College of Engineering with tremendous strength across the board

Opportunities for further excellence and a steep upward trajectory

Short term enrichments and invigoration measures showing early promise

*Short term enrichments and invigoration measures showing early promise. The present is very good, the future is GREAT.*