PROPOSAL FOR

____NEW INSTRUCTIONAL PROGRAM
_X_ SUBSTANTIAL EXPANSION/MAJOR MODIFICATION *(This includes a change to
the name of a program and a new pathway within an existing program.)*
____COOPERATIVE DEGREE PROGRAM
____WITHIN EXISTING RESOURCES or ____ REQUIRING NEW RESOURCES

*(For each proposed program, attach a separate cover page. For example, two cover pages would
accompany a proposal for a degree program and a certificate program.)*

College of Southern Maryland
Institution Submitting Proposal

Fall 2016
Projected Implementation Date

AAS	Engineering Technology
Award to be Offered	Title of Proposed Program

See Program Exploration Form and Copy	See Program Exploration Form and Copy
Suggested HEGIS Code	Suggested CIP Code

Business and Technology	Bernice Brezina
Department of Proposed Program	Name of Department Head

Bernice Brezina	berniceb@csmd.edu	301-934-7556
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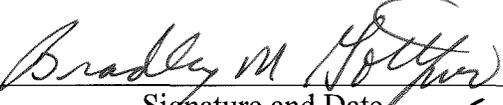
_____ President/Chief Executive Approval
Signature and Date 6-24-16

1-21-16
Date

Date Endorsed/Approved by Governing
Board

Academic Program Proposals

Include in the proposal every lettered and numbered section listed below. Use the same letters and headings as shown. Please number your pages.

A. Centrality to institutional mission statement and planning priorities:

1. Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.

> The mission statement of the College of Southern Maryland (CSM) inspires the development of close partnerships among the college and its tri-county community stakeholders. The institutional commitment to "meet the diverse needs of students and the community" through "accessible, accredited, affordable, and quality learning opportunities for ... career enhancement, and personal growth" aligns with the programmatic realities for the redesigned Engineering Technology AAS degree program.
>
> The following is a description of the proposed changes:
>
> This degree modification will incorporate three areas of concentration within this degree: Electronics, Robotics, and Drafting. The manufacturing program is currently not planned to be incorporated into this degree because enrollment in manufacturing programs has been very low over the past 5 years.
>
> Careful consideration was made to design the first semester to be common for all three areas of concentration. This provides students with the same preparation for study while also providing them with the opportunity to explore the fields of engineering technology before committing to an area of concentration. Further, the sequencing of the courses was determined so that students will be best prepared with a firm foundation in mathematics, and the fundamental DC and AC electronics courses to prepare for the rigor of the program.
>
> Along with the degree modification, the certificate and LOR programs will be modified so that students may progress into the degree program without taking any additional classes.
>
> Several new courses are proposed to be added, including two new Mathematics for Technologies courses (MTH-1011 & MTH-1012), separate DC and AC Electronics courses (ELT-1010 & ELT-1020), a soldering course (ELT-1025), a new Building Information Modeling drafting course (DFT-2150), and an Engineering Technology Capstone course (EGT-2950). Additionally, other courses that are no longer relevant to the program are being removed. DFT 1325 is a new course with a name and prerequisite change, and it is equivalent to DFT 1320.

2. Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.

> The Engineering Technology AAS program is consistent with CSM's Strategic Goal #2 which is to promote student success by providing outstanding education and related support services that

help students achieve their goals. The new program will serve to increase graduate satisfaction with job preparation.

This program redesign will "effectively serve a changing student population and emerging workforce." The new areas of concentration in Electronics, Drafting, and Robotics reflect the changing local workforce needs.

The recommendations enclosed are reflections of these elements and are consistent with the College's Vision, "To transform lives through lifelong learning and service."

A new full-time Engineering/Robotics faculty member and program coordinator was recently hired to teach the technical courses, manage the robotics lab, and promote the growth of the program. Additionally, several new Electronics and Drafting adjunct instructors were hired to assist with the course development of the new and redesigned courses in the program.

B. Adequacy of curriculum design and delivery to related learning outcomes:

1. Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements.

The program description and requirements are as follows:

This degree program prepares students who are currently employed in the engineering technology field as well as those without prior work experience to develop the skills and knowledge required of technicians in a variety of engineering settings.

The first semester is the same for all students in this program. The first semester is designed to provide all students with a firm foundation for the study of engineering technology. After the first semester, students select an area of concentration from one of the following fields: Electronics, Robotics, or Drafting.

Students in Electronics will develop fundamental competencies that are important in the design, development, installation, testing, and troubleshooting of electronics equipment including communications equipment, computer components, medical devices, aircraft systems, and many other applications.

Students in Robotics will learn the basic principles of robotics, including drives, actuators, sensors, control systems, human-machine interface, programming, and autonomy. CAD skills are also emphasized.

Students in Drafting will learn how to use a variety of software tools to develop complete drawing packages for engineering or architectural designs.

Students will be taking courses in this program through several course delivery formats. Because it is important for students to obtain hands-on experience in engineering technology

applications, some courses are only offered in a face-to-face lab environment. For many courses though, students may choose between face-to-face or online course sections. Additionally, there are a few courses that are only offered online.

The mathematics requirement in this program is important to note. In order to successfully complete the technical coursework, it is essential that students obtain a strong background in mathematics for their area of study. The Mathematics for Technologies courses (I and II) are designed to provide students with a weak background in mathematics with the competencies to be successful in this program.

Additionally, oral and written communication skills are emphasized throughout this program. Students will have multiple learning opportunities to improve soft skills by completing activities such as developing a resume or portfolio, preparing for a job interview, and delivering a project presentation.

The maximum number of credits accepted in transfer from other institutions to this program is 45.

The list of courses with title, semester credit hours, and category is shown in Appendix A, Table 1.

The recommended program sequence is as follows:

First Semester
EGT-1015 – Exploring Engineering Technology (3)
ELT-1010 – DC Electronics (3) * [NEW COURSE]
ENG-1010 – Composition and Rhetoric (3) *
ITS-1015 - The Information Age: Emerging Technologies (3) *
MTH-1011 – Mathematics for Technologies I (4) * [NEW COURSE]

Second Semester
MTH-1012 - Mathematics for Technologies II (3)* [NEW COURSE]
PHY-1010 - Fundamentals of Physics I (3) * and
PHY-1010L - Fundamentals of Physics I - Lab (1) *

    Area of Concentration:
    Please take all courses listed under your particular area of concentration.

    Drafting: DFT-1200 - Engineering Graphics (3)
                    DFT-1325 – Introduction to Computer-Aided Drafting I (3) * [NEW COURSE]
                    ENG-2050 – Business and Technical Writing (3) *

    Electronics: ELT-1020 – AC Electronics (3) [NEW COURSE] *
                    ITS-1110 – Program Design and Development (3) *
                    MCT-1010 - Introduction to Mechatronics (3) * [PREREQUISITE CHANGE]

    Robotics: DFT-1200 - Engineering Graphics (3)

ITS-1110 – Program Design and Development (3) *
MCT-1010 - Introduction to Mechatronics (3) * [PREREQUISITE CHANGE]

Third Semester

Area of Concentration:
Please take all courses listed under your particular area of concentration.

Drafting   DFT-1370 – 3D CAD with SolidWorks I (3) *
MFT-1010 - Manufacturing Technology I (3)

Drafting Elective (3 credits):
Acceptable:
DFT-2150 – Building Information Modeling with Autodesk Revit (3) * [NEW COURSE]
MFT-1120 CAD/CAM: Drawing Designs in Manufacturing (3)

Social/Behavioral Science (3):
Acceptable:
See Gen Ed Listing

Technical Elective (3):
Acceptable:
CNT-1030 - Construction Project Management (3)
EGT-2910 - Cooperative Education I: Engineering Technology (3) *
ITS-2300 - Introduction to Project Management (3) *
MCT-1010 - Introduction to Mechatronics (3) *
MTH-2300 - Introduction to Statistics (3) *

Electronics: ELT-1025 – Soldering Basics (1) [NEW COURSE]
ELT-1030 – Semiconductors (3) *
ELT-2022 - Computer Logic and Programmable Logic Controllers (4) *
ENG-2050 – Business and Technical Writing (3) *
MCT-1020 – Principles of Robotics (3) * [PREREQUISITE CHANGE]

Robotics: DFT-1370 – 3D CAD with SolidWorks I (3) *
ELT-2022 - Computer Logic and Programmable Logic Controllers (4) *
ENG-2050 – Business and Technical Writing (3) *
MCT-1020 – Principles of Robotics (3) * [PREREQUISITE CHANGE]

Fourth Semester

Communications (3 Credits)
Acceptable: See Gen Ed Listing

Area of Concentration:

Please take all courses listed under your particular area of concentration.

Drafting: CNT-2020 – Construction Surveying (3) *
                DFT-1380 – 3D CAD with SolidWorks II (3) *
                EGT-2950 – Engineering Technology Capstone (4) * [NEW COURSE]

Electronics: ELT-2017 - Operational Amplifiers and Introduction to Communications (4) *
                ITS-2750 – Computer Architecture (4) *

                Social/Behavioral Science (3)
                Acceptable: See Gen Ed Listing

Robotics: DFT-1380 – 3D CAD with SolidWorks II (3) *
                MCT-2010 – Robotics Capstone (3) *

                Social/Behavioral Science (3)
                Acceptable: See Gen Ed Listing

                Technical Elective (3)
                Acceptable:
                EGT-2910 - Cooperative Education I: Engineering Technology (3) *
                ELT-2022 - Computer Logic and Programmable Logic Controllers (4) *
                ITS-2300 - Introduction to Project Management (3) *
                MFT-1010 - Manufacturing Technology I (3)
                MTH-2300 - Introduction to Statistics (3) *

*Note: * Course requiring a prerequisite*

Course descriptions for the required and technical elective courses are provided below:

CNT-1030 - Construction Project Management (3)

This is a comprehensive construction project management course based on the essentials of project management. Students learn theories, techniques and methodologies to effectively plan and control construction projects. Using project management software and the project life-cycle model from construction project simulations, or real life projects, students will organize, plan, monitor and control a construction project. Students learn to delineate the unique cost control methods for construction productivity, job cost, labor records, and material and equipment purchases. Construction site safety is emphasized throughout the course.

CNT-2020 - Construction Surveying (3)

Prerequisite: MTH 1012

Students learn fundamental surveying methods and receive practical experience in plane surveying for construction. Emphasis is placed on construction site safety, learning to read and understand contract drawings and written materials; and students receive surveying instruction and guidance on care and use of instruments and field notes.

DFT-1200 - Engineering Graphics (3)

This course gives students a basic understanding of how to create and read engineering drawings. Students are introduced to topics in engineering graphics including: orthographic projection, auxiliary views, sections, conventions, dimensions, tolerances, pictorial drawings, threads, and fasteners. Students will be introduced to basic computer-aided drafting techniques.

DFT-1325 - Introduction to Computer-Aided Drafting (3)

Co-requisite: DFT 1200

This is an introductory course in computer-aided drafting. Students will practice 2D drafting concepts and techniques using AutoCAD drawing software. Topics include basic 2D object construction, polylines, techniques for editing objects, object properties, using layers, creating orthographic views in multiview drawings, dimensioning and notes, plotting scaled drawings, and creating section views.

Students who have passed a current AutoCAD Certified User exam (within the past 3 years) may apply for Credit by Certification Evaluation for this course. Students may initiate this request by meeting with an advisor.

DFT-1370 - 3D CAD with SolidWorks I (3)

Prerequisite: DFT 1200 or DFT 1325 or DFT 5100 ; or permission of the division chair

Students will work with SolidWorks 3D CAD software to learn fundamental Solid Modeling concepts and techniques to design parts, assemblies, and drawings on sheets. Students will learn how to create 2-D sketches and transform them into 3D models by applying extrusions, revolves, patterns, shells, lofts, sweeps, fillets and ribs. Students will also learn techniques to dimension models, create engineering drawings, edit geometry, create exploded assemblies, and prepare models for 3-D printing.

DFT-1380 - 3D CAD with SolidWorks II (3)

Prerequisite: DFT 1370 or permission of Division Chair

Students will learn advanced techniques of Solid Modeling using SolidWorks 3D CAD software. Topics to be covered include: advanced drawing, surface modeling, and assembly modeling, advanced part modeling, creating simple animations and photorealistic renderings, and simulations. Students will learn how to use advanced dimensioning on drawing sheets, create section views, and use basic geometric tolerance techniques. A Final Project is included in this course to allow students to bring all the skills together in a prototype model or a rendered image to be printed on a 3-D printer.

DFT-2150 - Building Information Modeling with Autodesk Revit (3)

Prerequisite: DFT 1325 or permission of division chair

Students will use Autodesk Revit building information modeling (BIM) software in the model-based process of planning, designing, building, and managing buildings and infrastructure. Students will create models comprised of intelligent objects that consist of both geometry and data. Students will gain practice in using BIM software to both create and update models. BIM software is used by drafters, architects, structural engineers, and contractors to work collaboratively on designs.

EGT-1015 - Exploring Engineering Technology (3)

Students study the varying aspects of the engineering technology profession. Backgrounds, qualifications and career paths are discussed. Selected technical problems and the methodology used to solve them will be presented.

EGT-2910 - Cooperative Education I: Engineering Technology (3)

Prerequisite: ENG 1010 ENG 2050 ITS 1015 ;MTH 1120 or higher; completion of 12 additional credits in engineering technology, electronics, manufacturing, drafting or robotics; permission of the division chair

Cooperative education allows students to combine academic study with on-the-job experience by working on paid training assignments coordinated by departmental faculty. The major objective of cooperative education is the application of classroom theory in a work environment. This course is intended for students who are pursuing a degree in engineering technology, electronics, manufacturing, drafting, or robotics.

EGT-2950 - Engineering Technology Capstone (4)

Prerequisite: ENG 2050 ITS 1015 MFT 1010 DFT 2150 DFT 1370

This is a capstone conclusion to a program's curriculum. Students will apply their knowledge and skills to a comprehensive project to demonstrate the achievement of the learning outcomes in their program. Students will present their completed capstone project to a panel of faculty and local industry experts or employers.

ELT-1010 - DC Electronics (3)

Co-requisite: MTH 1011

This beginning course in electronics covers the topics of DC fundamentals, including Ohm's Law, series and parallel circuit analysis, circuit theorems and conversions, and DC generators and motors. The student uses the lab extensively to learn the operation of electronic test equipment including the oscilloscope, function generator and multimeter.

ELT-1020 - AC Electronics (3)

Prerequisite: ELT 1010

Co-requisite: MTH 1012

This course is a continuation of the topics of basic electronics covering topics of AC fundamentals including capacitors, inductors, transformers, tuned circuits, passive filters, and AC circuit theorums. The student uses the lab extensively to complete hands-on lab activities in the study of AC electronics.

ELT-1025 - Soldering Basics (1)

This beginning course in soldering provides an overview of soldering for printed circuit boards. Students learn how to use the basic soldering tools and components. The importance of safety procedures are emphasized.

ELT-1030 - Semiconductors (3)

Co-requisite: ELT 1020 ; or permission of division chair

Students learn basic semiconductor theory and the characteristics of diodes, bipolar and FET transistors, thyristors and elementary circuits relating to these devices. Laboratory work includes related practical experiments with semiconductors.

ELT-2017 - Operational Amplifiers and Introduction to Communications (4)

Prerequisite: ELT 1030

Students learn the basics of analog electronic circuit analysis including the theory and circuitry of differential amplifiers, operational amplifiers, power supplies, oscillators and voltage regulators. Practical laboratory work includes building and analyzing electronic circuits. Students learn basic radio communication systems from lectures and observation of laboratory experiments.

ELT-2022 - Computer Logic and Programmable Logic Controllers (4)

Prerequisite: ELT 1010 or ELT 1015

Students learn the theory and construction of digital computer circuits. Topics include number systems, Boolean algebra, digital logic devices, counters, adders, registers, encoders, displays, digital and analog voltage conversion, and integrated circuits. Students learn an introduction to control logic, relay logic principles and fundamentals of programmable logic controllers (PLCs). Practical related laboratory experiments are included.

ENG-1010 - Composition and Rhetoric (3)

Prerequisite: ENG 0900; and IDS 1010T or RDG 0800; or placement

Students in this course complete their first semester college-level composition course. Students focus on planning, organizing, and developing a variety of argumentative compositions. Students practice the conventions of written Standard American English, gain information literacy skills, and learn research and documentation techniques including conducting online and print research and documenting sources. By the end of the semester, students demonstrate their ability to write a unified and coherent argument-based essay of about one thousand words that incorporates research and is nearly free of grammatical, mechanical, and structural errors. Students should refer to the schedule of classes for sections of this course taught in a computer lab. Students must pay an additional lab fee when taking this course in a computer-assisted classroom. Students may earn credit for this course through CLEP or Advanced Placement Examination.

ENG-2050 - Business and Technical Writing (3)

Prerequisite: ENG 1010

Students develop writing skills through composing a variety of clear, effective memos, letters, and reports. Subject matter for the papers may come from the student's occupation or interests, whether scientific, technical, or non-technical. Students should refer to the schedule of classes for sections of this course which are taught in computer labs.

ITS-1015 - The Information Age: Emerging Technologies (3)

Prerequisite: IDS 1010T or RDG 0800

Students learn the core concepts of information technology and its rapidly expanding role in solving problems and influencing decision making. The course focuses on emerging technologies through discussion and demonstrations utilizing technology-based instructional material. Topics include the functions and applications of computer systems, hardware components, software basics, electronic databases, communication networks, computer graphics and security. Independent exploratory learning projects are required.

ITS-1110 - Program Design and Development (3)

Prerequisite: IDS 1010T or RDG 0800

Students learn to solve business-oriented problems with emphasis on structured and object oriented programming techniques. Design tools are used to develop pseudo-code, flowcharting and 3D interactive environments. Students are introduced to several software packages that may be used to develop pseudo-code, flowcharts and interactive 3D environments.

ITS-2300 - Introduction to Project Management (3)

Prerequisite: ENG 1010 ITS 1015 ITS 1040

This course has been recommended by business leaders all over Southern Maryland. Students will be introduced to the concept of project management and will investigate key elements of the project management framework. Specific knowledge in several of the project management knowledge areas such as project scope, project time, project cost and project quality management will be covered. Students will sample several popular project management software packages in order to compare their features.

ITS-2750 - Computer Architecture (4)

Prerequisite: ITS 2591 or ELT 2020 or ELT 2022

Utilizing a widely used real world microcontroller, this course explores the internal architectures of microprocessors and how hardware components are interconnected to external peripherals. Through various programming assignments we will learn how the processor utilizes the control and data paths to access memory and peripherals. The importance of the memory map is emphasized. The course will also explore various ways to measure and improve a

microprocessors performance. Topics covered include pipelining superscalar, memory hierarchies (cache and virtual memory) and instruction set. Other topics covered include digital logic circuits and dthe representations of numbers and data.

MCT-1010 - Introduction to Mechatronics (3)

Prerequisite: MTH 1011 or MTH- 0970 or MTH 1080 or higher; and ELT 1010 or permission of division chair

Students learn about the basic electronics and electrical drives in mechatronic systems. Topics presented include AC and DC fundamentals, reading simple schematics and wiring diagrams, AC and DC motors, basic motor control circuits, and simple programming of a microcontroller. Students use the laboratory extensively to learn the operation of electronic test equipment and to setup, control, and troubleshoot AC and DC motors.

MCT-1020 - Principles of Robotics (3)

Prerequisite: MCT 1010

Co-requisite: ITS 1110 or permission of division chair

Students learn the basic principles of robotics, including drives, actuators, sensors, control systems, human-machine interface, programming, and autonomy. A hands-on approach is used to introduce basic concepts, focusing on the construction and programming of remotely controlled and autonomous robots. Students build and test increasingly complex robots, culminating in an end-of-semester robot project.

MCT-2010 - Robotics Capstone (3)

Prerequisite: MCT 1020

Students work in project teams to design and build robots to address specific challenges. Challenges will require robot operation in both structured and unstructured environments, with autonomous control being emphasized. A structured design process will be used and collaboration within teams will be essential to success.

MFT-1010 - Manufacturing Technology I (3)

Traditional manufacturing processing methods as employed in contemporary practice are presented. Key topics include safety, properties of materials, machining, casting, forming, speeds and feeds, and fabrication techniques. Various manufacturing processes are demonstrated.

MFT-1120 - CAD/CAM: Drawing Designs in Manufacturing (3)

Students are exposed to Windows commands required for working with a CAD package, creating two-and three- dimensional drawings, and using a text editor for work processing.

Related topics include job planning, tool selection, construction of process mode, tool path verification, simulation, quality control, CAD/CAM data transfer, and CNC code generation. Instruction is conducted in a computer lab.

MTH-1011 - Mathematics for Technologies I (4)

Prerequisite: MTH 0950 or higher

A course for engineering technology majors. Topics include solution of equations, formula transformations, systems of equations, coordinate geometry, and an introduction to trigonometry.

MTH-1012 - Mathematics for Technologies II (3)

Prerequisite: MTH 1011

This course is a continuation of MTH 1011. Topics include functions and graphs, vectors, oblique triangles, exponential and logarithmic functions, complex numbers and conic sections.

MTH-2300 - Introduction to Statistics (3)

Prerequisite: MTH 0900T with Division Chair approval or MTH 0970 or MTH 1080or MTH 1100 or MTH 1105 or MTH 1115

In this introduction to descriptive and inferential statistics, students learn about presentation of data, measures of central tendency and dispersion, the binomial and normal probability distributions, sampling techniques, correlation and regression, and hypothesis testing (z-test, t-test, chi-squared). Examples are selected from education, business, and the social and natural sciences.

PHY-1010 - Fundamentals of Physics I (3)

Prerequisite: MTH 0970 or MTH 1080 or MTH 1011

This algebra based physics course is the first of a two-semester sequence in general physics treating the fields of mechanics, heat, sound, electricity, magnetism, optics and modern physics. Together with PHY 1020 and PHY 1010L/PHY 1020L this generally satisfies the minimum requirement for medical and dental schools.

PHY-1010L - Fundamentals of Physics I - Lab (1)

Co-requisite: PHY 1010

Lab work includes experiments on vectors, equilibrium forces, motion, energy, momentum, properties of materials, oscillating motion, and heat.

2. Describe the educational objectives and intended student learning outcomes.

Through the curriculum, professional organizations and engagement activities, graduates of the College of Southern Maryland's Engineering Technology AAS program will achieve the following educational objectives:

    a. Provide graduates with a common body of knowledge in engineering technology.
    b. Provide graduates with the capability to develop the skills and knowledge required of technicians in a variety of engineering settings.
    c. Provide graduates the resources and skills allowing them to find employment or enter trainee programs in engineering technology and related professions.

Through the curriculum, professional organizations and engagement activities, graduates of the College of Southern Maryland's Engineering Technology AAS program will achieve the following intended student learning outcomes:

Students will...

1. Identify professional, ethical, security, and societal issues related to engineering technology
2. Combine fundamental engineering technology principles and the use of modern tools to select and implement the methodology required to solve engineering technology problems demonstrating appropriate safety practices
3. Work effectively with other members of an engineering team to perform experiments, analyze results, and recommend a course of action.
4. Use oral and written communication skills to prepare project reports and presentations.
5. Students in the Electronics area of concentration will also...
    a. Describe basic electric and electronic concepts of voltage, current, and resistance and their interrelationships and identify, explain, and use basic electric and electronic laws including Ohm's law and Thevenin's theorem
    b. Describe basic semiconductor theory in both digital and analog applications and build and analyze electronic circuits using multiple basic components along with a variety of increasingly complex semiconductor components
    c. Describe and explain digital data theories and practical applications, describe the difference between analog and digital data structures, and explain the importance of digital applications
    d. Describe and construct basic radio communication systems
    e. Discuss internal architectures of microprocessors and how hardware components are interconnected to external peripherals
6. Students in the Robotics area of concentration will also...
    a. Describe the basic electronics and electrical drives in mechatronic systems.
    b. Apply the basic principles of robotics, including drives, actuators, sensors, control systems, human-machine interface, programming, and autonomy.

  c. Follow a structured design process to design and build robots to perform specific challenges in both structured and unstructured environments.

 7. Students in the Drafting area of concentration will also…

  a. Setup, develop, and modify, as necessary, engineering drawings and models using modern Computer-Aided Design and Drafting (CADD) software.

  b. Use Building Information Modeling (BIM) software to create and update models for design projects.

  c. Describe and compare mechanical properties of engineering materials and modern manufacturing technologies.

3. Discuss how general education requirements will be met, if applicable.

> There are 22 General Education credits required for this program. The General Education course requirements are listed in <u>Appendix A, Table 1</u>.

4. Identify any specialized accreditation or graduate certification requirements for this program and its students.

> Not applicable

5. If contracting with another institution or non-collegiate organization, provide a copy of the written contract.

> Not applicable

C. Critical and compelling regional or statewide need as identified in the State Plan:

1. Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:

> o The need for the advancement and evolution of knowledge;

> o Societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education;

> o The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs.

> > The availability of an in-demand, STEM, career path, in an ever-evolving engineering industry, will attract both traditional and returning adult students, those entering a new field of opportunity as well as workers changing or upgrading skills. These very changes are evident in CSM's own enrollment records. An examination of the demographics of our current student population reflects these realities and supports the needs identified in the 2009 Maryland State Plan for Post Secondary Education, "ensuring equal opportunity for Maryland's diverse citizenry."

2. Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.

> The redesigned degree option in Engineering Technology at CSM is consistent with the elements of the 2009 Maryland State Plan for Postsecondary Education. Much of our focus in curriculum development addressed the advisories cited in this document. All the goals were utilized as required criteria but considerable attention was given to the Governor's Priorities and Goal 5: "The advancement of knowledge, the development and implementation of technology and the expansion of a highly trained workforce are essential to Maryland's economic vitality, especially in times of economic and environmental change. An educated citizenry that has the ability to adapt to the changes in the global market has become the number one resource in attracting new businesses and in maintaining a healthy economy. Maryland has been fortunate in that its proximity to the nation's capital and numerous federal agencies has resulted in a workforce that is among the most highly educated in the world."

> The new program at CSM reflects one of the Governor's priorities as cited in the State Plan, "to provide new knowledge and a well trained workforce and benefit individuals through pathways to personal and professional goals."

> The State Plan cites that "post secondary education should be poised to meet changing basic workforce needs to assure a vigorous and competitive State economy."

> Citations in the State Plan also address the need for post secondary institutions to strive for academic excellence and effectiveness. "Excellence should be evidenced by the value of the education or training the student receives and the opportunities that result from that education." The very nature of this charge is to develop student-centered learning bolstered by the partnerships with the various media employers in our region. This format increases experiential learning through internships and other hands on job related activities assuring workplace readiness. Internships are already being made available at many of the local construction, land development, engineering, and also robotics businesses.

> CSM's Engineering Technology AAS program will offer courses that, taken together, enable our students to matriculate and earn their AAS degree. Formative and summative evaluations are an essential value of the educational process at CSM, and are a viable part of the new CSM program. Students are held to standards that are reflective of academic and professional systems, while the structure and operation of the program provides the environment to support the achievement of these standards.

> Employers have expressed interest in our program and intend to provide substantive experiential learning through internships and other hands-on job related activities. These are extremely important as they provide students enrolled at CSM in Engineering Technology both vital experience and opportunities for networking, and will increase chances of getting a job significantly.

To expand our geographic reach, stimulate enrollment and provide increased access to this new curricular option, the Engineering Technology Program intends to incorporate alternative means of course delivery. The program intends to provide traditional face to face courses complimented by offerings that are hybrid or fully online by form. The College of Southern Maryland has demonstrated success in delivering instruction by alternative methods, increasing flexibility and effective use of new technologies. The Division of Distance Learning and Faculty Development (DLF) support the faculty in developing high quality, accessible and effective teaching and learning environments. To facilitate these goals, the DLF staff provides service to faculty including planning, consulting, training, and support. The DLF staff makes available the resources necessary to incorporate instructional technologies into their traditional or distance learning courses. As such, the DLF staff will contribute significantly to the delivery of all new courses in Engineering Technology by providing the faculty with the necessary support structures to enhance student success in their delivery, particularly those identified for distance learning, be the methodology fully on line or hybrid.

In summary, the new degree in Engineering Technology at the College of Southern Maryland as proposed is consistent with and reflective of the 2009 Maryland State Plan for Postsecondary Education.

D. Quantifiable & reliable evidence and documentation of market supply & demand in the region and State:

1. Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.

2. Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.

3. Data showing the current and projected supply of prospective graduates.

    The industry is characterized by growth over time and extremely high wages. For instance:

    - Southern Maryland is home to one of the nation's leading clusters of military and Department of Defense Navy bases and contractors as it is bordered by three major Navy Bases including Naval Air Station Patuxent River in St. Mary's County and Naval Surface Warfare Center, Indian Head EOD Technology Division in Charles County. This is evidenced by the large number of engineering contractors in St. Mary's County as shown in the table below:

TOP 10 EMPLOYERS in ST. MARY'S County		
Company	**Industry**	**Size Category**
Analysis Tech Inc	Professional, Scientific, and Technical Services	250 - 499
BAE Systems	Manufacturing	1000+
Booz Allen Hamilton	Professional, Scientific, and Technical Services	250 - 499
Eagan Mcallister Assoc Inc	Professional, Scientific, and Technical Services	250 - 499
Food Lion	Retail Trade	250 - 499
Honeywell	Manufacturing	500 - 749
Man Tech Intl Corp	Professional, Scientific, and Technical Services	250 - 499
Northrop Grumman	Wholesale Trade	250 - 499
St Mary's College of Maryland	Educational Services	250 - 499
Walmart	Retail Trade	500 - 749
Data Extracted from Office of Workforce Information and Performance (OWIP) http://www.dllr.state.md.us/lmi/ Source: Infogroup		

- These Navy Bases and defense contractors employ many technical professionals, including military veterans and service members who look to CSM to complete degrees to advance in their fields or learn new skills. CSM has been identified as a veteran and military-friendly institution by Victory Media for attracting and supporting student veterans and spouses who are transitioning from the military to civilian workforce. CSM has made a commitment to offer relevant degree programs, provide alternative course delivery formats, including traditional, web-hybrid, and web course offerings, and to provide services to serve military and veteran students. Veteran and Military support services are available here: http://www.csmd.edu/student-services/veteran-military-support-services/index.html

- According to the Maryland Department of Labor, Licensing, and Regulation, Office of Workforce Information and Performance, employment for multiple types of engineering technician jobs in Maryland is expected to grow through 2022. This data is listed in the table below:

Maryland Statewide Projected Growth in Engineering Technician & Related Occupations				
2012	2022	Growth Rate	Change	Occupational Title
3746	3879	3.6%	133	Electrical and Electronics Engineering Technicians
3218	3278	1.9%	60	Engineering Technicians, Except Drafters, All Other
848	917	8.1%	69	Electrical and Electronics Drafters
230	255	10.9%	25	Drafters, All Other
1041	1126	8.2%	85	Mechanical Engineering Technicians
794	861	8.4%	67	Surveying and Mapping Technicians
1581	1819	15.1%	238	Aircraft Mechanics and Service Technicians
Data Extracted from *Office of Workforce Information and Performance (OWIP)* http://www.dllr.state.md.us/lmi/				

- Current wages for experienced electrical and electronics engineering technicians in Maryland exceeded $90,000. Projected growth is shown in the table below:

Maryland Wages for Engineering Technician Occupations				
Occupation	2015	2017	Change	% Change
Architectural and Civil Drafters		$48,497	$39,537	$52,976
Mechanical Drafters	30	$64,323	$43,013	$74,978
Drafters, All Other	30	$52,246	$36,890	$ 59,924
Electrical and Electronics Engineering Technicians	540	$80,811	$56,813	$92,810
Data Extracted from *Office of Workforce Information and Performance (OWIP)* http://www.dllr.state.md.us/lmi/ Updated April 2016				

- Short term occupational projections show some growth in the some engineering technician fields. Data is provided in the table below:

Maryland Short Term Occupational Projections (2015-2017)				
Occupation	2015	2017	Change	% Change
Engineering Technicians, Except Drafters, All Other	1,854	1,881	27	1.46%
Civil Engineering Technicians	1,015	1,032	17	1.67%
Data Extracted from *Office of Workforce Information and Performance (OWIP)* http://www.dllr.state.md.us/lmi/ Next Scheduled Update: Summer 2017				

- According to data extracted from the Occupational Employment Statistics Query System through bls.gov, the average mean wage for engineering technicians range are very high, ranging from $53,730 to $84,440. There are significant numbers of engineering technicians and drafters employed locally in St. Mary's County, especially in the areas of Electrical and Electronics and All Other (except drafters). Employment data was not available for Calvert or Charles County. Data for robotics technicians is not available as this is a rapidly growing field in engineering. Because robotics technology encompasses electronics, it is assumed that some robotics-related jobs are included in these numbers. Local employment data is shown below:

Area: St. Mary's County, Maryland nonmetropolitan area Period: May 2014			
Occupation (SOC code)	Employment(1)	Annual mean wage(2)	Employment per 1,000 jobs
Mechanical Drafters(173013)	30	$56,600	0.782
Electrical and Electronics Engineering Technicians(173023)	450	$83,150	10.435
Mechanical Engineering Technicians(173027)	30	$59,540	0.766
Engineering Technicians Except Drafters All Other(173029)	310	$84,440	7.171
Surveying and Mapping Technicians(173031)	30	$53,730	0.773
Footnotes: (1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers. (2) Annual wages have been calculated by multiplying the hourly mean wage by 2080 hours.			
SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm Data extracted on January 6 2016 from data.bls.gov Occupational Employment Statistics Query System			

- Since 2011, the number of graduates in engineering technology programs has stayed about the same. With the proposed program changes and ever-growing STEM workforce needs, it is expected that enrollments and graduate numbers will grow. Graduate numbers are shown in the table below:

Awards by Program by Fiscal Year					
Program Name	2011	2012	2013	2014	2015
Electronics Technology, AAS	5	1	0	2	0
Engineering Technology, AAS	3	7	6	3	1
Engineering Technology: Drafting, AAS	0	4	4	7	6
Engineering Technology: Electronics, AAS	2	0	4	4	3
Engineering Technology: Manufacturing, AAS	0	1	1	0	0
Total AAS Degrees:	**10**	**13**	**15**	**16**	**10**
Basic Computer-Aided Drafting Certificate	6	9	10	14	11
Electronics Technology - Basic Certificate	1	1	6	5	4
Electronics Technology - Communications Certificate	2	1	4	5	6
Electronics Technology - Microprocessor Certificate	1	1	3	5	4
Engineering Technology Certificate	1	3	6	3	1
Total Certificates:	**11**	**15**	**29**	**32**	**26**
Drafting Letter of Recognition	1	4	2	7	5
Total Letters of Recognition:	**1**	**4**	**2**	**7**	**5**
Source: College of Southern Maryland Fact Book, 2014-15					

E. Reasonableness of program duplication:

1. Identify similar programs in the State and/or same geographical area. Discuss similarities or differences between the proposed program and others in the same degree being awarded.

The following community colleges have programs in engineering technology, drafting, or robotics:

ENGINEERING TECHNOLOGY DEGREES AT MARYLAND COMMUNITY COLLEGES		
Institution	Program Name	Degree Offered
Anne Arundel Community College	ELECTRONIC ENGINEERING TECH	Associate Degree
Chesapeake College	ENGINEERING TECHNOLOGY	Associate Degree
College of Southern Maryland	ENGINEERING TECH	Associate Degree
Community College of Balt County	ENGINEERING TECHNOLOGY	Associate Degree
Hagerstown Community College	MECHANICAL ENGINEERING TECH	Associate Degree
Harford Community College	ENGINEERING TECHNOLOGY	Associate Degree
Prince George's Community College	COMPUTER ENGINEERING TECH	Associate Degree
Prince George's Community College	ELECTRONIC ENGINEERING TECH	Associate Degree
Prince George's Community College	ENGINEERING TECHNOLOGY	Associate Degree
Wor-Wic Community College	ELECTRONIC ENGINEERING TECHNOLOGY	Associate Degree
Wor-Wic Community College	MANUFACTURING ENGINEERING TECHNOLOGY	Associate Degree
Anne Arundel Community College	Mechatronics Technology	Associate Degree
Baltimore City Community College	Robotics/Mechatronics Technology	Associate Degree
Harford Community College	Computer-Aided Design & Drafting	Associate Degree
Source: Maryland Higher Education Commission, Finding a Major http://www.mhec.maryland.gov/utilities/search_major.asp		

ENGINEERING TECHNOLOGY CERTIFICATES AT MARYLAND COMMUNITY COLLEGES		
Institution	**Program Name**	**Degree Offered**
Anne Arundel Community College	Mechatronics Technology	Certificate
College of Southern Maryland	Mechatronics Technology: Robotics	Certificate
Anne Arundel Community College	Electronics Engineering Tech	Certificate
College of Southern Maryland	Engineering Tech	Certificate
Wor-Wic Community College	Electronic Engineering Technology	Certificate
Wor-Wic Community College	MANUFACTURING ENGINEERING TECHNOLOGY	Certificate
Howard Community College	Electronics Tech	Certificate
Anne Arundel Community College	Designing and Drafting Tech	Certificate
Chesapeake College	Drafting	Certificate
College of Southern Maryland	Basic Computer-Aided Drafting	Certificate
College of Southern Maryland	Drafting	Certificate
Community College of Balt County	Drafting Tech	Certificate
Harford Community College	Computer-Aided Design & Drafting	Certificate
Prince George's Community College	Computer-Aided Drafting	Certificate
Wor-Wic Community College	Architectural Computer-aided Drafting	Certificate
Source: Maryland Higher Education Commission, Finding a Major http://www.mhec.maryland.gov/utilities/search_major.asp		

The above programs are all similar in providing students with the skills and knowledge to gain employment in entry-level positions in various fields of engineering technology. CSM's program is designed with local workforce needs in mind, while still offering students with the education required to pursue non-Navy or DOD job opportunities in other fields of engineering such as manufacturing and mechanical.

2. Provide justification for the proposed program.

This degree program prepares students who are currently employed in the engineering technology field as well as those without prior work experience to develop the skills and knowledge required of technicians in a variety of engineering settings.

The first semester is the same for all students in this program. The first semester is designed to provide all students with a firm foundation for the study of engineering technology. After the

first semester, students select an area of concentration from one of the following fields: Electronics, Robotics, or Drafting.

Students in Electronics will develop fundamental competencies that are important in the design, development, installation, testing, and troubleshooting of electronics equipment including communications equipment, computer components, medical devices, aircraft systems, and many other applications.

Students in Robotics will learn the basic principles of robotics, including drives, actuators, sensors, control systems, human-machine interface, programming, and autonomy. CAD skills are also emphasized.

Students in Drafting will learn how to use a variety of software tools to develop complete drawing packages for engineering or architectural designs.

Students will be taking courses in this program through several course delivery formats. Because it is important for students to obtain hands-on experience in engineering technology applications, some courses are only offered in a face-to-face lab environment. For many courses though, students may choose between face-to-face or online course sections. Additionally, there are a few courses that are only offered online.

The mathematics requirement in this program is important to note. In order to successfully complete the technical coursework, it is essential that students obtain a strong background in mathematics for their area of study. The Mathematics for Technologies courses (I and II) are designed to provide students with a weak background in mathematics with the competencies to be successful in this program.

Additionally, oral and written communication skills are emphasized throughout this program. Students will have multiple learning opportunities to improve soft skills by completing activities such as developing a resume or portfolio, preparing for a job interview, and delivering a project presentation.

There are currently four (4) similar Engineering Technology Degrees, and these programs have not been modified in a long time. These programs are out-of-date; there are some redundant classes across these programs; and enrollments have been fairly low over the past 5 years. Additionally, enrollment in the electronics program has been dropping, and enrollment in manufacturing programs has been very low.

PROGRAM	HEADCOUNTS				
	2011 FALL	2012 FALL	2013 FALL	2014 FALL	2015 FALL
Engineering Technology, AAS	37	33	35	25	39
Engineering Technology: Drafting, AAS	45	45	33	32	32
Engineering Technology: Electronics, AAS	31	31	30	24	20
Engineering Technology: Manufacturing, AAS	7	5	2	6	9

Graduate numbers are also very low (see section D.3). Based on the above data, the review of the recent Academic Program Monitoring Reports, student surveys, and recommendations from the Mechatronics and Industrial Studies Advisory Councils, as well as feedback from CSM faculty, this program modification is being proposed.

The proposed program improvements include:
1. Adding new current courses in drafting, including Building Information Modeling and 3D CAD Solid Modeling.
2. Adding new courses in electronics, including separate AC and DC electronics courses and a soldering course.
3. New technical mathematics courses.
4. Adding a robotics concentration degree option.
5. Providing options for courses in project management, construction surveying, robotics, and manufacturing.
6. Combining identical courses from related disciplines such as ELT 2015/2017; ELT 2020/2022; and ITS-2750/ELT-2042.
7. Optimizing course prerequisites and program sequence to improve student success.

F. Relevance to Historically Black Institutions (HBIs)

1. Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBI's.

2. Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.

There is no impact to the uniqueness, identities and missions of HBIs. The only other college in the tri-county area is St. Mary's College.

G. If proposing a distance education program, please provide evidence of the Principles of Good Practice (as outlined in COMAR 13B.02.03.22C).

Students will have the option to take classes through traditional, web-hybrid, and web-based course offerings. CSM is a proponent of the Principles of Good Practice for Distance Education.

Specifically, CSM follows the Principles of Good Practice for Distance Education in the following areas:

a. Curriculum and Instruction
   a. The division is led by highly trained faculty and staff with both academic credentials and professional experience in distance learning.

b. All courses follow a master course syllabus, regardless of whether it is a traditional or web-based course.

c. Student learning outcomes are monitored and assessed yearly, and program reviews are done every five years.

b. Role and Mission

    a. The mission of CSM's Division of Distance Learning and Faculty Development (DLF) aligns with the college mission and "embraces an eLearning-centered approach with integrated technology, accessibility, and personal attention, resulting in quality learning and student success in a technology-driven future. The DLF staff provides service to faculty and staff including planning, consulting, and training. The DLF staff encourages, challenges, and assists faculty to incorporate instructional technologies into their traditional, hybrid, and online learning courses. DLF provides support for students, as e-Learners, to help them successfully achieve their academic goals."

c. Faculty Support

    a. All new faculty participate in mandatory distance learning training sessions. Throughout the year, many training courses and workshops are offered for both adjunct and full-time faculty. Faculty are also encouraged to attend teaching conferences. Faculty support services are found here:

        i. http://www.csmd.edu/faculty-staff/

d. Student Support

    a. CSM maintains adequate learning resources for students including library services and resources. More information is available here:

        i. http://www.csmd.edu/student-services/student-resources/index.html

e. Student Services

    a. CSM provides many services to promote student success including testing, tutoring, Learning Labs, and Academic Progress Monitoring:

        i. http://www.csmd.edu/student-services/student-success-services/index.html

f. Commitment to Support

    a. CSM evaluates faculty, both adjunct and full-time faculty, according to policies and procedures outlined in the Faculty Handbook, available on CSM's Intranet.

    b. CSM will support students in meeting their educational goals, regardless of students' timelines and interruptions.

g. Evaluation and Assessment

    a. CSM's Planning, Institutional Effectiveness, and Research Department (PIER) help the college community to improve student learning and achieving organizational effectiveness. Its mission is accomplished through the development and implementation of strategic plans, assessment plans, and process improvement at all levels of the college. The office works collaboratively with current and prospective students, faculty staff, regulatory agencies and other external customers to provide the

highest quality customer service while continuously improving processes and maximizing college resources.

      b. CSM just recently formed a committee to evaluate and promote academic rigor and success in online instruction.

H. Adequacy of faculty resources (as outlined in COMAR 13B.02.03.11).

Faculty Name	Appointment Type	Terminal Degree Title & Field	Academic Title & Rank	Status	Course(s)
Brezina, Bernice	Permanent	AA, BSME, MS	Technical Studies Faculty, Professor	Full-time	EGT-1015 MFT-1010 MFT-1120 DFT-1325
Brezina, Byron	Permanent	AA, BSME, MS	Engineering/Robotics Faculty, Assistant Professor	Full-time	MCT-1010 MCT-1020 MCT-2010 ELT-1010
Gates, Robert	Permanent	BSEE, MAEd	Electronics Faculty, Professor	Full-time	ELT-1010, 1015, 1010, 1020, 1030, 2017, 2022, 2030, 2042, ITS-2750
Luyster, William	Adjunct	BS, Physics MA, Physics	Electronics Faculty	Part-time	EGT-1015, ELT-1010, ELT-1020
Faughnan, Eric	Adjunct	M ARH	Drafting Faculty	Part-time	DFT-1200, 1325, and other DFT

I. Adequacy of library resources (as outlined in COMAR 13B.02.03.12).

Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. **If the program is to be implemented within existing institutional resources**, include a supportive statement by the President for library resources to meet the program's needs.

    Students may borrow circulating materials from any of the three CSM library branches. Through the interlibrary loan program (ILL), students can order almost any book, periodical article, or ERIC document needed, generally available within one week of the request. Library resources also include audiovisual collections use in the library and classrooms only. Additionally, substantial material is available through online databases, including ProQuest and EBSCO.

The President assures that appropriate library resources are available to support the needs of this program.

J. Adequacy of physical facilities, infrastructure and instructional equipment (as outlined in COMAR 13B.02.03.13)

Provide an assurance that physical facilities, infrastructure and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in the technologies and sciences. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for adequate equipment and facilities to meet the program's needs.

CSM is a leader among Maryland community colleges in offering courses which meet the busy schedules of our students, traditional weekday face to face courses, weekend and evening classes, Web-hybrid courses which offer a mix of online and traditional classroom face-to-face instruction and a popular online learning community. The college makes available state of the art facilities on three campuses to accomplish its mission in support of our community's academic, professional, and self-enrichment pursuits.

The new degree program in Engineering Technology will be conducted primarily on the Leonardtown campus, in the B building, home to a new Robotics lab and an electronics lab. Some classes will be offered at the La Plata and Prince Frederick campuses. Many technical classes are offered in the ST building. Renovations were completed and the building was dedicated in the fall of 2008, and houses state of the art classrooms, conference rooms, faculty and administrative offices, open computer labs, Student Computer Support department (help desk) and science laboratories. Facilities in both the computer labs and classrooms are adapted for disabled students. Prince Frederick campus also has a dedicated electronics lab used mostly by students in the Nuclear Engineering Technology program.

"The President assures that appropriate physical facilities, infrastructure, and instructional equipment are available to support the needs of this program."

K. Adequacy of financial resources with documentation (as outlined in COMAR 13B.02.03.14)

The Resources and Expenditures are shown in Appendix B, Tables 2 and 3, respectively.

CSM and the Business & Technology Division have identified the redesigned Engineering Technology program as a valuable curriculum for the educational and workforce needs of the region. As such, CSM has committed the necessary financial resources and has already assigned one (1) full time faculty/ administrator to establish the curriculum and deliver the course offerings at the inception of the new program

L. Adequacy of provisions for evaluation of program (as outlined in COMAR 13B.02.03.15).

Discuss procedures for evaluating courses, faculty and student learning outcomes.

OAP's focus is the primary mission of the college: to provide quality opportunities for intellectual development that result in student learning. The SLOAP outlines the process of collecting information to determine whether CSM's academic offerings are having the appropriate educational impact on students. Student Learning Outcomes Assessment (SLOA) is defined as the systematic collection of information about academic offerings and analysis thereof, for the purpose of improving student learning.

Program Assessment at CSM is a cyclical process that includes:
1. Program Reviews conducted every five-six years, or more often as needed.
2. Program Monitoring conducted every other year (except in the year of a Program Review).
3. Program Assessments of Student Learning conducted on a cycle established by faculty.

In addition, CSM conducts course evaluations every semester or, more often when deemed necessary.

M. Consistency with the State's minority student achievement goals (as outlined in COMAR 13B.02.03.05 and in the State Plan for Postsecondary Education).

Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.

One of CSM's Values/Guiding Principles is Diversity. The Institutional Equity and Diversity Office works to "create an environment that instills an appreciation and understanding of the diverse qualities each of us brings to this campus; where our students, staff, and faculty mirror the community we serve and are free from discrimination and harassment."

Additionally, CSM defines civility as "the demonstration of respect for others through basic courtesy and the practice of behaviors that contribute toward a positive environment for learning and working."

As is true of CSM, the redesigned engineering technology program is open to all students with no restrictions reference to age, gender, or ethnic background. As such, any student meeting the eligibility requirements of the college admissions process is entitled to enroll in this discipline of study. Furthermore, CSM, the Business & Technology Division, and representatives of the engineering technology program all participate in events, programs, orientations, and information sessions sponsored internally or by external advocates in order to reach all students seeking information on the college's programs and the professional opportunities that result from that education and training.

CSM's marketing department is developing a comprehensive marketing plan for this new program. These resources include the designing and printing of brochures, assistance with marketing campaigns (web and traditional news media), and development of other recruitment materials. CSM is committed to ensuring new programs are marketed to diverse populations, as demonstrated by the organizational values, which include valuing diversity. Marketing plans will include activities specifically designed to market the program to the diverse population of the tri-county region.

Diversity and multiculturalism are vitally important issues for future leaders. As such, the representatives of this new program at CSM intend to make contact with multiple professional associations, national, regional and local employers, secondary and postsecondary institutions to create partnerships that will lead to the diversity of our student population and graduates of our programs.

N. Relationship to low productivity programs identified by the Commission:

The proposed program is not directly related to an identified low productivity program identified by the Commission.

Appendix A: Table 1 (referenced in Questions B.1 and B.3)

REQUIRED COURSES			
Course #	Course Title	Category	Credits
ALL AREAS OF CONCENTRATION (9 CREDITS)			
EGT-1015	Exploring Engineering Technology	Engineering Technology	3
ELT-1010*	DC Electronics	Electronics Technology	3
ENG-2050*	Business and Technical Writing	English	3
DRAFTING AREA OF CONCENTRATION (28 CREDITS)			
CNT-2020*	Construction Surveying	Construction Management	3
DFT-1200	Engineering Graphics	Drafting	3
DFT-1325*	Introduction to Computer-Aided Drafting	Drafting	3
DFT-1370*	3D CAD with SolidWorks I	Drafting	3
DFT-1380*	3D CAD with SolidWorks II	Drafting	3
EGT-2950*	Engineering Technology Capstone	Engineering Technology	4
MFT-1010	Manufacturing Technology I	Manufacturing Technology	3
Drafting Elective (3 Credits), Acceptable:			
DFT-2150*	Building Information Modeling with Autodesk Revit	Drafting	3
MFT-1120	CAD/CAM: Drawing Designs in Manufacturing	Manufacturing Technology	
Technical Elective (3 Credits), Acceptable:			
CNT-1030	Construction Project Management	Construction Management Technology	3
EGT-2910*	Cooperative Education I: Engineering Technology	Engineering Technology	
ITS-2300*	Introduction to Project Management	Information Services Technology	
MCT-1010*	Introduction to Mechatronics	Mechatronics	
MTH-2300*	Introduction to Statistics	Mathematics (Gen. Ed.)	
ELECTRONICS AREA OF CONCENTRATION (28 CREDITS)			
ELT-1020*	AC Electronics	Electronics	3
ELT-1025	Soldering Basics	Electronics	1
ELT-1030*	Semiconductors	Electronics	3
ELT-2017*	Operational Amplifiers and Introduction to Communications	Electronics	4
ELT-2022*	Computer Logic and Programmable Logic Controllers	Electronics	4
ITS-1110*	Program Design and Development	Information Services Technology	3
ITS-2750*	Computer Architecture	Information Services Technology	4
MCT-1010*	Introduction to Mechatronics	Mechatronics	3
MCT-1020*	Principles of Robotics	Mechatronics	3
ROBOTICS AREA OF CONCENTRATION (28-29 CREDITS)			
DFT-1200	Engineering Graphics		3
DFT-1370*	3D CAD with Solidworks I	Drafting	3
DFT-1380*	3D CAD with Solidworks II	Drafting	3

ELT-2022*	Computer Logic and Programmable Logic Controllers	Electronics	4
ITS-1110*	Program Design and Development	Information Services Technology	3
MCT-1010*	Introduction to Mechatronics	Mechatronics	3
MCT-1020*	Principles of Robotics	Mechatronics	3
MCT-2010*	Robotics Capstone	Mechatronics	3
Technical Elective (3 Credits), Acceptable:			
EGT-2910*	Cooperative Education I: Engineering Technology	Engineering Technology	3-4
ELT-2022*	Computer Logic and Programmable Logic Controllers	Electronics	
ITS-2300*	Introduction to Project Management	Information Services Technology	
MFT-1010	Manufacturing Technology I	Manufacturing Technology	
MTH-2300*	Introduction to Statistics	Mathematics (Gen. Ed.)	
		Subtotal Required Courses	**37-38**

GEN ED			
Course #	**Course Title**	**Category**	**Credits**
ENG-1010*	Composition and Rhetoric	English Composition	3
MTH-1011*	Mathematics for Technologies I	Mathematics	4
Communication (3 Credits) *Acceptable: Any Gen. Ed. COM Course*		Arts/Humanities	3
Social/Behavioral Science (3 Credits) *Acceptable: Any Gen. Ed. Social/Behavioral Science Course*		Social/Behavioral Sciences	3
PHY-1010*	Fundamentals of Physics I	Biological/Physical Sciences	3
PHY-1010L*	Fundamentals of Physics I – Lab	Biological/Physical Sciences	1
MTH-1012*	Mathematics for Technologies II	Mathematics	3
ITS-1015*	The Information Age: Emerging Technologies	Interdisciplinary/Emerging Issues	3
		Subtotal Gen Ed Courses	**23**
		TOTAL CREDITS	**60-61**

Appendix B: Table 2 (answers question K.1.)

TABLE 2: RESOURCES					
Resource Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Reallocated Funds	0	0	0	0	0
2. Tuition/Fee Revenue (c + g below)	$36,240	$108,720	$181,200	$181,200	$181,200
a. Number of F/T Students	5	15	25	25	25
b. Annual Tuition/Fee Rate ($151 x 30 credits)*	$4,530	$4,530	$4,530	$4,530	$4,530
c. Total F/T Revenue (a x b)	$22,650	$67,950	$113,250	$113,250	$113,250
d. Number of P/T Students	5	15	25	25	25
e. Credit Hour Rate	$151	$151	$151	$151	$151
f. Annual Credit Hours Rate	18	18	18	18	18
g. Total P/T Revenue (d x e x f)	$13,590	$40,770	$67,950	$67,950	$67,950
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources**	$2,700	$8,100	$13,500	$13,500	$13,500
TOTAL (Add 1 – 4)	$38,940	$116,820	$194,700	$194,700	$194,700

* The credit hour rate ($151) is based upon CSM's current tuition rate of $123 plus 23% combined fee.
** Fees charged: FT students, approx.. 6 Mechatronics Technology, Electronics, and Drafting courses are $60 per student per course over 4 semesters. PT students, approx.. 3 Mechatronics Technology, Electronics, and Drafting courses are $60 per student per course over 4 semesters.

Appendix B: Table 3 (answers question K.1.)

TABLE 2: EXPENDITURES:					
Expenditure Categories	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
1. Faculty (b + c below)					
a. # FTE	1 FT x 5 courses	1 FT x 5 courses	1 FT x 5 courses	1 FT x 5 courses	1 FT x 5 courses
b. Total Salary	$70,000	$70,000	$70,000	$70,000	$70,000
c. Total Benefits					
2. Admin. Staff (b + c below)					
a. # FTE					
b. Total Salary					
c. Total Benefits					
3. Support Staff (b + c below)					
a. # FTE					
b. Total Salary					
c. Total Benefits					
4. Equipment	$4,000	$4,000	$4,000	$4,000	$4,000
5. Library					
6. New or Renovated Space					
7. Other Expenses (Equip.Maintenance, Software, Marketing: $3,000)	$8,000	$5,000	$5,000	$5,000	$5,000
TOTAL (Add 1 – 7)	$82,000	$79,000	$79,000	$79,000	$79,000