STRATEGIC PLAN

FOR

FAMU-FSU COLLEGE OF ENGINEERING

Based on:
Quality Enhancement Review and Graduate Policy Committee Review 2011
And ABET Accreditation for 2009-10 Cycle

For
Chemical and Biomedical Engineering
Civil and Environmental Engineering
Electrical and Computer Engineering
Industrial and Manufacturing Engineering
Mechanical Engineering

John R. Collier
Interim Dean of Engineering

May 2012
# ADMINISTRATION

## OFFICE OF THE DEAN

<table>
<thead>
<tr>
<th>Position</th>
<th>Phone #</th>
<th>Fax #</th>
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</thead>
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## DEPARTMENT CHAIRS

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<tr>
<td>Chemical and Biomedical Engineering</td>
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Strategic Plan
For
FAMU-FSU College of Engineering

Based on
Quality Enhancement Review and Graduate Policy Committee Review (2011)
And
Program Evaluation of Engineering Accreditation Commission of ABET (2009-10)

I. Process, Mission and Milestones

(1) Process

The College of Engineering has five academic departments: Chemical and Biomedical Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Industrial and Manufacturing Engineering, and Mechanical Engineering. Each Department in 2010-2011 prepared a report for the Quality Enhancement Review (QER) process for Florida State University and Florida A&M University. These reports were used to form the strategic plan for the College of Engineering. Review of the overall departmental performance for the QER was accompanied by specific analysis of the graduate program for the Graduate Policy Committee (GPC). The review included the assembly of data on the graduate and undergraduate programs and the faculty productivity for the period of 2004-2011. One external reviewer for each program was invited and performed an on-site review of the program. The reviewers included the following people:

Chemical and Biomedical Engineering
Dr. William Bentley from University of Maryland

Civil and Environmental Engineering
Dr. Eric Landis from the University of Maine

Electrical and Computer Engineering
Dr. Dan Bouldin from University of Tennessee

Industrial and Manufacturing Engineering
Dr. Paul Cohen from North Carolina State University

Mechanical Engineering
Dr. Paul Strykowski from the University of Minnesota

In the final meeting, the faculty, the Departmental Chairs, and the Dean of Engineering met with the QER/Program Review Committee chaired by Robert Bradley (FSU) and Associate VP Dr. Pitter (FAMU) to exchange ideas and plan for future actions. The departmental representatives also met with the GPC. The QER and GPC Summary and Action Plans for each program were made.

On this basis, the strategic plan for College of Engineering was formulated.

The program evaluation of the Engineering Accreditation Commission of ABET was conducted in November of 2009.
(2) Mission of the College of Engineering

The mission of the FAMU-FSU College of Engineering includes:
(a) To provide an innovative academic program of excellence at both the undergraduate and graduate levels, judged by the highest standards in the field and recognized by national peers;
(b) To attract and graduate a greater number of African Americans, women and other underrepresented groups into professional engineering, engineering teaching and research; and
(c) To attain national and international recognition of the college through the educational, research achievements and the professional service of its faculty and students.

(3) Vision

The College of Engineering will provide the citizens of Florida, the nation, and the world with inspirational teaching, high level of research, and excellent professional service by offering accredited engineering curriculum with leading-edge research.

(4) Brief History and Major Milestones

On February 13, 1982 at the Board of Regents (BOR) meeting in Tampa the formation of a FAMU/FSU Institute for Engineering was approved with an initial budget of $1.4 million. Thus, the FAMU-FSU College of Engineering became a reality in 1982. The first class in 1983 at the College of Engineering had 35 students. In 1985 the first ABET Accreditation was achieved for Mechanical Engineering, Electrical Engineering and Civil Engineering and in 1986 the ABET Accreditation was also achieved for Chemical Engineering. In 1987 masters programs (M.E., C.E., Ch.E., E.E.) were established. At the same time the college enrollment surpassed 1000 (1016 undergraduate, 10 graduate). In 1988 an additional BS Program in Industrial Engineering was approved by the BOR and two Ph.D. Programs, Mechanical Engineering and Chemical Engineering, were implemented. Additionally, Phase I Building (110,000 sq. ft.) was occupied. The Joint Management Council was established by the Board of Regents (BOR) and the Universities in 1988. A Joint Management Agreement between two universities for the College of Engineering was also signed in 1988. The plan was slightly revised in 2005 to include information regarding the Pre-Engineering program which was implemented to satisfy recommendations by ABET.

A brief summary of the College’s achievements since 1982 is documented in the following milestones:

1982    • FAMU-FSU Institute for Engineering Approved
        • First Class Admitted — 35 Students

1983    • Elvin Dantin Named Dean of Engineering

1985    • First Graduation — 13 Graduates in April
        • First ABET Accreditation in 3 Departments (M.E., E.E., C.E.)
1986
- ABET Accreditation in Ch. E.
- Krishnamurti Karamchetty Named Dean of Engineering

1987
- Masters Programs (M.E., C.E., Ch.E., E.E.) Established
- Enrollment passes 1000 (1016 Undergraduate, 10 Graduate)

1988
- B. S. Program in I.E. implemented
- 2 Ph.D. Programs (M.E., Ch.E.) Implemented
- Phase I Building (110,000 sq. ft.) occupied
- Joint Management Council established

1992
- Full ABET Accreditation of Chemical, Civil, Electrical, Industrial and Mechanical Engineering Programs
- Sponsored Research Funding at $2M annually
- Ching Jen Chen named Dean of Engineering

1993
- Enrollment passes 2000 (1937 Undergraduate, 156 Graduate)
- 5 B.S. Programs (M.E., Ch.E., E.E., C.E., I.E.)
- 4 M.S. Programs (M.E., Ch.E., E.E., C.E.)
- 2 Ph.D. Programs (M.E., Ch.E.)

1994
- Fifth M.S. Program implemented (I.E.)
- Third Ph.D. Program implemented (E.E.)

1996
- Fourth and Fifth Ph.D. Programs Proposed (C.E., I.E.)
- Sponsored Research passed $5 M annually
- Since 1984, 1741 B.S. degrees granted, 213 M.S. degrees granted
- 11 Ph.D. degrees granted
- College and Industry Advisory Council cosponsor first Industry Day

1997
- Construction of Phase II Building, $15M, began
- Ph.D. programs in Civil and Industrial Engineering approved

1998
- Phase II Building (96,000 sq. ft.) Occupied
- Challenger Learning Center project receives initial funding ($2.5M)
- Biomedical and Computer Engineering programs proposed
- Full ABET Accreditation: All Programs
- Florida Advanced Center for Composite Technologies established
- Institute for Transportation Technologies established

1999
- Computer Engineering BS Program approved.
- Challenger Learning Center enhanced ($8.6M) to include wide-screen theater and moved to downtown Tallahassee
- Phase III Building planned for 2004 ($20M budget)
- Total College of Engineering graduates pass 3000 mark
2000
- MS and PhD in Biomedical Engineering approved ($1M Whitaker Biomedical Foundation grant to support development).
- Established Multidisciplinary Design and Training Clinic (MDTC)
- Becomes top producer of African American BS engineers with 167 graduates during the academic year
- Center for Advanced Power Systems established with $52M funding
- Sponsored Research reached $7.5 M annually

2001
- NSF supported Industry-University Cooperative Research Center in Composite Materials established
- Graduate enrollment reached all-time high of 241
- Transition from Board of Regents to Florida Board of Education
- Sponsored Research reached $9 M annually.

2002
- Joint Board of Trustees for the College of Engineering Established
- Center for Cutting Edge Technologies Established (Title III)
- Sponsored Research reaches $10M annually

2003
- Center for Intelligent Systems, Control, and Robotics (CISCOR) established
- Center for Nanomagnetics and Biotechnology (CNB) funded by FSU Cornerstone Program ($1.0M)
- Challenger Learning Center ($8.6M) opened
- Sponsored Research reached $12M annually

2004
- Sustainable Energy Science and Engineering Center (SESEC) established
- Enrollment exceeded 2300
- Full ABET Accreditation: All Programs
- Since 1984, over 3750 B.S. degrees granted over 650 M.S. degrees granted over 70 Ph.D. degrees granted
- Top ten national ranking as producer of African American Engineers: BS (#3), MS (#6), PhD (#9)
- Total College of Engineering graduates passed 4500 mark
- Sponsored Research Expenditures reached $19M annually

2005
- Established Student Chapter of Hispanic Engineers
- The College is ranked #2 in producing African American BS Engineers
- Pre-Engineering calcification implemented
- Sustainable Energy Science and Engineering Center established
- Challenger Learning Center was named xxxxxxxxx

2006
- 102 companies participated in the Engineering Career Day
- The College received the first National Institute of Health Career Grant. Recipient: Professor Anke Meyer-Baese
- Applied Superconductivity Center joined FSU; two engineering faculty members joined the Department of Mechanical Engineering
• The College has two faculty members as members of the National Academy of Engineering: Professors David Larbalestier and Simon Ostrach.
• The College received $5.7M from FSU to conduct cluster research in Advanced Materials.
• Industry Day Keynote Speaker featured Nobel Laureate, Sir Harold Kroto.

2007
• The College Celebrates the 25th Anniversary.
• The College Building is named the Herbert F. Morgan Building by the State Legislation.
• The total active external funding with single and multiyear contracts exceeds $80M.
• Graduated 313 BS; 46 MS and 22 PhD students.
• The College’s first NSF Career Award Granted to Professor Helen Li
• Florida State University and the College of Engineering received $4M to establish the Center of Excellence in Advanced Materials.

2008
• Established Multidisciplinary Master program in Materials
• State funded Florida Center for Advanced Aero Propulsion $14.7M
• State funded Institute for Energy Systems, Economics and Sustainability $6.5M
• NSF funded Future Renewable Electrical Energy and Management System Center
• Established Energy and Sustainability Center

2009
• Opening of Materials Research Building for High Performance Materials Institute
• College Faculty achieved 20 Society Fellows
• College received ABET Claire L Felbinger Award for Diversity
• Engineering Building III Approved for Design
• Enrollment of Undergraduate Engineering Students exceeds 2,000

2010
• Groundbreaking for Aero-Propulsion, Mechatronics and Energy Center
• Engineering students win trophy in national Hybrid Vehicle Competition for fuel efficiency and “Hybrid in Progress”
• NSF Funds Next-Generation Wind Tunnel for Aviation Research
• Civil and Environmental Engineering’s Self-Study Report Recognized by ABET
• Department of Civil and Environmental Engineering made rank in the top 50 of 212 reporting schools in the number of Civil Engineering bachelor degrees awarded in 2010

2011
• Two Engineering Faculty Members win NSF CAREER Awards: William Oates and Anant Paravastu
• Dean Ching-Jen Chen Announces His Retirement: John Collier named Interim Dean
Bing Energy Relocates to Tallahassee to Partner with FSU on High-Tech Fuel Cells developed by College of Engineering Researchers
Fall enrollment surpasses 2500 students
American Society of Civil Engineering Student Chapter hosts Southeast Regional Competition and wins Second Place Overall
American Society of Civil Engineering Student Chapter wins Best Florida Student Chapter for three consecutive years
Electrical and Computer Engineering Students Win the 2012 IEEE SouteastCon

2012
Dr. Yaw Yeboah named Dean of Engineering
Dedication of the Aero-propulsion Mechatronics and Energy Center

II. Planning Context and College Program Summary

(1) Enrollment and Programs

The FAMU-FSU College of Engineering was established by the Florida Board of Regents in 1982 as a joint school of engineering for FAMU and FSU. This unique structure of the joint school is the only engineering college in the United States built upon the full partnership of two universities. The College of Engineering has a unique mission combining the missions of FAMU and FSU. The college offers a comprehensive engineering curriculum both in undergraduate and graduate programs, as summarized in the following table.

Undergraduate Programs

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Graduate Programs

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<td>Electrical and Computer</td>
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The College of Engineering in 2012 has 72 faculty members and over 2500 students representing all racial groups. Over a quarter of the students are women, and about one half are African American. Since 1985, the college awarded over 7,500 degrees and has become one of the top producers of African American BS, MS, and PhD engineering graduates in the country. In 2010-2011, the college graduated 263 BS, 67 MS and 25 PhD degrees.

(2) Faculty

The 2011 distribution of current faculty head count by rank and department is given below.

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<th>DEPARTMENT</th>
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<td><strong>16</strong></td>
<td><strong>26</strong></td>
<td><strong>30</strong></td>
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Faculty members also have achieved national recognition by establishing research centers. The College has established eight centers that are among the foremost in their fields, conducting leading-edge research in technologies of the future. These centers include the following:

(A.) High Performance Materials
(B.) Center for Advanced Power Systems
(C.) Center for Intelligent Systems, Control, and Robotics
(D.) Applied Superconductivity Center
(E.) Energy and Sustainability Center
(F.) Florida Center for Advanced Aeropropulsion
(G.) Aeropropulsion Mechatronics and Energy Center
(H.) Future Renewable Electric Energy Delivery and Management Systems Center

Outreach to the country’s youth has become a primary mission of all engineering colleges, to cope with the deficit in engineering graduates for meeting the demands of society. In 2003 the FAMU-FSU College of Engineering opened a Challenger Learning Center ($8.6M) in Tallahassee to attract middle and high school students to the study of science, mathematics and engineering. Located in downtown Tallahassee,
the facility features a planetarium and wide-screen IMAX Theater. The Challenger Learning facility has become a major attraction in Tallahassee.

3. FAMU-FSU College of Engineering Action Plan related to QERs and Program Reviews

Introduction

During the Fall Semester 2011 the FAMU-FSU College of Engineering was involved with FAMU and FSU in a joint assessment of the five academic departments in the College. At FSU this is referred to as the Quality Enhancement Review (QER) and at FAMU as the Program Review. Both universities agreed to jointly conduct these assessments and to use a common report. The following action plan was developed in response to the review that consisted of external reviewers for each department and the meetings with various bodies at the universities. Separate reports were submitted to the FSU Graduate Program Review that was an integral part of the FSU evaluation. The information in the FSU Graduate Program Review is included in this report. The five departments are: Chemical and Biomedical Engineering (ChBE), Civil and Environmental Engineering (CEE), Electrical and Computer Engineering (ECE), Industrial and Manufacturing Engineering (IME), and Mechanical Engineering (ME).

Although this report is being submitted by the Interim Dean of the FAMU-FSU College of Engineering due to the required reporting date, it should be noted that the appointment of Dr. Yaw Yeboah as Dean will be effective July 1, 2012. Additional recommendations could be made after his arrival.

Issues Related to All Departments

Budget Arrangements

Some of the issues raised by the reviews involve budgetary matters; therefore an overview of the unique budgetary constraints in the FAMU-FSU College of Engineering follows. Funding for the college consists of two distinct sources referred in the college as the reimbursable and the non-reimbursable budgets. The reimbursable budget is through FAMU and controlled by the Joint Management Committee (this committee consists of the Presidents, Provosts, and Chief Financial Officers of both Universities). This portion of the budget includes the pay (one university calls this salary, the other rate) and benefits (referred to as salary by one university) for faculty and staff under this budget, and operating expenses. The reimbursable budget includes both FAMU and FSU faculty and staff. The pay and benefits for the FSU faculty and staff are paid by FSU and then reimbursed by FAMU, the FAMU faculty and staff are paid by FAMU. The non-reimbursable budget is from FSU and includes some additional faculty and staff and operating expenses, and is treated like other college budgets at FSU. Germaine to the discussion that follows, the non-reimbursable budget from FSU does not include benefits, they are funded centrally, and any across the board raises etc. by FSU are added to the budget. However, raises for the FSU faculty and staff under the reimbursable budget are not added to the budget but must be taken out of the reimbursable budget.
FAMU administration generally restricts support for students paid by grants and contracts through FAMU to only FAMU students, with exceptions required to support FSU students. Whereas, grants and contracts through FSU allow support for both FSU and FAMU students without restrictions to which university the students are enrolled.

As is common at both universities, the operating budget each year is partially funded by vacant positions some from the previous year that result in carry-forward funds. This includes college start-up funds for new faculty, matching funds when needed for grants and contracts, OCO funds for needed equipment, and teaching assistant and other support staff paid through OPS.

**Issues Noted By Evaluators Common To All Departments**

One of the primary concerns stressed by all external and many internal reviewers was the inequity of salaries between FAMU and FSU faculty. A spring 2011 study of the inequities in salaries concluded that at that time it would require $50,000 to make the FAMU engineering faculty salaries equitable with the FSU engineering faculty. A recommendation was made to the FAMU administration and no action was taken. This inequity was increased to $153,000 in the fall 2011 semester when FSU gave 3% raises and FAMU did not. A revised plan and recommendation was made to the FAMU administration and to date no action other than a statement that it is the goal of FAMU to correct this inequity. Neither plan involved additional resources for the reimbursable budget; the money would come from vacant positions. A recent analysis by the college office suggests that about one million dollars would be required to bring all FAMU-FSU engineering faculty salaries to the national average by rank and discipline.

**Recommended Action**

Permission should be granted and a starting date stated for the correction of the inequity in pay between FAMU and FSU to be implemented. Furthermore, the Dean of the FAMU-FSU College of Engineering should be empowered to make similar equity adjustments in the future without prior approval, thereby awarding the same across the board raises and bonuses to faculty and staff independent of university of contract.

1. All of the reviewers, in some fashion, stated that many inequalities exist in the joint administration by the two universities at the college in addition to the salary inequities. This includes appointment and evaluation of faculty, staff and students and eligibility for various awards, funding, staff supervision by personnel from one university over personnel from the other, etc.

**Recommended Action**

This is a critical issue that severely limits the potential of the College and should be addressed by the Joint Management Council of the College (i.e. the presidents, provosts, and chief financial officers of both universities). The Joint Management Agreement should be revised to reflect the current understanding of how the College should operate.

2. FAMU has insisted that any intellectual property developed in which a FAMU piece of equipment was used belongs to FAMU independent of whether the inventor
was from FSU or FAMU. The position of the FSU administration has been that decisions should be made on a case by case basis. As a result, in the new buildings paid by FSU funds, no FAMU equipment is allowed and no FAMU paid engineering faculty are permitted to have offices and labs.

**Recommended Action**

A general policy on intellectual property should be made with the primary consideration being the employment status of the inventor(s), i.e. whether FSU or FAMU independent of equipment involved. Inventors listed by patents must be limited to the person or persons who developed the concept and excludes individuals who demonstrate the concepts; therefore equipment used is not the prime consideration. If more than one inventor is involved and not from the same university, the university of the first listed inventor should be the university through which the patent process occurs with a case by case consideration of the sharing of any royalties. The potential distribution formula should be determined as part of the patent disclosure procedure, similar to determining distribution of overhead return funds when proposals are submitted. The patent ownership disputes have resulted in patent disclosures not be filed in a timely fashion resulting in loss of protection of intellectual property. Recent changes in patent procedures strongly favor early application since the decision on US patent ownership is now based upon date of filing patent disclosures not on date of concept development.

3. The evaluators for all departments suggested that additional faculty and support staff were needed, while recognizing the limitations in general of university funding. The evaluators generally urged that consideration should involve a defined focus for each addition whether or not the position is in a given department or shared in some fashion.

**Recommended Action**

The Dean of the FAMU-FSU College of Engineering should work with the engineering departments to further develop the focus for each department including collaboration with each other and other programs both on and off campus. Additional faculty positions and funding should be requested when appropriate.

4. A general comment phrased in different ways for each department was to develop strategies to recruit more highly qualified graduate students.

**Recommended Action**

The current college-wide effort to have more focused and directed recruitment of graduate students should be continued and strengthened. Currently half time of one staff member is devoted to this effort that was initiated during the Fall Semester 2011.

5. All of the departments were encouraged by the reviewers to insure that the annual reviews of graduate students were conducted in a thorough and instructive fashion.

**Recommended Action**

All departmental graduate committees have agreed and are implementing this recommendation.
Issues Related to Specific Departments

CHEMICAL AND BIOMEDICAL ENGINEERING

1. Given the constraints of faculty expertise and availability, the department should review the graduate curriculum to foster growth of both the related but distinct ChE and BME disciplines.

   **Recommended Action**
   The Chemical and Biomedical Engineering Department faculty have instituted a new sophomore level introductory biomedical engineering required course in that program and is considering additional biomedical courses at the graduate level. For a current opening for a faculty member to begin in the Fall 2012 or later the department will strongly consider having a person with a chemical engineering background; with his/her research area being in the biomedical engineering area, and with the intent to develop additional graduate and perhaps undergraduate courses in this area. Discussion at the college level should be initiated to integrate BME into some of the other programs such as EE and ME.

2. The department should consider how to further enhance graduate student professional development through expansion of educational opportunities in such areas as writing (including grant writing)/presentation skills, attending professional conferences, and in career advisement.

   **Recommended Action**
   The College should consider developing technical writing and professional presentation training for graduate students in all programs.

CIVIL AND ENVIRONMENTAL ENGINEERING

1. The newly instituted Master of Engineering (MEng) program in CEE is projected to increase graduate enrollment, especially when the new Professional Engineer (PE) criteria become effective. Scheduling classes, and covering the additional classes, will present new challenges for the department faculty.

   **Recommended Action**
   Pending available funds, more faculty lines should be allocated in the near future to continue the commitment to delivering an effective graduate program. The search for a faculty member in a new FAMU line is on-going. As part of the reassignment of space in the Engineering building and the allocation of OCO funds, better facilities should be provide to deliver the online MEng courses.

2. The department should establish as a goal enabling faculty to have more time devoted to research, thus making it possible for faculty to produce more journal publications and conference publications, especially those based on doctoral research.

   **Recommended Action**
The department is in the process of establishing a policy to increase the number of journal publications and conference publications. Each MS or PhD student will be required to produce a defined number of publications before graduation. The graduate committee in the department is preparing the new policy and will present it to the faculty members for their review and approval.

3. The department should endeavor to have five or more students in all graduate-level courses, in order to optimize faculty resources, and in keeping with similar policies in other programs.

   **Recommended Action**

   The CEE department is setting a goal to increase the number of outside research grants which should increase the number of research supported graduate assistants, thereby increasing the enrollment in classes. Additionally, the new MEng program is expected to increase the enrollment in CEE graduate classes.

4. The external reviewer suggested that the CEE department develop a niche research area to improve their competitive position with high profile institutions.

   **Recommended Action**

   The new strategic plan of the department will reflect the emphasis on increasing the pool of external research funds, especially from federal grants. Also, the department has already implemented a research plan by which faculty expertise was grouped in three different civil and environmental engineering research themes: Structural Health Monitoring, Environmental Sustainability, and Transportation Infrastructure.

**ELECTRICAL AND COMPUTER ENGINEERING**

1. ECE graduate courses and degree program requirements and their scheduling should be reviewed periodically by a faculty curriculum committee or ad hoc committee that includes some graduate student representation.

   **Recommended Action**

   The Graduate Committee will review the graduate courses, degree program requirements, and course scheduling on an annual basis. The department will consider a proposal to include graduate student representation, i.e., 1 FAMU and 1 FSU graduate students, in the Graduate Committee, starting fall 2012.

2. The department should work towards reducing the number of dual-listed courses.

   **Recommended Action**

   Beginning fall 2012, pending availability of resources, the ECE department will gradually reduce the number of dual-listed courses. Dual-listed courses will be identified and faculty will be informed of the decision(s).

3. The ECE Department should seek to start the MS and PhD degree programs in computer engineering or combine computer and electrical engineering. The Computer Science departments at FAMU and FSU should be partners in such an expansion, if only to efficiently assure needed computer science components.

   **Recommended Action**
The ECE Graduate Committee is developing a proposal to combine the graduate electrical engineering and computer engineering degree programs rather retaining them as separate programs.

4. The ECE Department should consider spending some effort on improving its percentage of female graduate students which is currently below college and national levels.

   **Recommended Action**
   The ECE department is proposing to set up fellowships for female graduate students as part of an overall effort to attract more female students. Some possible funding sources for these fellowships include the Dean’s Office fund-raising activities, e.g., through the ECE Advisory Board, industry partners, etc. In addition, the department is setting up an ad hoc committee (preferably headed by a female faculty member) to organize outreach programs to the local high schools.

5. Student perception is that there is usually inadequate curriculum information and the website should be consistent with the graduate handbook.

   **Recommended Action**
   The ECE website has been completely revamped and will be reviewed on a regular basis for accuracy and up-to-date content with links to the undergraduate and graduate program information.

6. The department should ensure that students receive training in professional ethics and standards.

   **Recommended Action**
   All new graduate students will be required to enroll in the professional ethics training course at FSU and this requirement will be added to the review checklist for graduation.

**INDUSTRIAL AND MANUFACTURING ENGINEERING**

1. Student recruitment at the undergraduate and graduate levels should be a priority for the department. At the undergraduate level there appears to be a systemic issue with regard to drawing Florida A&M University students into the joint College of Engineering (with the exception of Electrical and Computer Engineering). This needs to be addressed at a higher administrative level although the department may be able to provide additional information sessions to recruit students.

   **Recommended Action**
   As noted by the external reviewer, this is something that should be addressed at the college and university level. However, the IME department will enhance student recruitment efforts at both undergraduate and graduate levels, with a particular focus on FAMU students. Specifically, the Department plans to initiate and continue the following activities:

   a. Working with the Associate Dean’s Office, the IME department will continue to promote Industrial Engineering among the students in Pre-Engineering classes. The Department will improve and implement the IE-oriented class-projects.
b. The Department will work with student advising offices at both FAMU and TCC to enhance students’ awareness of the Industrial Engineering major and to facilitate a smooth pathway for those students entering into the IME Department.

c. The Department will visit local/regional high schools to promote Industrial Engineering among counselors and students (via math or science clubs).

d. The Department will enhance graduate recruitment by continuing effective efforts including visiting targeted schools, recruiting from honor thesis and REU programs, and offering special fellowships. Another effort is to develop new non-thesis MS programs such as the planned new MSIE program for orthotics and prosthetics professionals.

2. The current requirement of four published papers for Ph.D. graduation is good in principle but leaves graduation dates largely in the hands of people external to the universities. The new requirement is being reasonably applied by the current graduate advisor but there may still be unintended consequences. The external reviewer would suggest that the department faculty carefully evaluate the requirement and its impact, considering submitted rather than accepted papers. The intent of this requirement should assist students in gaining domestic academic positions. Further mentoring students to pursue domestic academic positions would, raise the profile of the department nationally.

   **Recommended Action**
   The IME department is reviewing and revising the publication requirement for PhD graduation based on the suggestion from the external reviewer. It is planned that the policy will be finalized by summer, 2012 and will be implemented starting fall 2012.

**MECHANICAL ENGINEERING**

1. Steps should be taken to control enrollments into the undergraduate mechanical engineering program. Given the limited size of the faculty and the need to effectively educate undergraduates, some controls must be implemented to avoid overcrowding and the quality erosion that accompanies it. The external reviewer recommends that a threshold GPA be considered in multiple pre-engineering courses to maintain enrollments at a level deemed critical for the state and region, yet not so large as to compromise the program’s quality and morale of faculty and staff.

   **Recommended Action**
   The following actions are proposed:
   a. To put extra restrictions on the students who take 7 times to pass the 5 pre-engineering classes (Calculus I, Calculus II, Physics I, Chemistry I, and First Year Engineering Lab).
   b. To strengthen the requirements for passing the first term sophomore Mechanical Engineering courses. For example, one repeat of these courses may be allowed and/or the grade of B or better be required in one of the courses necessary to continue in ME.
c. Students no longer will be allowed to have a D in a sophomore level Mechanical Engineering course. (They are currently allowed to have one D in a Mechanical Engineering course with no specification on the level of the course.)

2. Far too many courses are being offered under the title of “Special Topics in Mechanical Engineering,” or not offered at all, or cancelled.

   **Recommended Action**
   This problem is being partially addressed by requesting additional faculty. The ME department also plans to teach 1 and 2 hour graduate courses in addition to the normal course loads.

3. The ME department should consider employing one or more individuals to raise endowment funds.

   **Recommended Action**
   This is a FAMU-FSU College of Engineering-wide problem and should be addressed by the Joint Management Council to assign additional resources to the college for fund raising.

4. The fraction of faculty actively engaged in the research enterprise could be increased. The department is encouraged to implement a post-tenure review process that is not punitive to existing faculty, but one that can develop a culture for the next generation of faculty to remain engaged at the highest level of scholarship possible throughout their careers.

   **Recommended Action**
   With the recent addition of a very research oriented faculty member in spring 2012 and anticipation of two more research oriented faculty for fall 2012, the percent of faculty actively engaged in research will increase. Due to the existence of faculty unions any post-tenure review process development must occur at the university and not just at the departmental level.

Advancing the quality of our degree programs and research is a continuing goal of the College. Achieving and maintaining national and international recognition through our research activities will further attract high quality students and faculty as well as financial support from industry and government. These efforts will also enhance the economy of the State of Florida and the Gulf Coast to bring investment in high technology activities to this region. General plans to ensure the continued growth of the College include the following:
(A.) Grow the faculty size with competitive salary and start up funds for new faculty,

(B.) Provide sufficient office space and laboratory facilities to conduct teaching and research,

(C.) Recruit more domestic graduate students and under represented groups,

(D.) Construct Engineering Building including a full Engineering Library,

(E.) Add supporting staff, particularly laboratory technicians

(F.) Improve the college management infrastructure to reduce the frustration for faculty and students in dealing with two system procedures and policies.

By the year 2014, the FAMU-FSU College of Engineering seeks to rank among the top 50 institutions and be one of the most unique engineering schools in the nation.

III. Engineering Accreditation Commission of ABET

The accreditation visit by the Accreditation Board for Engineering and Technology (ABET) was conducted in November 2009. During the visit, meetings were held with administrators, faculty and staff, Presidents and Provosts of both Universities and the Dean of Engineering, members of the financial administration, Registrars, Directors of Admissions, Career Center Directors of both institutions, and the Associate Dean for Student Affairs as well as officials responsible for support groups within the College. Visits also took place with representatives of supporting units including computer science, mathematics, physics, and chemistry.

A program's accreditation action is based upon the findings of the site visit. Actions depend on the program's range of compliance or non-compliance with the criteria. This range can be construed from the following terminology:

• Deficiency: A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.

• Weakness: A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure prior to the next evaluation.

• Concern: A concern indicates that a program currently satisfies a criterion, policy, or procedure; however, the potential exists for the situation to change such that the criterion, policy, or procedure may not be satisfied.

• Observation: An observation is a comment or suggestion that does not relate directly to the accreditation action but is offered to assist the institution in its
continuing efforts to improve its programs.

(1) FAMU-FSU College of Engineering

Institutional Findings

Units external to the engineering programs which support the program are managed by energetic, motivated and professional employees whose desire to serve students, faculty and staff is evident. All supporting units provide adequate support to the engineering programs.

Departmental Findings

CHEMICAL AND BIOMEDICAL ENGINEERING

Program Strengths

1. The program has a well qualified faculty with strong ties to undergraduate students. In addition to normal venues for student-faculty interaction in classroom and outside, student involvement in research with faculty is noteworthy.

2. Through an enhanced two-semester course, students receive a solid foundation in mass and energy balances. Students are exposed to a significant amount of computational techniques in their course and laboratory experience. As demonstrated in senior design projects, they are familiar with most current commercial software packages in the field.

Program Concern

1. **Criterion 8. Support** This criterion requires that resources be sufficient to attract, retain and provide for the continued professional development of a well-qualified faculty. The current salary differential between the FAMU and FSU faculty caused by different annual salary adjustments between the two institutions is noteworthy because they deliver a single program. This situation has the potential to impact the quality of the program by eroding faculty morale, risking the loss of existing, experienced faculty members and/or making it more difficult to attract new faculty members.

Due-process response: The program reported that they are "working with both university administrations to minimize these differences in order to maintain the morale of the faculty and to maintain vital atmosphere for our educational and research efforts."

The concern remains unresolved.

Program Observation

1. While the program support personnel and departmental services seemed adequate to meet program needs, it is noted that there may be an issue with the maintenance of software packages used in teaching across the curriculum (Aspen Plus and Chemcad), and steam generator/ compressed air used in laboratory courses. It is also suggested that
efficient coordination of safety reviews of new building projects between the college and the two universities will be needed to avoid potential future problems.

CIVIL AND ENVIRONMENTAL ENGINEERING

Program Concern

1. Criterion 8. Support This criterion requires that resources be sufficient to attract, retain and provide for the continued professional development of a well-qualified faculty. The current salary differential between the FAMU and FSU faculty caused by different annual salary adjustments between the two institutions is noteworthy because they deliver a single program. This situation has the potential to impact the quality of the program by eroding faculty morale, risking the loss of existing, experienced faculty members and/or making it more difficult to attract new faculty members.

Due-process response: The program reported that they are "working with both university administrations to minimize these differences in order to maintain the morale of the faculty and to maintain vital atmosphere for our educational and research efforts."

The concern remains unresolved.

COMPUTER ENGINEERING

Program Strength

1. The qualified and dedicated faculty work to engage and cooperate with colleagues at both the Tallahassee and Panama City campuses. Faculties at both locations serve on department committees and rotate through committee leadership roles seamlessly. Faculty members are dedicated to providing a quality experience for the students in spite of the difficulties created by the unique twin-institution arrangement at Florida A&M University -Florida State University. The actions of the faculty help individual students make progress toward degree completion. Furthermore, the faculty's concern about the students' well-being promotes goodwill and high student morale within the program.

Program Weaknesses

1. Criterion 2. Program Educational Objectives This criterion requires that the program have in place: (a) published educational objectives that are consistent with the mission of the institution and these criteria; (b) a process that periodically documents and demonstrates that the objectives are based on the needs of the program's various constituencies; and (c) an assessment and evaluation process that periodically documents and demonstrates the degree to which these objectives are attained. Furthermore, program educational objectives are defined as broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The first three published program educational objectives are not broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve, but are narrow statements written more like program outcomes. Little evidence was presented of a process that periodically documents and demonstrates that the objectives are based on the needs of the program's various constituencies. No evidence was presented that an assessment and evaluation process is in place that periodically documents and demonstrates the degree to which these objectives are attained.
Due-process response: The EAC acknowledges receipt of information indicating that the educational objectives have been included in the latest Florida State University Bulletin (2009-10) and on the departmental website. The Florida A&M University Catalog is revised every two years and the educational objectives will be included in the next edition (2011-12). The first three educational objectives have been rewritten to describe the career and professional accomplishments that the program is preparing graduates to achieve. A process has been developed that makes use of alumni surveys and Advisory Board surveys to assess and evaluate each of these objectives. Target levels of achievement have been set for each objective and the alumni survey was conducted in 2009. However the survey data (58 responses in total) reported are from alumni of both the electrical and computer engineering programs. Without separate data unique to the program's alumni assessment of the degree to which these objectives are attained for the computer engineering respondents cannot be determined.

The weakness remains unresolved and will be a focus of the next review. In preparation for this review, the EAC anticipates evidence indicating that the program is evaluating the degree to which the educational objectives are achieved for the computer engineering program.

1. **Criterion 3. Program Outcomes** This criterion requires that there be an assessment and evaluation process that periodically documents and demonstrates the degree to which the program outcomes are attained for outcomes (a) through (k) plus any additional outcomes that are articulated by the program. It appears that the program does not adequately measure the degree to which the program outcomes are attained. Little evidence was presented to demonstrate the existence of a periodic process to assess and evaluate all outcomes for the computer engineering program.

Due-process response: The EAC acknowledges receipt of information indicating that the program is revising its process so that it can adequately measure students' performance against the program outcomes. The program noted that while previously it was unable to distinguish electrical engineering and computer engineering students, nor main campus from or satellite campus at Panama City, the measurements now appear to distinguish between electrical and computer engineering students. The program reports that at the time of the visit they only had data from the spring 2009 semester available for analysis whereas now they have a complete year's worth of data. However no results from that larger data set were provided that show the degree to which the outcomes are attained.

The weakness remains unresolved and will be a focus of the next review. In preparation for this review, the EAC anticipates evidence indicating that the program is evaluating the degree to which the educational objectives are achieved by students in the computer engineering program.

**ELECTRICAL ENGINEERING**

**Program Strengths**

The program labs are well equipped and the students have access to updated test equipment such as digital storage oscilloscopes, power meters, function generators and power supplies. The classrooms at the Panama City Campus are well equipped with tools to enhance the learning experiences, such as computer equipped teaching stations, internet connections, LCD projectors and sound systems.
1. The faculty members at FAMU and FSU are well established in their fields and bring a wealth of knowledge to the classrooms. Most faculty members are currently conducting advanced research in their fields. The faculty has a well balanced schedule between teaching, research and service to the university.

Program Weaknesses

1. Criterion 1. Students This criterion requires that the program evaluate student performance, advise students regarding curricular and career matters, and monitor student's progress to foster their success in achieving program outcomes, thereby enabling them as graduates to attain program objectives. Analysis of the transcripts indicated that students were taking classes without the required prerequisites. Students who failed a core class (i.e., EEL 3300, Electronics), which is a prerequisite for other classes, were allowed to retake the class the last semester before graduating. In some cases, students were allowed to take Calculus 3 before successfully passing Calculus 1 or 2. Some students graduated with a letter grade of D without obtaining the correct waivers. All the student transcripts reviewed met ABET minimum requirements for engineering credit hours but at least one student did not meet the minimum requirements for the university.

Seven-Day response: The EAC acknowledges receipt of information during the seven-day period which focused on the transcript of the student who did not appear to meet institutional requirements. The program noted that the student did indeed meet institutional requirements and the reason why the student apparently graduated without meeting them was the result of a clerical error on the transcript. This further indicates that a process is not in place to adequately monitor student's progress and to advise students. This lack of process was evident in the review of the transcripts as was noted above in the examples related to Calculus 1, 2 and 3, and the issue of EEL 330, Electronics, which led to a student taking several classes without the correct prerequisites. This electronics class was required for several classes including the senior design lab.

The weakness remains unresolved.

Due-process response: The EAC acknowledges receipt of information indicating that the program has taken steps to deal with this weakness. To avoid situations in which students take classes without the prerequisites the program has now extended the current requirement for manually checking the core course prerequisite satisfaction during the first week of the semester to all department courses. It is reported that this was implemented during the spring 2010 semester without incident. To broaden career and curricular advising, the program has now instituted faculty advising. The new process makes use of enrollment "stops" that are not removed until advising is satisfied at several points in the student's matriculation.

The weakness is resolved.

2. Criterion 2. Program Educational Objectives This criterion requires that the program have in place: a) published educational objectives that are consistent with the mission of the institution and these criteria; b) a process that periodically documents and demonstrates that the objectives are based on the needs of the program's various constituencies and; c) an assessment and evaluation process that periodically documents and demonstrates the degree to which these objectives are attained. Furthermore, program educational objectives
are defined as broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The first three published program educational objectives are not broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve, but are narrow statements written more like program outcomes. Little evidence was presented of a process that periodically documents and demonstrates that the objectives are based on the needs of the program's various constituencies. No evidence was presented that an assessment and evaluation process is in place that periodically documents and demonstrates the degree to which these objectives are attained.

Due-process response: The EAC acknowledges receipt of information indicating that the educational objectives have been included in the latest Florida State University Bulletin (2009-10) and on the departmental website. The Florida A&M University Catalog is revised every two years and the educational objectives will be included in the next edition (2011-12). The first three educational objectives have been rewritten to describe the career and professional accomplishments that the program is preparing graduates to achieve. A process has been developed that makes use of alumni surveys and Advisory Board surveys to assess and evaluate each of the objectives. Target levels of achievement have been set for each objective and the alumni survey was conducted in 2009. However the survey data (58 responses in total) are from alumni of both the electrical and computer engineering programs. Without separate data unique to the program's alumni assessment of the degree to which these objectives are attained for the electrical engineering respondents cannot be determined.

The weakness remains unresolved and will be a focus of the next review. In preparation for this review, the EAC anticipates evidence indicating that the program is evaluating the degree to which the educational objectives are achieved for the electrical engineering program.

**INDUSTRIAL ENGINEERING**

**Program Strengths**

1. The program has enthusiastic students and faculty who are invested in their students' education. The High Performance Materials Institute provides an outstanding research opportunity for students and faculty in composite materials design, manufacturing and test.

2. The program has an extensive assessment and evaluation program that drives on-going improvement of its undergraduate program. Faculty members are enthusiastic and involved in this program. It is deployed throughout their curriculum.

3. Students obtain engineering employment and attend excellent graduate schools after graduation. Local and national firms seek the program's students and participate in the program's advisory board.
MECHANICAL ENGINEERING

Program Strength

1. The program has well-established senior design courses with industry-sponsored projects. These projects provide invaluable hands-on experience for students.

Program Weaknesses

1. Criterion 2. Program Objectives Criterion 2 requires that each program have in place an assessment and evaluation process that periodically documents and demonstrates the degree to which the program educational objectives are attained. The program has not fully demonstrated or documented the degree to which the objectives are attained. Assessment tools do not appear to be mapped to the program objectives leading to limited evidence for determining the extent to which the objectives are attained.

Due-process response: The EAC acknowledges receipt of a statement that the program considers its current assessment process, while admittedly not the most progressive, sufficient to satisfy ABET criteria and has been functioning effectively in terms of identifying past program shortcomings while resulting in necessary improvements. Nevertheless the program indicates a number of steps were taken after the visit to plan actions to correct the identified shortcomings. These steps include several remedial actions to enhance the assessment process for the program educational objectives including developing new and much improved survey forms for: 1) the mechanical engineering advisory council; 2) employers and supervisors; and 3) alumni. In addition the program educational objectives themselves have been edited to render them more measurable. The program notes that a survey (of the older program objectives) was conducted in summer 2009 which was after the self-study report was completed and submitted and before the visit took place in fall 2009. These results were made available to the program evaluator during the pre-visit discussions but the assessment tools at that time were not well mapped to the program objectives leading to limited evidence for determining the extent to which the objectives are attained.

The weakness remains unresolved and will be a focus of the next review. In preparation for this review, the EAC anticipates evidence demonstrating how the program has implemented the new assessment tools and that results, which measure the level of achievement of the defined program objectives, are available.

2. Criterion 3. Program Outcomes This criterion requires an assessment and evaluation process that periodically documents and demonstrates the degree to which the program outcomes are attained. The defined process, which is based on exit surveys, exit interviews and informal input from the Mechanical Engineering Advisory Council, does not appear to demonstrate the degree to which the individual required program outcomes are attained. Assessment tools do not appear to provide sufficient data to determine the extent to which the program outcomes are attained.

Due-process response: The EAC acknowledges receipt of a statement that the program recognizes the shortcomings of the current assessment process since it relies on course outcomes instead of assessing program outcomes at the course level. The program provided an outline of a new assessment process being put in place. This new process has not yet been implemented.
The weakness remains unresolved and will be a focus of the next review. In preparation for this review, the EAC anticipates evidence showing how the program has implemented the new assessment process, generated data and used that data to determine the level of attainment of the program outcomes.

**Summary of Visit of November 2009:**

Chemical Engineering (BS)
Civil Engineering (BS)
Industrial Engineering (BS)

Accredited to September 30, 2016

Computer Engineering (BS)
Electrical Engineering (BS)
Mechanical Engineering (BS)

Accredited to September 30, 2012. A request to ABET by January 31, 2011 was required to initiate a reaccreditation report evaluation. A report describing the actions taken to correct shortcomings identified in the attached final statement was submitted to ABET by July 01, 2011. The reaccreditation evaluation focused on these shortcomings. A visit was not required.

The Engineering Accreditation Commission of ABET conducted an interim evaluation of computer, electrical, and mechanical engineering programs. In February of 2012 a report was received from the Commission recommending that as of July 2012, the ABET Team Chair recommended that the accreditation status for these programs be extended until July 2016. Therefore, all six engineering programs received accreditation to 2016.