Marshall University
Marshall Digital Scholar

Recommendations

Faculty Senate

5-9-2016

SR-15-16-58 CC

Marshall University

Follow this and additional works at: http://mds.marshall.edu/fs_recommendations

Recommended Citation

Marshall University, "SR-15-16-58 CC" (2016). *Recommendations*. 53.
http://mds.marshall.edu/fs_recommendations/53

CURRICULUM COMMITTEE
RECOMMENDATION

SR-15-16-58 CC

NOTE: The curricular form for each item listed may be accessed at www.marshall.edu/senate/ucc. Click the UCC Agendas/Minutes link; click the link for the April 15, 2016 meeting date; click the link in the Description column to open a particular item.

Recommends approval of the listed UNDERGRADUATE PROGRAM ADDITION in the following colleges and/or schools/program: COLLEGE OF INFORMATION TECHNOLOGY & ENGINEERING

- **COLLEGE OF INFORMATION TECHNOLOGY & ENGINEERING:**

  *NAME OF MAJOR TO BE ADDED: BS Electrical & Computer Engineering BSEE
  *Rationale:
  After a decade's-long absence, undergraduate engineering education was re-established on the Marshall University campus in the fall of 2006 when the Marshall University Board of Governors approved the Bachelor of Science in General Engineering (BSE) degree. The BSE degree is a general engineering that also allows students to pursue areas of emphasis in particular engineering fields of study. Based on student interest and regional needs, the first area of emphasis offered was civil engineering (CEE). During this time, the BSE program has continued to grow and develop and provide additional resources to its students. A mechanical engineering discipline was created during 2014-15 academic year. Based on market demands and the available resources, we believe it is the right time to expand engineering programs to include an electrical and computer engineering discipline. After careful and in-depth analysis, the faculty of the Weisberg Division of Engineering along with the Engineering Advisory Board believe creating a Bachelor of Science in Electrical and Computer Engineering (BSEE) is the appropriate approach to address current and future demands for engineers within the discipline. The proposed BSEE program will enable the students to choose one of two areas of emphasis: Electrical Engineering or Computer Engineering.
  *Curriculum: See attachments on curriculum request form.

FACULTY SENATE CHAIR:

APPROVED BY THE
FACULTY SENATE: _____ DATE: 5/9/2016

DISAPPROVED BY THE
FACULTY SENATE: _____ DATE: _____

UNIVERSITY PRESIDENT:

APPROVED: _____ DATE: 5-20-16

DISAPPROVED: _____ DATE: _____

Undergraduate Degree Addition

BACHELOR OF SCIENCE-ELECTRICAL AND COMPUTER ENGINEERING-BSEE

THE WEISBERG DIVISION OF ENGINEERING

COLLEGE OF INFORMATION TECHNOLOGY AND ENGINEERING

Contact Person:

Asad Salem, Chair
Weisberg Division of Engineering
(salema@marshall.edu)

April 28, 2016

Undergraduate Degree Addition
Bachelor of Science-Electrical and Computer Engineering
Major: Electrical and Computer Engineering (BSEE)

Brief Summary Statement:

The Bachelor of Science in Electrical and Computer Engineering (BSEE) is being developed by the Weisberg Division of Engineering of the College of Information Technology and Engineering (CITE) to graduate electrical and computer engineers for meeting West Virginia's increasing technological demands. Graduates of this Program will contribute to West Virginia's economic development, advance its competitive edge globally and contribute to improvement in the quality of life.

The proposed program will allow students to select one of two areas of emphasis: Electrical Engineering or Computer Engineering. Graduates of this Program will contribute to West Virginia's economic development, advance its competitive edge globally and contribute to improvement in the quality of life.

Electrical engineering is a field of engineering that generally deals with the study and application of electricity, electronics, and electromagnetism. The fields of electrical and computer engineering cover a wide range of subfields including electronics, power engineering, telecommunications, control systems, radio-frequency engineering, signal processing, instrumentation, microelectronics, digital systems including hardware, software, compliers and operating systems, coding, cryptography, network, mobile and distributed computing system, and cyber physical systems and security. As such, the BSEE program at Marshall University (MU) will prepare graduates with a BSEE with two areas of emphasis: general electrical engineering, and computer engineering. It will, also, emphasize service, systems-based knowledge, and sustainability with an eye toward the interface of traditional electrical and computer engineering with new and emerging fields. In accordance with the standards set forth by the Accreditation Board for Engineering and Technology (ABET) and MU's mission, the specific educational objectives of this program are to graduate students who will:

1. Practice the electrical and computer engineering discipline successfully within community-accepted standards

2. Possess teamwork and communications skills to develop a successful career in electrical and computer engineering

3. Fulfill professional and ethical responsibilities in the practice of electrical and computer engineering, including social, environmental and economic considerations,

4. Engage in professional service, such as participation in professional society and community service

5. Engage in life-long learning activities, such as graduate studies or professional workshops, and

6. Develop a professional career in the prevailing market that meets personal goals, objectives and desires

Accordingly, graduates will have the ability to work professionally and ethically, as individuals and in multi-disciplinary teams, in both the electrical and computer areas, including the design, manufacture, and control of such systems. Moreover, they will develop a deep understanding of the impact of engineering solutions from global, financial, environmental, societal, political, ethical, health and safety, and sustainability perspectives.

The University and the Weisberg Division of Engineering will actively recruit and train students from under-represented populations in the West Virginia and Tri-State region, beginning in middle school and continuing through high school. The BSEE degree program will be built on the foundation of the faculty members and facilities in MU's ABET-accredited B.S. degree program in General Engineering (BSE), degree program in Mechanical Engineering (BSME), and degree program in Computer Science (BSCS). To a substantial extent, the supporting coursework and infrastructure for a new BSEE program is in place as a result of our current programs in BSE, BSME and BSCS, most of the cost of the expanded program will be incremental and offset by the current programs. The proposed BSEE program, however, is geared toward the development of conceptual skills and the acquisition of specific knowledge regarding electrical and computer engineering systems, delivered in a sequence of engineering fundamentals and design courses that rely upon a foundation of advanced mathematics and science courses. Accordingly, the BSEE will differ from the existing programs, which is currently oriented toward Civil Engineering, and Mechanical engineering related applications. Therefore, five new faculty with doctoral degrees in electrical or computer engineering will be added in the first three years of the program.

From its inception, the BSEE program is designed to meet ABET accreditation standards. To be able to address the afore-mentioned "societal concerns," the BSEE program will incorporate a multi-disciplinary approach to the curriculum including a strong liberal arts component. The University's core curriculum with its emphasis on ethics provides the basis for such an approach. The curriculum will include courses that address MU's geographical location and the regional needs including energy, mining, materials, manufacturing, etc. Finally, an optional co-operative education component will be included that involves a full-time internship in industry, patterned after recent recommendations of the National Academy of Engineering and similar to other leading engineering programs.

ABET is the accreditation agency for engineering, and MU's BSE program is already accredited by ABET. Marshall will also seek ABET accreditation for the proposed undergraduate program in electrical and computer engineering. ABET does not consider, however, an institution for accreditation until the program produces its first graduate(s). It is anticipated that the first graduating class of BSEE engineering students will receive their BSEE degrees by the end of the Spring 2020 semester. Therefore, MU will make a Request for Evaluation (RFE) to ABET during the 2019-2020 academic year, which would require completing a self-study report in June 2020 and a comprehensive site visit during the Fall 2020 semester. The results of the accreditation visit shall be known during the Fall 2021, and would be considered retroactively for the graduating student class in May 2020. All components of the program will be designed to be consistent with ABET accreditation standards, and accreditation expenditures have been built into the budget for

the program beginning in the first year. Designing the program to meet ABET standards from the start will facilitate the program's eventual accreditation.

The proposed program will require five additional faculty and one laboratory technician. The program will cost approximately $3.5 million during its first five years, of which about $655,000 will be used to develop the required undergraduate teaching laboratories. The program is expected to generate $3.35 million in revenues and reallocated funds during the first five years. The program is projected to become financially viable in its fourth year. The projected net revenues in the fourth and fifth years are $133,000 and $270,000 respectively. Enrollment is expected to increase over this period; it is expected that, after the first five years, 20 students will have graduated with a BSEE degree and approximately 102 students will be actively pursuing a BSEE degree at MU.

The primary tangible objective of the BSEE program will be to prepare students for the professional practice of engineering. Upon completion of an electrical and computer engineering degree, students will have completed the "education" component of the three requirements for licensure from the West Virginia Board of Professional Engineers (WVBPE). All individuals seeking licensure to practice engineering are required to take the Fundamentals of Engineering (FE) examination and the Principles and Practice of Engineering (PE) examination, prepared by the National Council of Examiners for Engineering and Surveying (NCEES) and administered by state licensing boards, such as the West Virginia Board of Registration for Professional Engineers (WVPEBD). To qualify for licensure from the WVPEBD, candidates must hold a bachelor degree from an ABET-accredited engineering program. Accordingly, electrical and computer engineering students will be strongly advised to complete WVBPE's FE exam in their senior year to facilitate progress toward qualification for their PE licenses.

1. Rationale for the New Degree Program

After a decade's-long absence, undergraduate engineering education was re-established on the Marshall University campus in the fall of 2006 when the Marshall University Board of Governors approved the Bachelor of Science in General Engineering (BSE) degree. The BSE degree is a general engineering that also allows students to pursue areas of emphasis in particular engineering fields of study. Based on student interest and regional needs, the first area of emphasis offered was civil engineering (CEE). During this time, the BSE program has continued to grow and develop and provide additional resources to its students. A mechanical engineering discipline was created during 2014-15 academic year. Based on market demands and the available resources, we believe it is the right time to expand engineering programs to include an electrical and computer engineering discipline. After careful and in-depth analysis, the faculty of the Weisberg Division of Engineering along with the Engineering Advisory Board believe creating a Bachelor of Science in Electrical and Computer Engineering (BSEE) is the appropriate approach to address current and future demands for engineers within the discipline. The proposed BSEE program will enable the students to choose one of two areas of emphasis: Electrical Engineering or Computer Engineering.

1.1 Program Need and Justification

1.1.1 Existing Programs in West Virginia:

Currently, there are two West Virginia state supported institutions (WVU &WVUIT) that offer an ABET-accredited degree program in Electrical and/or Computer Engineering or closely related fields. West Virginia lags behind surrounding states in the number of accredited electrical and computer engineering programs as illustrated in the table below. West Virginia could realistically justify adding at least one additional BSEE program and related fields and still remain barely at the average of the neighboring states which have, on average, 1.41 programs per million residents. It is also noteworthy to mention that many BSEE or closely related programs listed in the table below are larger than those in the State of West Virginia and can accommodate larger student populations. For Instance, Ohio has at least eight programs that are comparable in size of the BSEE program at WVU or larger.

Existing BSEE Programs in Surrounding States

State	BSEE Programs	Population	BSEE Programs/Million
Kentucky	6	4.34 million	1.38
Ohio	16	11.25 million	1.42
Pennsylvania	20	12.70 million	1.57
Virginia	13	8.01 million	1.62
West Virginia	2	1.89 million	1.05

West Virginia also lags behind comparable states in the number of degrees awarded in Engineering in general and Electrical Engineering and Computer in particular. The total number of undergraduate BSEE degrees awarded by all USA institutions in 2012-2013 was about 14,600 at an average of 48 per million capita (www.asee.org/college). However, West Virginia universities in 2013-2014 awarded only 79 degrees of which 31 in Computer Engineering (www.asee.org/college) at an average of 42 per million capita of West Virginians.

The same situation is true in enrollments in BSEE programs. In the 2012-13 academic year, there were about 91,000 students enrolled in BSEE programs nationwide (Engineering Enrollment 2012-13, www.asee.org/college). The total enrollment in state supported BSEE programs in West Virginia during the 2014 academic year was 298 students (Engineering Enrollment 2013-14, www.asee.org/college) at a rate of 157 per million capita—146 per million lower than the national average.

West Virginia University (WVU) and West Virginia Institute of Technology (WVIT) currently offer a Bachelor of Science in in electrical and computer engineering programs. These degrees can be obtained through their Morgantown and Montgomery campuses. They enrolled 298 students in Fall 2014. There are no other public or private institutions in the State of West Virginia offering a B.S. in Electrical and/ or Computer Engineering. The WVU as well as WVIT offer two separate degrees in in electrical engineering and computer engineering. In contrast, the proposed MU BSEE program would offer a single degree in Electrical and Computer Engineering with two areas of emphasis: Electrical Engineering (BSEE-Electrical Emphasis) and Computer Engineering (BSEE-Computer Emphasis).

1.1.2 National Needs:

The need to take actions for maintaining technological leadership of the United States is progressively becoming more urgent. Developing cutting-edge technology through cultivating innovation is critically important in the global competitive environment. Engineering education is one of the most important aspects of this innovation-cultivating process. Many states are now recognizing a shortage of engineers and are taking actions to address this urgent problem.

The U.S. Bureau of Labor projected a 10-13 percent increase in the national demand for electrical/computer engineering and closely related fields (software engineering, power, telecommunications, cyber security) between 2012 and 2022. The demand for engineers with expertise in the design and development of electrical and computer systems for power, renewable energy, cyber security and biomedical applications is projected to increase 21% nationally over the same period.

Several studies at the national, state, and local levels have delineated the overall needs for additional engineers and scientific personnel. For example, the National Academy of Engineering, the National Academy of Sciences and the Institute of Medicine produced a report (2007): "Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future." This report summarizes the huge demand for engineers and science (STEM) graduates in U.S. industries and universities. The report indicates that to address the deficit in engineering and scientific knowledge, the nation must import foreign nationals to close the gap between supply and demand. As financial opportunities in foreign countries increasingly develop via globalization, the U.S. is going to find itself with a deficit of talent that will negatively impact its ability to maintain its world leadership in science and engineering. The Gathering Storm report defines a "compelling call to action" to draw more underrepresented U.S. citizens into engineering and science.

Thomas Friedman in his highly acclaimed book "The World is Flat" highlights staggering statistics showing how far the U.S. trails the world in meeting its science and technology needs. Societal need for graduates of science and engineering has been a concern of policy makers and educators for many years and now this concern is exacerbated with advances in China and India. Foreign graduates are being sought for high-paying, knowledge-based jobs or the work is being outsourced because of a lack of qualified U.S. educated engineers. In his more recent publication, "Hot, Flat and Crowded," Mr. Friedman takes a look at the rapid changing of the world through climate change, population growth and globalization. In this 2008 book, he urges the U.S. to become a world leader in developing 'green' technologies needed for the coming era he calls the "Energy-Climate Era." Without becoming a leader in these technologies, he fears that the U.S. will be shunted aside by other nations. The need to take actions for maintaining the technological leadership of the United States is progressively becoming more urgent. Developing cutting-edge technology by cultivating innovation is critically important in this competitive environment.

Engineering education is one of the most important aspects of this innovation cultivating process. Many states are now recognizing a shortage of engineers and are taking actions to address this urgent problem. These conclusions have been reached through a deliberate process of studying the current state of engineering education in the state and country, future trends and needs of society, the role of the U.S. in the knowledge-based society and global economy for high-impacting jobs and markets, the need of the state for economic development and the role of MU as a public supported university in economic development.

The career prospects for new graduates in Electrical and Computer Engineering are excellent. According to the U.S. Department of Labor, the total number of electrical and computer engineers employed in the U.S. in 2004 was about 216,000 (13% of the total number of engineers.

1.1.3 State and Local Needs:

Electrical and Computer Engineering and related disciplines saw enrollment gains of 5 percent to 11 percent between 2013 and 2014 (www.asee.org). Within college populations sophomore and junior engineering classes showed the largest enrollment growth, each rising 11 percent over 2012.

Student interest in electrical and computer engineering at MU is remarkably high. In the past academic year (2014-15), about 200-220 prospective students made direct contact with the University about engineering programs, of which about 40-50 students showed strong interest in electrical and computer engineering. Furthermore, 21 of incoming freshmen of Fall-15 indicated a strong interest in electrical or computer engineering and they would choose it as a field of study should the program exist at MU. Without a local electrical/computer engineering option, some students have commented that they are reluctantly completing an engineering degree at MU.

1.2 Employment Opportunities:

The U.S. Department of Labor, Bureau of Statistics, reported that nationwide, the number of electrical and computer engineers and closely related jobs grew by 11 % between 2006 and 2014 (from 216,000 to 240,000); and it is expected to grow to about 290,000 in year 2022. The U.S.

Census Bureau (Field of Bachelor's Degree in the US: 2009; Issued February 2012) reported that there are 4.452 million engineers of 25 years and over in the USA; with 1.410 million in the age bracket of 25-39 and 2.252 million in the age bracket of 40-64. Therefore; the overall job opportunities in engineering are expected to be good because the number of engineering graduates should be in rough balance with the number of job openings between 2010 and 2020. In addition to openings from job growth, many openings will be created by the need to replace current engineers who retire or transfer to management, sales, or other occupations; or leave engineering for other reasons. Therefore, in the next 20-25 years US academic institutions are expected to graduate, on average, about 125,000 engineers per year to keep up with demands. The American Society of Engineering Education (ASEE), in its annual report (Engineering by the Number-2011; www. asee.org/colleges) reported that in 2010-2011, all US Institutions graduated only 83, 001 engineers of which 6.7% were nonresident aliens.

Employment of engineers is expected to grow about as fast as the average for all occupations over the next decade, but growth will vary by specialty. Electrical and computer engineers are projected to have about 20 percent employment growth over the projected decade, slower than the average for all occupations. But, some new job opportunities will be created due to emerging technologies in biotechnology, smart grid, power systems, cyber systems and security, and mobile technologies. Additional opportunities outside of electrical and computer engineering will exist because the skills acquired through earning a degree in electrical/computer engineering often can be applied in other engineering specialties.

Competitive pressures and advancing technology will force companies to improve and update product designs and to optimize their manufacturing processes. Employers will rely on engineers to increase productivity and expand output of goods and services. New technologies continue to improve the design process, enabling engineers to produce and analyze various product designs much more rapidly than in the past. Unlike some other occupations, however, technological advances are not expected to substantially limit employment opportunities in engineering because engineers will continue to develop new products and processes that increase productivity.

In West Virginia, as reported by many industrial leaders, a substantial percentage of all engineering jobs in the state are filled by graduates of out-of-state or foreign institutions. There are more than thirty large businesses in the Tri-State region that employ electrical or computer engineers. In recent years, many of these companies have had difficulty hiring qualified engineers and also had difficulty retaining them longer than five years. Local leaders assert that a substantial problem for them is the absence of a BSEE in this region of the State to support local industries.

1.3 Program Impact:

Clearly, the addition of the BSEE will make MU a more effective public university. The BSEE program will allow science and biomedical students interested in high-tech devices to apply advanced software, control, computer, and transport techniques to biotechnology and/or bioengineering problems.

In terms of program features, the proposed BSEE program will differ significantly from WVU's and WVIT's programs in that there will be much more emphasis on the core liberal arts component and learning communities approach, more cross-integration of subject materials in the engineering courses for a systems approach. The program will, also, contain unique features that differentiate it from most traditional electrical or computer engineering offerings in West Virginia and surrounding universities. The students in MU's BSEE program will take MU's core curriculum through which they learn interpersonal skills, team efforts, and many other skills that are of value as a practicing professional. A strong emphasis on a systems approach to problem solving will be incorporated in all the engineering curricula resulting in multidisciplinary activities especially at the senior level. Accordingly, MU's BSEE students will be trained to work professionally and ethically, as individuals and in multi-disciplinary teams, in both the electrical and computer engineering areas, including the design, and control of such systems. Moreover, they will develop a deep understanding of the impact of engineering solutions from a global, financial, environmental, societal, political, ethical, health and safety, and sustainability perspective. The curriculum will include courses directly related to MU-'s Tri-State location that will address issues related to mining, materials, manufacturing, bio-technology and fuels, etc. Moreover, the program will incorporate an optional five-year schedule involving a cooperative educational experience whereby the students in the latter part of their studies have periodic full-time work experiences in their area of interest with participating industries and businesses. Alternatively, a student may choose a fast-track approach and finish in four years (A Co-Op Plan is attached in Appendix B).

In sum, the proposed BSEE program specifically targets the unique requirements of the 300,000-400,000 residents. The demand for high-tech workers in the State is unlikely to diminish in the foreseeable future. West Virginia, like other states in the country, must increase the number of graduates to meet the demand for high-tech workers during the next decade and beyond. U.S. and West Virginia universities need to produce more graduates because international competition for high-tech workers has increased sharply in recent years. West Virginia industries need to be insulated from the future uncertainty of international politics by having access to a guaranteed supply of new BSEE graduates. Many developed and developing countries, with their own rapidly growing high-tech industries, are becoming very competitive for the same pool of high-tech workers. Therefore, unless new degree programs are offered in high-tech areas in the regions of the country where there is a demand for such programs, the supply of skilled workers will continue to be less than adequate for the rapidly growing regional and statewide high-tech industry. In addition, in order to draw more students, especially underrepresented students, the engineering programs must be established in the vicinity of the families of the targeted students.

1.4 Program Projections

1.4.1 Five-Year Enrollment Projections

The estimates for student enrollment are conservative and based upon the number of student inquiries and interest shown in the proposed degree. The estimates also assume that all students will be full-time and incorporates a dropout rate of approximately 20-25%. The 20-25% average

drop rate is based on MU's experience with the BSE program and on data from similar institutions (WVU, WVIT, Ohio University and UK) with electrical and computer engineering programs. Some of the current BSE, BSME, or BSCS students will undoubtedly transfer to BSEE and these will tend to stay since they have achieved a level of success in their programs and will be better prepared for the BSEE than students who are new to the program. It is conceivable that once the BSEE program is approved and ABET accredited, the newly founded INTO program on the MU may recruit foreign students interested in the BSEE degree, but these figures are not included in the table below.

This new degree is projected to have around 100 majors in its fifth year. MU has a very strong commitment to recruiting students from underrepresented groups. The engineering program will actively recruit students from the underrepresented groups and International students to advance this mission. The Program is expected to graduate 8 students in 2019-2020 and 12 students in 2020-21.

Student Enrollment Projections

	Change of Major	New Students	Attrition	Graduation	Cumulative Head Count
1st year 2016	10	20	0	0	30
2nd Year 2017	5	25	6	0	54
3rd Year 2018	0	30	10	0	74
4th Year 2019	0	30	12	0	92
5th Year 2020	0	30	13	8 (2019)	102

Five-Year Projection of Program Size

	First Year 2016	Second Year 2017	Third Year 2018	Fourth Year 2019	Fifth Year 2020
Number of Students Served through Course Offerings of the Program:					
Headcount	30	54	74	92	102
FTE	2.2	14.2	33.0	50.3	51.0
Number of student Credit hours generated by	66	426	992	1508	1531

Courses within the program (entire academic year):					
Number of Majors:					
Headcount	30	54	74	92	102
FTE majors	33	60.2	81.4	101.2	112.2
Number of student Credit hours generated by majors in the program (entire academic year):	990	1806	2442	3036	3366
Number of degrees To be granted (annual total):	0	0	0	8	15

1.5 Expenses and Revenue Projection

All operational support will come from student tuitions and program specific fees.

FORM 2 and a spread-sheet (Appendix D) show the operating resources requirements as well as the sources of operating resources, including personnel expenses, and nonrecurring expenses (such as program start-up/ development expenses), annual operating expenses. It also, shows the total and net annual revenues and the cumulative return.

Five-Year Projection of Total Operating Resources

	First Year 2016	Second Year 2017	Third Year 2018	Fourth Year 2019	Fifth Year 2020
A. FTE POSITIONS					
1. Administrators	0.25	0.25	0.25	0.25	0.25
2. Full-time Faculty	0	3	5.0	5.0	5.0
3. Adjunct Faculty	0	0	0	0	0
4. Graduate Assistants	0	0	0	0	0
5. Other Personnel:					
a. Clerical Workers	0.0	0.0	0.0	0.0	00
b. Professionals	0.0	1.0	1.0	1.0	1.0
B. OPERATING COSTS (Appropriated Funds Only)					
1. Personal Services:					
a. Administrators	$ 38,100	$ 39,243	$ 40,420	$ 41,633	$42,882
b. Full-time Faculty	$0.0	$372,818	$ 466,181	$480,166	$494,571
c. Adjunct Faculty	$8,000	$0.0	$0.0	$0.0	$0.0

d. Graduate Assistants	$0.0	$0.0	$0.0	$0.0	$0.0
e. Non-Academic Personnel:					
Clerical Workers	$0.0	$0.0	$0.0	$0.0	$0.0
Professionals	$0.0	$64,751	$66,693	$68,694	$70,755
Total Salaries	$46,100	$476,812	$573,294	$590,493	$608,208
2. Current Expenses (Recurring)	$20,000	$20,000	$11,000	$9,000	$9,500
3. Repairs and Alterations	$0.0	$0.0	$0.0	$0.0	$0.0
4. Equipment:					
Educational Equip.	$105,000	$280,000	$260,000	$0.0	$0.0
Library Books	$15,000	$25,000	$25,000	$30,000	$30,000
5. Nonrecurring Expenses : See the attached spreadsheet	$28,000	$76,100	$110,736	$81,785	$50,542
Total Costs	$214,100	$857,912	$980,030	$711,278	$698,250
C. Sources					
1. General Fund Appropriations	$239,451	$452,131	$646,934	$844,181	$967,993
D. Net Revenue	$25,351	($405,781)	($333,096)	$132,903	$269,743

2. Additional Resources Requirement

2.1 Program Administration

The BSEE program will be housed in the Weisberg Division of Engineering- College of Information Technology and Engineering. The Chairman of the Weisberg Division of Engineering will supervise and manage the program. No changes in the administration of the Division is projected.

2.2 Faculty and Instructional Requirements

The MU Faculty of Engineering and Computer Science are uniquely prepared to develop an Electrical and Computer Engineering Program that meets the expectations of the NAE report. Engineering graduates in the 21st Century must be technically competent and dedicated to the improvement of humankind. The proposed BSEE Engineering Program will be organized to educate engineers for careers devoted to the integration of discoveries from multiple fields and take advantage of multiple disciplines available in the University's liberal arts environment. MU already has all necessary academic units and complementary programs in general engineering to support this proposed Program. Weisberg Engineering faculty and academic resources will

support needs for the new Program; however, five new faculty, five electrical engineering related labs, about thirty new courses in the targeted electrical and computer engineering areas and one support staff will be needed.

As it was mentioned earlier electrical and computer engineering are wide engineering disciplines that require faculty with different expertise and knowledge. Therefore, a strong BSEE program should have the support of faculty with following areas of expertise: Controls (or closely related), Power and Power Electronics, Electronics, Communications, Computer Architecture and Hardware. In addition, the BSEE program will require a technician to manage the electrical engineering labs and to provide support for faculty and students.

The listed tables to provide information about <u>Core</u>. An asterisk (*) indicates the individual who will have direct administrative responsibilities for the program.

B.S. of Electrical and Computer Engineering Faculty

Name of <u>Core</u> Faculty and Faculty Rank	Highest Degree	% of time assigned to the Program
Salem, Asad * [Primary responsibility for administering the program]	PhD in Mechanical Engineering	25
New Faculty (1) in Year 2017-18	PhD in Electrical Engineering	75
New Faculty (2) in Year 2017-18	PhD in Electrical/ Computer Engineering	75
New Faculty (3) in Year 2017-18	PhD in Electrical Engineering	75
New Faculty (4) in Year 2018-19	PhD in Electrical Engineering	75
New Faculty (5) in Year 2018-19	PhD in Electrical/Computer Engineering	75

2.2.1 Faculty Course Load Mapping

The following table shows a typical faculty course load when the program is fully staffed and implanted.

From the above listed table, it is noticed that during a typical academic year the teaching load for a designated BSEE faculty is 7-8 Credit Hours in fall and 6-7 Credit Hours in spring of undergraduate related courses.

Course Offerings by Semester

	Fall	Faculty	SCH	Spring	Faculty	SCH
2019-20	ENGR 201	Faculty I	4	ENGR 202	Faculty I	4
	ENGR 204	Faculty II	4	EEC 330	Faculty I	3
	EEC 210	Faculty II	3	EEC340	Faculty II	4
	EEC 310	Faculty III	3	EEC 370	Faculty III	3
	EEC 320	Faculty III	3	EEC 380	Faculty V	3
	EEC 350	Faculty IV	3	EEC 420	Faculty IV	3
	EEC 360	Faculty I	3	EEC Elective IV	Any	3
	EEC 410	Faculty IV	3	EEC Elective V	Any	3
	EEC 412	Faculty V	3			
	EEC Elective I	Any	3			
	EEC Elective II	Any	3			
	EEC Elective II	Any	3			

2.3 Library Resources and Instructional Materials

MU libraries have many of the resources necessary to support a new program in Electrical and Computer Engineering. Monographic, journal and database holdings enable the libraries to provide initial support for the program. Most of the resources available are not discipline specific but are available through multidisciplinary databases and may provide the depth of breadth of material required to support such a degree. Keeping in mind, MU libraries are currently supporting the BSE and the MSE, BSCS, MSCS, BSIS, MSIS, BSME and MSME programs. However, some improvements in the collections will be required to ensure that they can adequately support the Electrical and Computer Engineering program consistently over the long-term.

The College of Information Technology and Engineering (CITE) will require at least one additional full-text database, IEEE, to support existing BSCS, MSCS, MSIS and future programs in Electrical and Computer Engineering. This shared resource will cost approximately $20,000 for the first year, with estimated increase in costs of 10-20% per year annually (based on increases for comparable databases). Additional costs will be incurred for the purchase of electronic full-test reference resources, standards, technical manuals and guides, and monographs to support the program. Additional funding needed in the first year will be approximately $20,000 for these resources. Maintenance costs for these resources will be recurring annually and will be established at the time of contract negotiation and signing. However, it is projected that the

required additional resources will cost about $125,000 during the first five years (please refer to the spread sheet in Appendix D).

2.4 Support Services Requirements

The approach for building this Program proposal has been to leverage MU resources and complement engineering programs of other organizations to meet the State's needs for practicing engineers. The needed facilities (teaching labs, research labs, computer labs, classrooms, and offices) for the BSEE will require approximately 6,000 square feet. All needed space will be accommodated in the Weisberg Family Applied Engineering Complex (WAEC), the Weisberg Engineering Lab (WL), and Gullickson Hall (GH).

CITE has five related laboratories (Circuits, Controls, and Computers) that are associated with the existing engineering program. Most of these facilities can be utilized as associated electrical and computer engineering laboratories with the proper equipment complement. In addition to the five existing laboratories, a Capstone lab with moderate capabilities and five new laboratories are needed to provide specialized electrical and computer engineering teaching and research competences. The needed laboratories are: Power Systems, Electronics and Power Electronics, Communication, Digital and Embedded Systems, and Microprocessor Systems and Interfacing. The following equipment is needed in the next three years of the program for the basic teaching labs:

Needed Equipment

Equipment	Yr. 1	Yr. 2	Yr. 3	Cost
Power Systems (GH 05)	$45,000	$70,000	$50,000	$165,000
Communications (GH 205)		$75,000	$75,000	$150,000
Electronics and Power Electronics (WAEC 2218)	$30,000	$35,000	$10,000	$75,000
Digital and Embedded Systems (WL 101)	$30,000	$40,000	$55,000	$125,000
Microprocessor and Interfacing (WL)		$50,000	$50,000	$100,000
Capstone (WL)		$20,000	$20,000	$40,000
Total	$105,000	$290,000	$260,000	$655,000

The total projected, therefore, for the teaching labs for the basic electrical and computer engineering courses is $655,000. Budget projections include $10,000/year for normal supplies and materials for the first three years and $6000/year thereafter.

2.5 Facilities Requirements

Adequate resources exist for laboratory and support services. No new needs are anticipated. Space for classrooms is adequate. The proposed program will not require the addition of new space or facilities or the remodeling or renovation of existing space.

2.6 Cooperative Arrangement

The proposed BSEE program has a strong support of the local, State and Tri-State Industry. Many employers expressed current and future needs for the electrical or computer engineers, and are willing to provide Co-Op and employment opportunities for the program's future students and graduates.

3. Non-Duplication

The new BSEE degree program does not duplicate any existing undergraduate programs.

4. New Catalog Description

The Marshall University Bachelor of Science in Electrical and Computer Engineering (BSEE) program goals are as follows:

1. Practice the electrical and computer engineering discipline successfully within community accepted standards
2. Possess teamwork and communication skills to develop a successful career in electrical and computer engineering
3. Fulfill professional and ethical responsibilities in the practice of electrical and computer engineering, including social, environmental and economic considerations
4. Engage in professional service, such as participation in professional society and community service
5. Engage in life-long learning activities, such as graduate studies or professional workshops
6. Develop a professional career in the prevailing market that meets personal goals, objectives and desires

Admission Requirements:

- Meet Marshall University admission requirements
- Admission to the BSEE program requires a minimum composite ACT score of 21 with a math score of 24, or a minimum SAT composite of 980 with a math SAT of 560.
- Transfer students must have completed MTH 127/130 College Algebra and MTH 132 Pre-Calculus.

For those students not meeting the ACT/SAT score requirements above may enroll in Pre-Engineering. Requirements for Pre-Engineering are a minimum composite ACT score of 19 with a math score of 19-23, or a minimum SAT composite of 900 with a math SAT of 460-550. Students who are admitted to the Pre-Engineering program generally will require an additional calendar year to complete the requirements for the BSEE degree. Transfer students must be eligible to take MTH127/130 College Algebra and MTH132 Pre-Calculus.

Graduation Requirements

The BSEE degree program requires a minimum of 132 credit hours of coursework. In addition to fulfilling the University's requirements for graduation, BSEE students must maintain a minimum

GPA of 2.0 in all professional courses. These professional courses include mathematics (MTH 229 or above), required science courses, core engineering (ENGR) courses, electrical and computer engineering courses (EE), and courses used as technical electives. Entering students with a Math ACT of 24-26 are required to take MTH 132 Pre-Calculus. Such students will likely need an extra semester or summer term to satisfy BSEE requirements.

Curriculum
1. Core Curriculum
   A. Core I (9 CH)
      - FYS 100 – First Year Seminar or FYS 100H – First Year Seminar – Honors (3 CH)
      - Two Critical Thinking courses (CT) (6 CH)
   B. Core II (18 CH)
      - Composition: ENG 101 – English Composition I (3 CH) and ENG 201 – Advanced Composition (3 CH) (Completion of ENG 201H – English Composition Honors (3 CH) with a C or better also satisfies the University composition requirement)
        - Communication: CMM 103 – Fundamentals of Speech Communications or CMM 207 – Business and Professional Communication (3 CH)
        - Math: (requirement met in major)
        - Physical or Natural Science: (requirement met in major)
        - Social Science (3 CH)
        - Humanities (3 CH)
        - Fine Arts (3 CH)
   C. Additional University Requirements
      - Two Writing Intensive (W) courses (6 CH)
      - One Multicultural (M) or International (I) course (3 CH)
   D. Transfer Students
      - Freshmen transfer students must complete Core I at Marshall. Core II can be completed with Marshall or transfer courses.
      - Transfers with 26 or more credit hours must complete one CT course but are exempt from the remaining Core I requirements. Core II can be completed with Marshall or transfer courses.

2. Mathematics (19 CH)
      - MTH 229 – Calculus with Analytic Geometry I (5 CH)
      - MTH 230 – Calculus with Analytic Geometry II (4 CH)
      - MTH 231 – Calculus with Analytic Geometry III (4 CH)
      - MTH 335 – Differential Equations (3 CH)
      - MTH 220 –Discrete Structures (3 CH)

3. Science (13 CH)
      - CHM 211 – Principles of Chemistry I (3 CH)
      - PHY 211 – Principles of Physics (4 CH)
      - PHY 202 – General Physics Lab (1 CH)
      - PHY 213 – Principles of Physics (4 CH)

- PHY 204 – General Physics Lab (1 CH)

4. Engineering (28 CH)
   - ENGR 103 – Freshman Engineering Seminar (1 CH)
   - ENGR 104 – The Engineering Profession (1 CH)
   - ENGR 201 – Circuits I (4 CH)
   - ENGR 202 – Circuits II (4 CH)
   - ENGR 204 – Introduction to Digital Systems (4 CH)
   - ENGR 215 – Engineering Materials (3 CH)
   - ENGR 217 – Engineering Co-Op Preparation (1 CH)
   - ENGR 221 – Engineering Economy (3 CH)
   - ENGR 265 – Engineering Analysis (4 CH)
   - ENGR 451 – Introduction to Project Management (3 CH)

5. Computer Science (3 CH)
   - CS 110 – Computer Science I (3 CH)

6. Electrical & Computer Engineering (52 CH)
   - EE 210 Programming Lab (3 CH)
   - EE 310 Electromagnetic Fields (3 CH)
   - EE 320 Signals & Systems (3 CH)
   - EE 330 Random Signals & Systems (3 CH)
   - EE 340 Computer Architecture & Design (4 CH)
   - EE 350 Elec. Properties of Materials (3 CH)
   - EE 360 Linear System & Control Theory (3 CH)
   - EE 370 Electric Machinery and Power Systems (3 CH)
   - EE 380 Microprocessors (3 CH)
   - EE 410 Electrical Engineering Design (3 CH)
   - EE 412 Computer Engineering Design (3 CH)
   - EE 420 Capstone (3 CH)
     a. **Electrical Engineering Emphasis**
        - EE 370 Electric Machinery and Power Systems (3 CH)
        - EE 410 Electrical Engineering Design (3 CH)
     b. **Computer Engineering Emphasis**
        - EE 380 Microprocessors (3 CH)
        - EE 412 Computer Engineering Design (3 CH)

7. Capstone, Technical Electives, and Free Elective

   A. Capstone (3 CH)
      To be eligible to take the capstone design course (EE 420), students must have completed EE 410 or EE 412.

   B. Technical Electives (15 CH)

At least 5 technical elective courses related to the area of emphasis and must be taken. The courses must be approved by the student's advisor and the Division's Charmian. The following is a *suggested* list:

1. Electrical Engineering Emphasis
- EE 440 – Digital Control Systems (3 CH)
- EE 445 – Radio Frequency and Microwave Engineering (3 CH)
- EE 448 – Power Electronics (3 CH)
- ME 465- Mechatronics (3 CH)
- ME 475- Programmable Logic Controls (PLC) (3 CH)

2. Computer Engineering Emphasis
- EE 440 – Digital Control Systems (3 CH)
- EE 447 – Real-Time Digital Processing (3 CH)
- CS 412 - Embedded Systems (3 CH)
- CS 430 – Cybersecurity (3 CH)
- CS 440- Digital Image Processing (3 CH)

C. Free Elective (3 CH)

Co-operative Education

Students may elect to participate in the co-operative education program. Students in the program will have periodic full-time work experiences in their area of interest with participating companies. Information on the program can be obtained from the Division's Chairman or academic advisor.

5 New Course Proposals Submitted

The following course have been by the University Curriculum Committee.
- ENGR 265 – Engineering Analysis (4 CH)
- EE 210 Programming Lab (3 CH)
- EE 310 Electromagnetic Fields (3 CH)
- EE 320 Signals & Systems (3 CH)
- EE 330 Random Signals & Systems (3 CH)
- EE 340 Computer Architecture & Design (4 CH)
- EE 350 Elec. Properties of Materials (3 CH)
- EE 360 Linear System & Control Theory (3 CH)
- EE 370 Electric Machinery and Power Systems (3 CH)
- EE 380 Microprocessors (3 CH)
- EE 410 Electrical Engineering Design (3 CH)
- EE 412 Computer Engineering Design (3 CH)
- EE 420 Capstone (3 CH)
- EE 440 – Digital Control Systems (3 CH)
- EE 445 – Radio Frequency and Microwave Engineering (3 CH)
- EE 447 – Real-Time Digital Processing (3 CH)
- EE 448 – Power Electronics (3 CH)

Appendix A
Bachelor of Science –Electrical & Computer Engineering (BSEE)

Pattern Sheet

Semester 1	SCH	Semester 2	SCH
MTH 229 Calculus I (CT)	5	MTH 230 Calculus II	4
ENG 101 English Composition I	3	Core II Social Science (CT,W/I,W)	3
FYS 100 First Year Seminar	3	PHY 211 Physics I	4
Core II Communications (W/I)	3	CS 110: Computer Science I	3
ENGR 103 Freshman Seminar	1	CHM 211 Chemistry I	3
ENGR 104 Engineer. Profession	1		
	16		17
Semester 3		Semester 4	
MTH 231 Calculus III	4	ENGR 202: Circuits II	4
EE 210 Programming Lab	3	MTH 220 Discrete Structures	3
ENGR 201 Circuits I	4	MTH 335 Diff. Equations	3
PHY 213 Physics II	4	ENGR 217 Co-Op	1
PHY 204 Physics II lab	1	ENGR 265 Engineering Analysis	4
		ENGR 215 Engr. Materials	3
	16		18
Semester 5		Semester 6	
EE310 Electromagnetic Fields	3	ENG 201 English Composition II	3
EE320 Signals & Systems	3	EE 330 Random Signals & Systems	3
EE 360 Linear Systems & Control Theory	3	EE 370 Electric Machinery and Power systems^ Or EE 380 Microprocessors**	3
ENGR 204 Introduction to Digital Systems	4	ENGR 221 Engr. Econ	3
EE 350 Elec. Properties of Materials	3	EE 340 Computer Architecture & Design	4
	16		16

Semester 7		Semester 8	
EE 410 Electrical Engineering Design^ or EE 412 Computer Engineering Design**	3	EE 420 Capstone	3
ENGR 451 Project Management (W/I)	3	EEC Elective ***	3
EE Elective ***	3	EEC Elective***	3
EE Elective***	3	Free Elective	3
EE Elective***	3	Core II, Fine Arts	3
Core II, Humanities	3		
	18		15
		Total Credits:	132

** Computer Engineering Area of Emphasis
^ Electrical Engineering Area of Emphasis
*** To support the Areas of Emphasis

Appendix B

Weisberg Division of Engineering
Bachelor of Science – Electrical & Computer Engineering (BSEE)

Cooperative Education Program
Student Schedule Layout
OPTION I

	Fall	Spring	Summer
Freshman Year	Classes	Classes	
Sophomore Year	Classes	Classes	
Junior Year	Classes Apply to CO-OP	CO-OP	CO-OP
Senior Year 1	Classes	Classes	CO-OP
Senior Year 2	CO-OP	Classes	

FRESHMAN YEAR & SOPHOMORE YEAR

Students spend their freshman and sophomore years in classes trying to earn the highest GPA as possible. In the summer between freshman and sophomore and the summer between sophomore and junior year, students are encouraged to pursue internships, participate in research, or take summer courses to get ahead or improve GPAs. These years should be dedicated to building strong resumes for the Co-Op program.

JUNIOR YEAR

FALL: Students apply to the CO-OP program, attend an orientation meeting, attend all professional preparation meetings, and interview with companies looking for students.

SPRING and SUMMER: Students gain full-time engineering experience at a company while receiving pay.

SENIOR YEAR 1

FALL: Students continue their education and complete more classes.

SPRING: Students continue to take classes, but again go through the interview process for a second CO-OP position. This position could be with the same company the student first CO-OPed with, but does not need to be. Many students prefer to explore multiple kinds of companies.

SENIOR YEAR 2

FALL: Students continue their second CO-OP experience.

SPRING: Students complete their final semester of classes in order to graduate. CO-OP students report ease in finding full-time positions in a competitive market due to their professional experience.

OPTION II

	Fall	Spring	Summer
Freshman Year	Classes	Classes	
Sophomore Year	Classes	Classes Apply to CO-OP	CO-OP
Junior Year	CO-OP	Classes	CO-OP (Optional)
Senior Year 1	Classes	CO-OP	CO-OP
Senior Year 2	Classes	Classes	

FRESHMAN YEAR & SOPHOMORE YEAR

Students spend their freshman and sophomore years in classes trying to earn the highest GPA as possible. In the summer between freshman and sophomore years, students are encouraged to pursue internships, participate in research, or take summer courses to get ahead or improve GPAs. These years should be dedicated to building strong resumes for the CO-OP program.

SOPHOMORE

SPRING: Students apply to the CO-OP program, attend an orientation meeting, attend all professional preparation meetings, and interview with companies looking for students.

SUMMER: After accepting a CO-OP position in the spring, students spend the summer gaining full- time, paid, engineering experience at a company.

JUNIOR YEAR

FALL: Students continue to gain full-time, paid, engineering experience at a company.

SPRING: Students resume taking and completing coursework.

SUMMER: Some students will be given the opportunity by their companies to complete a summer CO-OP. While only the length of a typical internship, summer CO-OP students are typically still provided the same level of work as a CO-OP because they do not need to be retrained by the company. This extra summer CO-OP is not required for the program.

SENIOR YEAR 1

FALL: Students resume taking classes, but again go through the interview process for a second CO-OP position. This position could be with the same company the student first CO-OPed with, but does not need to be. Many students prefer to explore multiple kinds of companies.

SPRING: After accepting a CO-OP in the fall, students gain full-time, paid, engineering experience at a company.

SENIOR YEAR 2

FALL: Students resume taking classes.

SPRING: Students complete their final semester of classes in order to graduate. CO-OP students report ease in finding full-time positions in a competitive market due to their professional experience.

GENERAL CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

All programs seeking accreditation from the Engineering Accreditation Commission of ABET must demonstrate that they satisfy all of the following General Criteria for Baccalaureate Level Programs

General Criterion 2. Program Educational Objectives

The program must have published program educational objectives that are consistent with the mission of the institution, the needs of the program's various constituencies, and these criteria. There must be a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and these criteria

General Criterion 3. Student Outcomes

The program must have documented student outcomes that prepare graduates to attain the program educational objectives.

Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

(a) an ability to apply knowledge of mathematics, science, and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multidisciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Appendix D

Attached Spreadsheet
FIVE-YEAR COST and FUNDING

BSEEC PROGRAM BUDGET PRO FORMA

FISCAL YEAR EXPENSES

	Base Salary (Year 1)	Benefits 27%	Year of Hire	Year of From	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
		Annual Salary Increase:	3%												
Admn:Faculty Position 0 - Chair-1/4 time Existing	$30,000	$8,100	-	99		$38,100	$39,243	40,420	41,633	42,882	44,168	45,493	46,858	48,264	49,712
Faculty Position 1- Asst. Professor (3/4 time)	$75,000	$20,250	2	99	-	-	98,106	101,051	104,082	107,205	110,421	113,733	117,145	120,660	124,280
Faculty Position 2 -Asst. Professor (3/4) time	$67,500	$18,225	2	99	-	-	88,297	90,946	93,674	96,484	99,379	102,360	105,431	108,594	111,852
Faculty Position 3 -Asst. Prof 3/4 time	$67,500	$18,225	2	7	-	-	88,297	90,946	93,674	96,484	99,379	112,596	115,974	119,453	123,037
Faculty Position 4 Asst. prof (3/4) time	$68,000	$18,360	3	8	-	-	-	91,619	94,368	97,199	100,115	103,118	116,833	120,338	123,948
Faculty Position5 - Asst Prof 3/4 time	$68,000	$18,360	3	8	-	-	-	91,619	94,368	97,199	100,115	103,118	116,833	120,338	123,948
Faculty Position - Assoc. Prof Exist 1/4 time(ME)	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-
Equivalent Faculty Position - (BSE) 1/4 time	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-
Faculty Position 0 - Asst Prof	-	-		8	-	-	-	-	-	-	-	-	-	-	-
Faculty Position 0- Asst Prof	-	-		9	-	-	-	-	-	-	-	-	-	-	-
Classified Employee 1	$45,000	$12,150	2		-	-	64,751	66,693	68,694	70,755	72,878	75,064	77,316	79,636	82,025
Classified Employee 0	-				-	-	-	-	-	-	-	-	-	-	-
Classified Employee 0	-	-			-	-	-	-	-	-	-	-	-	-	-
PERSONNEL TOTAL						38,100	129,495	171,291	500,492	601,308	626,454	656,414	696,201	717,382	738,801

Section Notes: Update positions, salaries, year of hire and year of promotion. Annual costs will automatically calculate. Set salary of position to zero if not needed.

PROGRAM START-UP/DEVELOPMENT															
New Program Application	$			-	-										
Annual Accreditation Fees						-	-	1,500	1,575	1,654	1,736	1,823	1,914	2,010	2,111
Accreditation Comprehensive Visit						-	-	-	12,000	8,000				15,000	-
Annual Sustaining Fees						-	-	-	-	1,654	1,736	1,821	1,914	2,010	2,110
New Program Consultation Expenses	$			-	-										
Travel and Profession Conferences						5,000	7,500	10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299
Staff Development	$		500			1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Recruiting Expenses						12,000	12,000	12,000	15,000	15,000	18,000	18,540	19,096	19,669	20,259
Professional fees				-		10,000	10,600	11,236	11,910	12,625	13,382	14,185	15,036	15,938	16,895
Faculty Start-Up Allowances/Relocation						-	45,000	75,000	30,000	-	-	-	-	-	-
PROGRAM START-UP/DEVELOPMENT	$		500			28,000	76,100	118,736	81,785	50,542	46,782	48,627	50,554	67,868	54,674

Section Notes: Itemized lines are examples. Update lines and annual amounts as necessary.

ANNUAL OPERATING EXPENSES															
Office Supplies						5,000	6,000	6,000	6,000	6,500	7,000	7,000	23,000	24,000	25,000
Faculty Recruitment						15,000	15,000	5,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Adjunct & Part-Time Faculty Positions						8,000	-	-	-	-	8,000	8,000	8,000	10,000	10,000
Equipment Maintenance						-	-	-	-	-	5,000	5,000	25,000	25,000	25,000
Equipment Replacement Fund (Increase in Year 5)						105,000	280,000	260,000	10,000	12,000	15,000	17,000	17,000	18,000	20,000
Library Resources						15,000	25,000	25,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Contingency						15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Employee-based expenses															
Number of Employees						-	2	4	6	6	6	6	6	6	6
Desk Cost (Phone/Network, Internet, Software,Computer Replacement)	900					2,700	5,400	6,500	7,200	7,200	8,000	8,400	8,500	8,500	9,000
ANNUAL OPERATING EXPENSES TOTAL					-	163,000	341,000	311,000	64,000	66,500	83,000	85,000	121,000	125,000	126,000

Section Notes: Itemized lines are examples. Update lines and annual amounts as necessary. Employee count is automatic for any employee line with a salary.

PROGRAM OPERATING EXPENSE TOTAL	$		500			191,000	417,100	421,736	145,785	117,042	129,782	133,627	171,554	192,568	182,674
TOTAL EXPENDITURE ESTIMATES	$		500			229,100	785,795	995,030	736,278	725,250	756,236	789,111	867,945	909,851	921,475

REVENUE ESTIMATES

Total students - Resident					-	24	43	59	73	82	95	105	105	105	105
Total students - Nonresident					-	6	11	15	19	20	25	28	28	28	28
Total E&G Fees Resident	$		$		132,829	249,845	360,609	467,706	551,637	671,046	778,767	817,705	858,590	901,520
Total E&G Fees Nonresident	$		$		82,621	359,046	227,725	302,874	334,756	439,367	516,696	542,531	560,657	598,140
Total Program/College Fees Resident	$		$		19,200	34,400	47,200	58,400	65,600	76,000	84,000	84,000	84,000	84,000
Total Program/College Fees Nonresident	$		$		4,800	8,800	12,000	15,200	16,000	20,000	22,400	22,400	22,400	22,400

Section Notes: Amounts above are all driven by formulas. Adjust fee and students counts below to set expected/goal amounts.

TOTAL REVENUE ESTIMATES	$219,451	$452,331	$646,934	$844,181	$967,993	$1,206,413	$1,401,862	$1,466,636	$1,534,647	$1,606,060
ANNUAL NET REVENUE	$10,351	($343,664)	($348,097)	$107,902	$242,743	$450,177	$612,752	$598,691	$624,797	$684,585
CUMULATIVE RETURN	$10,351	($333,313)	($691,761)	($240,195)	$350,645	$692,920	$1,062,929	$1,211,441	$1,223,488	$1,309,382

			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
Program Fee -Res			800	800	800	800	800	800	800	800	800	800
Program Fee - Nonres			800	800	800	800	800	800	800	800	800	800
Fee Incr Res (E&G)				5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Fee Incr Nonres (E&G)				5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
E&G Res	1st year	$	5,535	5,811	6,102	6,407	6,727	7,064	7,417	7,788	8,177	8,586
E&G Nonres	1st year	$	13,770	14,459	15,182	15,941	16,738	17,575	18,453	19,376	20,345	21,362
Total Res Students	1st year		24	24	24	24	24	31	35	35	35	35
Total Nonres Students	1st year		6	6	6	6	6	7	7	7	7	7
Total Res Students	2nd year			21	19	18	21	19	26	26	26	26
Total Nonres Students	2nd year			4	5	5	6	6	5	5	5	5
Total Res Students	3rd year			-	17	16	19	18	19	19	19	19
Total Nonres Students	3rd year				5	4	4	5	7	7	7	7
Total Res Students	4th year			-	-	14	18	17	18	18	18	18
Total Nonres Students	4th year				-	4	4	4	6	6	6	6
Retention - Resident Yr 1 to Yr 2				75%	75%	75%	75%	75%	75%	75%	75%	75%
Retention - Nonresident Yr 1 to Yr 2				65%	65%	65%	65%	65%	65%	65%	65%	65%
Retention - Resident Yr 2 to Yr 3				80%	80%	80%	80%	80%	80%	80%	80%	80%
Retention - Nonresident Yr 2 to Yr 3				80%	80%	80%	80%	80%	80%	80%	80%	80%
Retention - Resident Yr 3 to Yr 4				90%	90%	90%	90%	90%	90%	90%	90%	90%
Retention - Nonresident Yr 3 to Yr 4				90%	90%	90%	90%	90%	90%	90%	90%	90%