

Wayne State College

Proposal to Add a New Major in Engineering Technology

1. Descriptive Information

- A. Name of Institution: Wayne State College
- B. Name of Program: Engineering Technology Major
- C. Degrees/credentials to be awarded graduates of the program: Bachelor of Science; Engineering Technology
- D. Other programs offered in this field by the institution: Industrial Technology-Construction Management; Manufacturing Management; Drafting, Planning and Design; and Safety Management.
- E. CIP code: 15.0000
- F. Administrative units for the program: School of Business and Technology-Technology and Applied Science Department
- G. Proposed delivery site(s) and type(s) of delivery, if applicable: On Campus; Face-to-Face
- H. Proposed date (term/year) the program will be initiated: Fall, 2019
- I. Description of Program: The required coursework included in the Engineering Technology major focus on the career track for a graduate becoming an engineering technologist. An engineering technologist is a specialist devoted to the implementation of existing technology within a field of engineering. Technologists often work with engineers on a wide variety of projects by applying basic engineering principles and technical skills. The work of a technologist is usually focused on the portion of the technology spectrum closest to product improvement, manufacturing, construction, and engineering operational functions.
- For example, a technologist may oversee the deployment of technologies recommended by engineers, provide support for end users, train the users, integrate new technologies with existing technologies or processes, maintain the base of installed technologies, assist engineers in data gathering as part of engineering studies, assist engineers in the assessment of how well installed technologies are working, serve as a liaison with various stakeholder groups in the engineering process, and provide other support to engineers and the organizations they serve.
- J. The Accreditation Board for Engineering and Technology describes the difference between engineering and engineering technology as: "Engineering and technology are separate but intimately related professions." The specific preparation included in engineering technology programs are as follows:
- Engineering technology programs primarily focus on application of theory.
 - Engineering technology programs primarily prepare their graduates to apply others' designs rather than developing them as designers.

- Once they enter the workforce, engineering technology graduates spend much of their time making plans that others have developed work for a specific industry.
- Engineering technology undergraduate programs include less mathematics work and higher-level mathematics than engineering programs.
- Engineering technology graduates are prepared to immediately begin technical assignments, rather than initially serve in internship positions, since technology programs stress industrial practices and design procedures.

Students can choose a “generic” engineering technology program or can focus on a specific area of engineering. Common areas include manufacturing engineering technology, civil engineering technology, electrical engineering technology, mechanical engineering technology, architectural engineering technology, electro-mechanical engineering technology, aeronautical engineering technology, or petroleum engineering technology. WSC has selected the specialized area of manufacturing engineering technology for this new program. Wayne State College is committed to assisting in the growth and expansion of the Nebraska manufacturing section. During the past several years, WSC has expanded the offering of manufacturing courses, have constructed a new applied technology building, and purchased the appropriate equipment to support manufacturing education.

The course content of the 57-58 credit Engineering Technology major consists of 12-13 semester credit hours of course work that can also be used toward meeting the General Studies Program outcomes, and 45 semester credit hours from the disciplines of industrial technology, economics, business, computer information systems and computer science. An internship experience is required. The Engineering Technology Major is as follows:

Engineering Technology Major		Credits
CHE	106 General Chemistry I	4
MAT	130 Pre-Calculus or	
MAT	140 Calculus	5
PHY	201 General Physics 1 or	
	301 University Physics I	3/4
ITE	109 Mechanical Engineering and Drafting	3
	204 Introduction to Applied Engineering and Technology	3
	205 Introduction to Manufacturing Technology	3
	208 Material Science--Strength of Materials	3
	302 Composite Materials	3
	322 Fundamentals of CNC Machining	3
	403 Electronics and Control Systems	3
	421 Computer integrated Manufacturing I	3
	422 Computer Integrated Manufacturing II	3
	497 Internship	6
ECO	345 Engineering Economics	3
BUS	485 Introduction to Predictive Analytics	3
CIS	477 Project Management	3
CSC	478 Robotics for Industrial Technology	3
Total		57-58

While this proposed new major is primarily built upon existing courses, there are three new courses that would be developed specifically for this major (as shown below). The courses for this program and their descriptions are:

CHE 106 General Chemistry I (4) Prerequisite: High School Chemistry or CHE 102. Emphasis on nomenclature, atomic structure, bonding, gaseous and liquid states, equilibrium, and stoichiometry. (3 hours of lecture and 3 hours of laboratory). \$20 class fee required.

MAT 130 Pre-calculus (5) Prerequisite: Placement of "C-" or better in MAT 121. A rigorous course in the computational and theoretical aspects of algebra and trigonometry; equations and inequalities; systems of equations and inequalities; complex numbers; polynomial, rational, radical, exponential logarithmic, and trigonometric functions, equations, and graphs; right triangle trigonometry; inverse functions; law of sines; law cosines, trigonometric identities. Mastery of these skills will empower a student to achieve success in Calculus I.

MAT 140 Calculus I (5)

Prerequisite: Placement or "C" or better in MAT 130. Mastery of algebra and trigonometry is necessary before taking this course. Theory and application of limits, derivatives, antiderivatives, definite integrals, and differentials of algebraic, trigonometric, and exponential functions.

PHY 201 General Physics 1 (3)

Prerequisite: 2 years of algebra. An algebra-based general physics course intended primarily for health professions, life science, and education students. Topics include vectors, kinematics and dynamics, equilibrium, rotational motion, energy, momentum, oscillations, fluids, and thermodynamics.

PHY 301 University Physics I (4)

Prerequisites: High school physics and MAT 140 or equivalent calculus class. A calculus-based general physics course intended primarily for scientists, pre-engineers, computer and math majors and advanced health professional students. Topics include electricity, magnetism, optics, and modern physics. PHY 322 concurrent enrollment by advisement.

ITE 109 Mechanical Engineering and Drafting (3)

A drafting and design class that will emphasize geometry, geometric construction, multi-view drawings, orthographic projection, sectional views, primary and secondary auxiliary views, dimensioning, isometric drawing, sketching and drafting standards. The course will include extensive use of computer aided drafting software and solid modeling software, problem solving, and elements design. Students will be introduced to prototype development and 3D printing.

ITE 204 Introduction to Applied Engineering and Technology (3)

A survey course of engineering and technology principles. Through problems that engage and challenge, students explore a broad range of topics including mechanisms, the strength of materials and automation. Students develop skill in problem solving, research and design while learning strategies for design process documentation, collaboration and presentation.

ITE 205 Introduction to Manufacturing Technology (3)

A broad exploratory course that introduces students to the manufacturing industry. Through hands-on activities students will learn how manufacturers use technology to change raw materials into

finished products. The course will include the properties and behavior of materials and the advantages and disadvantages of types of materials, basic measurements and calibration skills, and familiarity with the tools and equipment used in the manufacturing industry. The processes of casting, forming, cutting, joining machining and finishing metals, wood, plastic, polymers and composites is presented.

ITE 208 Material Science –Strength of Materials (3) NEW COURSE

This course focuses on the properties of materials and is intended as an introduction to material science. Materials are used in everything and many major engineering problems are materials problems. The course will provide students with an introduction to stress, strain, and deformation analysis of materials subjected to axial, torsional, and bending loads and will focus on mechanical lab testing and structural analysis of polymers, metal and ceramics.

ITE 302 Composite Materials (3) NEW COURSE

The following topics are covered in this course: basic concepts and definitions of composite materials; fabrication, structure, properties, and applications of fibrous materials; and structure and properties of polymer matrix, metal matrix, and ceramic matrix materials. The student will also study the interface between fiber and matrix and the properties and applications of polymer matrix composites, metal matrix composites, ceramic matrix composites, and carbon/carbon composites.

ITE 322 Fundamentals of CNC Machining (3)

The goal of this course is to teach the student to produce a product on Computer Numerical Control (CNC) mills and lathes. Topics include reading a detailed blue print, tooling selection, work holding strategies (including jigs and fixtures), CNC programming, machine setup, and CNC operations. Students will use various specialized measurement tools to meet established quality standards. Multi-axis programming will be used to program parts (Lecture and lab combined). ITE majors must pass with a C or better.

ITE 403 Electronic and Control Systems (3)

This course will cover electricity, electronics, hydraulics, and pneumatics as each relate to controlling machines in manufacturing environments. Students will further explore the areas of Alternating Current, Direct Current, analog and digital circuitry, solid state devices, AC and DC motors, sensors, programmable logic controllers, and selected information input systems. (Lecture and lab combined). ITE majors must pass with a C or better.

ITE 421 Computer Integrated Manufacturing I (3)

The introduction of basic concepts and procedures of CIM production as well as the main components and devices in a CIM cell. Using a fully simulated industrial CIM, students learn about all aspects of a CIM production cycle, from customer order and inventory control through automated manufacturing of materials into finished parts, to quality inspection and final delivery. Additional topics include planning for specifying, and integrating sensors, actuators, parts feeding devices, fixtures, material handling equipment, robots, and programmable logic controllers in an automated environment. (Lecture and lab combined).

ITE 422 Computer Integrated Manufacturing II (3)

Prerequisite: ITE 421. CIM II builds on concepts covered in CIM I. Students design, setup and operate CIM cells, and learn about robotic systems, location planning, QC devices, part feeding, assembly, MRPII, and CIM databases. A study of the tools, techniques, and guidelines used to design

parts, products, and flows while minimizing costs, facilitating manufacturing operations, maximizing quality and functionality, and supporting modern production management techniques. (Lecture and lab combined).

ITE 497 Internship (6)

Students taking an internship for their major are required to secure placement in an internship of a professional capacity and related to their Major Concentration. Internships must be approved by the advisors. Internships will be supervised for a period of at least 50 clock hours for each credit hour earned. A signed internship agreement is required.

ECO 345 Engineering Economics (3) NEW COURSE

Engineering economics is the application of economic techniques to the evaluation of design and engineering alternatives. The role of engineering economics is to assess the appropriateness of a given project, estimate its value, and justify it from an engineering standpoint. This course covers the time value of money and other cash-flow concepts, reviews economic practices and techniques used to evaluate and optimize engineering decisions, and discusses the principles of cost analysis.

BUS 485 Introduction to Predictive Analytics (3)

This course introduces an analytical toolset to address modern, data-intensive business problems. The course provides an overview of the key concepts, applications, processes and techniques relevant to business analytics. The course is intended to provide tools for business applications working with data, databases and reports from analytic models. It covers the basic fundamentals of data analysis and inferential statistics as well as predictive modeling techniques; including linear regression, logistic regression, and decision trees.

CIS 477 Project Management (3)

Prerequisite: BUS 352 or instructor approval. This course provides an introduction to the management of projects. Emphasis is placed on both the technical aspects of the project management process and the management of the human behavioral/situational aspects of projects. The nature of projects is explored. The techniques and tools of project management are introduced. Operational, tactical, and strategic implications of project management approaches are considered. The use of current project management software is incorporated. Students are also provided with an understanding of the many environmental and behavioral issues surrounding project management, and approaches to dealing with these issues.

CSC 478 Robotics for Industrial Technology (3)

An exploration of basic robotics concepts and robotics programming/operation with an emphasis on applicability to industrial settings. Basic concepts will be discussed, including coordinate transformations, sensors, path planning, stressing the importance of integrating sensors, effectors and control.

2. Centrality to Role and Mission

Wayne State College's Mission Statement reads, "dedicated to freedom of inquiry, excellence in teaching and learning and regional service and development." As part of this mission, the vision is to improve educational opportunities for all students and provide service to individuals, schools and communities. Through interactions with manufacturing professionals and others seeking the skills

of professionals dedicated to the growth of the manufacturing sector in Nebraska, WSC has gained an understanding of their needs and has developed this program to provide opportunity for students to develop the necessary skill sets to address the needs of the industry. The need for additional engineers and engineering technologists is well documented in the job sector.

The Engineering Technology major has been developed in collaboration with WSC's Industrial Technology External Advisory Council, the faculty and staff in the Technology and Applied Sciences Department, the Business and Economics Department, and the Computer Technology and Information Systems Department at Wayne State College. The overall focus of this program and the required curriculum were also discussed with Dr. Lance Perez, Dean of Engineering at the University of Nebraska-Lincoln, in relation to addressing a gap in existing programming to meet the growing needs of the Engineering workforce in Nebraska. A letter of support from Dr. Perez is included with this proposal. The new program has been vetted and approved by the Wayne State College Academic Policies Committee, a group of fifteen faculty members representing each of the academic departments on the campus and was formally approved by the Nebraska State College System Board of Trustees on March 21st, 2019.

3. Evidence of Need and Demand

A. Need for the program:

Based upon 2017 data, manufacturing is the second largest industry in Nebraska, providing almost 9.5% of the state's non-farm jobs, 10% of individual earnings and 11.2 percent of the total output in the state (\$13.6 billion). Nebraska had 97,600 manufacturing jobs paying on average \$59,867 annually. Jobs are expected to grow at a 6% rate. The manufacturing industry continues to be a driver for Nebraska's economy, with \$5.94 billion in manufactured goods exports reported for 2017. Engineering technologists, who identify potential areas for improvement in quality, productivity, efficiency and cost of automation in the manufacturing process, are in need. (Starting wage average of \$57,000 per year). (<https://www.nam.org/Data-and-Reports/State-Manufacturing-Data/State-Manufacturing-Data/January-2018/Manufacturing-Facts---Nebraska/>)

Wayne State College Industrial Technology graduates reflect a diversified background in the areas of applied engineering, construction, manufacturing, safety, and business management. Based upon the 2017-2018 WSC Career Services Graduate Employment Report, 96% of the Industrial Technology graduates reported employment in their areas of study, with 76% employed in Nebraska. Job titles include buildings material manager, CAD drafter, construction manager, environmental health and safety specialist, field engineer, inventory manager, documents control coordinator, production foreman, and computer numerical control (CNC) programmer/estimator. With the appropriate background, it is expected that graduates of a Wayne State College engineering technology major will also experience high employment rates and will seek job opportunities in Nebraska.

According to Forbes magazine, Nebraska is one of the top three states with the fastest growth in technology jobs. This is due to large companies opening branches in the state as well as the addition of many highly successful homegrown businesses. For these companies to grow and prosper, additional employees who have the ability to design, deploy, integrate, and manage

both emerging (advanced manufacturing, robotics, and 3-D printing) and traditional (manufacturing, and planning/design) technologies are needed. These skills and abilities are central to the background of an engineering technologist.

(<https://www.forbes.com/sites/susanadams/2015/08/18/the-fastest-growing-states-for-tech-jobs-in-2015/#319987a519ff>)

The National Bureau of Labor statistics does not have a separate category for engineering technology but combines this area with engineering. The Occupational Outlook Handbook indicates the employment of industrial engineers is “projected to grow 10 percent for 2016 to 2026, faster than the average for all occupations. Firms in a variety of industries will continue to seek new ways to contain cost and improve efficiency.” A 10% increase over the next ten years will see a potential increase in need of 25,100 engineers. In Nebraska, the Department of Labor predicted for the period 2010 to 2020, “engineers are also expected to see quite a bit of growth, 13.1%, as they are desired by companies to optimize production processes in order to maintain competitiveness in a globalized economy”. (<https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineering-technicians.htm>)

In a more recent article, 2016, the Nebraska Department of Labor projected that from 2016 to 2026, 13.7% more engineers would be needed to meet the needs of Nebraska industry. (<https://networks.nebraska.gov/admin/gsipub/htmlarea/uploads/Nebraska%20Economic%20Insight%20Outlook2018.pdf>) The May 2017, Nebraska State Occupational Employment and Wages Estimates Report shows that with the increase in need for industrial engineers, industry has substantially increased the mean wage for industrial engineering technicians by 14.2%. We believe that expanding the number of engineering technologist will also reduce the need and potential shortage, for engineers. (https://www.bls.gov/oes/2017/may/oes_ne.htm)

The Nebraska Department of Labor has developed a list of occupations and rates the occupations based on high wage, high skill and high demand. Other data are also considered. Based upon their ratings, many of the occupations connected to, or similar to, the engineering technology meet all three of the criteria. The occupations include: engineers, machinists, industrial production managers, engineering technicians, mechanical and civil drafters, and general operations managers. The H3 occupations are those most desired for Nebraska’s growth. (<https://networks.nebraska.gov/gsipub/index.asp?docid=1165>)

Ongoing discussions with members of the WSC Industrial Technology External Advisory Council reflected a growing need for this type of skilled workforce across a number of manufacturers within the Northeast Nebraska region. The committee wholeheartedly supports the offering of this new program at Wayne State College and the opportunities that such a program will bring to the manufacturing industry. The Industrial Technology External Advisory Council’s support of this program is reflected in a letter from the Chairman of the council, Mr. Jeff Thompson of Timpte, Inc., which is included with this proposal.

B. Demand for the Program:

WSC will seek to recruit students from a variety of backgrounds, offering opportunities for skill development in engineering technology. Much demand for new graduates today is concentrated in what are termed “STEM fields” – science, technology, engineering or math. While STEM-related fields encompass a wide range of studies, central among those is the study

of engineering where professionals apply math, science and technology to address issues important to the society and environment in which we live. Engineering Technology degrees are a doorway to STEM fields, where graduates are in high demand.

During the past several years, numerous career academies have appeared in Nebraska public schools, and the community colleges have expanded their academic programs in the areas of manufacturing and applied engineering. For example, in the past five years, Northeast Community College has constructed a new building to house many of its technical programs including those in manufacturing and applied engineering, Norfolk Public Schools has developed an extensive career academy to support those students interested in the STEM areas, and Southeast Community College has developed its associate degree in Engineering Technology. These new additions are likely to produce students interested in a four-year degree in engineering technology. It is projected that the Engineering Technology major will grow to 45 students enrolled and 14 graduates by the five-year mark and to 75 students enrolled and 20 graduates by year 10. These numbers exceed the minimum number of 28 students for viability of the program, which would average 7 graduates per year. This new program can be implemented fairly quickly, as the Engineering Technology major will require many of the existing manufacturing courses that are taught by existing faculty.

While WSC's projected enrollments, revenue and expenses may seem aggressive, the college is confident they can be met due to the increased importance that STEM education is playing in the State of Nebraska and surrounding states. While it would not be accurate to say that Nebraska is a leading state in the expansion of STEM education, it is clear that Nebraska has made a strong effort to focus on STEM education for all students. Increasingly, Nebraska youth are told that their futures depend on understanding challenging STEM concepts. These skills and competencies are vital for the modern economy.

Blueprint Nebraska has established 16 Industry Councils charged with analyzing and making recommendations related to the Nebraska economy. STEM education is a focused aspect of the charges for the Education Attainment Industry Council, Technology and Innovation Industry Council, and the Manufacturing Industry Council. Nebraska politicians are promoting scholarship monies for Industrial Technology students. WSC's success with the Engineering Technology major will mirror the college's efforts to support STEM education and to market the resources now available in the Center for Applied Technology. Collaborations with partner colleges and universities will also be important, and during the past year, WSC has made significant steps toward developing and growing a number of meaningful partnerships across the state.

4. Adequacy of Resources

A. Faculty and Staff Resources:

Currently the Technology and Applied Sciences Department has four full-time faculty members who teach the courses in the Skilled and Technical Science Education Endorsement and the three concentrations and minors connected with the Industrial Technology major. Several of the courses that will be taught in the existing Industrial Technology manufacturing management concentration are part of the existing instructional loads of these faculty members.

A commitment of two additional faculty lines was included as part of the program statement for the Center for Applied Technology and have already been built into the college's overall budget for the School of Business and Technology. These additional FTE are scheduled to be phased in as the academic offerings which are supported by the new facility expand. One new FTE is proposed for the 2019-2020 academic year. WSC also anticipates the need to develop an expanded adjunct pool to support the new major. The new major will not necessitate any new support staff.

B. Physical Facilities:

The Center for Applied Technology, completed in November 2018, contains 53,000 square feet of state of the art lab and classroom space that can fully support this new major.

C. Instructional Equipment and Informational Resources:

Approximately \$1.5 million in new equipment and instructional technology to support the areas of manufacturing, welding/metals, electronics, robotics, computer science, and other disciplines are currently available in the new Center for Applied Technology. No additional equipment or information resources are needed to support this new program.

D. Budget Projections for the first five years of program:

Based upon the facilities and equipment available in the Center for Applied Technology and WSC's expanded manufacturing curriculum, the college believes it will see a significant increase in enrollments and graduates in the Industrial Technology major that will support a start-up period for the Engineering Technology major. The two programs share numerous manufacturing courses and share general studies courses with the broader student population. Only three new courses will be added to support the Engineering Technology program.

Attached are two tables, one for revenue and one for expenses related to the new program. The revenue table, Table 2, assumes a steady growth in students from 10 students the first year to 52 students in year 5. The table assumes a number of students will exit due to normal attrition and 7 students will graduate in both years 4 and 5. Table 2 also assumes a tuition rate of \$177 per credit hour, fees of \$64.75 per credit hour, and an average student load of 12 credit hours. Total revenue over the five-year period is projected at \$354,577.50.

Table 1, projected expenses, is based on the use of adjunct faculty to initially teach the three new courses in the program and any additional sections of these or existing courses that may be needed. Adjunct pay rate is \$850 per credit hour. The new courses will be offered only one time per year during years 1 and 2, but the offering of these and/or other required courses for the program are expected to increase in the total number of sections offered by year 5, as shown in the table. General operating expenses are estimated at \$1,000 per year. Total expenses over the five-year period is projected at \$73,850. Total contribution margin is \$280,727.50.

5. Avoidance of Unnecessary Duplication

Wayne State College (WSC) is one of only two four-year institutions in Nebraska that offers an Industrial Technology non-teaching program, with the other program currently offered at the University of Nebraska-Kearney. WSC's skills/management focus allows students who desire to

work in a specific skill area such as construction, safety, drafting, planning and design or manufacturing to acquire the basic skill set required as well as the business/management background to allow for employment at an entry-level supervisory role. With the addition of the Engineering Technology major, Wayne State College will be the only Nebraska institution with a four-year bachelor's degree in Engineering Technology.

- A. Community colleges have for many years offered engineering technician degrees. Engineering technicians will usually possess an associate degree and are more often employed in service jobs. Nebraska-based Southeast Community College does offer an associate degree that is titled Engineering Technology. It is a comprehensive 117 quarter hours (78 semester hours) program. Iowa Western Community College offers several engineering technology associate degrees including electrical and industrial but not manufacturing. Metropolitan Community College offers an associate degree in Civil Engineering Technology. It is a 110 quarter hours (73 semester hours) program.

Nebraska's community colleges also offer pre-engineering courses that will transfer into established engineering schools. Only two engineering programs exist in Nebraska. They are at the University of Nebraska-Lincoln (noting that the program is offered at both the UNL and UNO campuses) and at Doane University. Neither of these programs offer engineering technology degrees. The closest four-year schools that offer an Engineering Technology major are Missouri Western State University and Minnesota State University-Mankato. South Dakota State University offers numerous engineering degrees and a Manufacturing Technology AS degree.

University programs that have informed the development of our curriculum have included Bemidji State University, St. Cloud State University, Missouri State University, Minnesota State University and Southeast Missouri State University. These schools are all accredited by the Association of Technology, Management, and Applied Engineering, an organization in which we participate. As previously mentioned, discussions with the Dean of Engineering at the University of Nebraska-Lincoln also informed the development of the program.

WSC welcomes the opportunity to work with Southeast and Metropolitan Community College to provide an in-state 2+2 program for Engineering Technology and are open to collaborating with the community colleges to develop other 2+2 Engineering Technology programs.

- B. WSC was able to identify 51 schools that are in states associated with the Midwestern Higher Education Compact that currently offer engineering technology programs. This includes both 2-year and 4-year schools. Twenty-nine of the schools offer engineering technology programs that lead to a bachelor's degree.

6. Consistency with the Comprehensive Statewide Plan for Postsecondary Education

In reviewing the document published by the Nebraska Coordinating Commission for Post-Secondary Education, Wayne State College is convinced that this new major in Engineering Technology clearly addresses the goal of "Meeting the Needs of the Students", in that the career preparation for this major is responsive to students' needs and will provide knowledge needed to succeed as capable employees. In addition, the program of study will help in "Meeting the Needs of the State" given that those in the manufacturing/applied engineering industry have indicated that there is a deficit in

the state for this type of education. Finally, the program will be “Meeting Educational Needs through Partnerships and Collaborations”, as evidenced by the current and anticipated growth of our collaboration with local manufacturers, the Nebraska Advanced Manufacturing Coalition, the Nebraska Manufacturing Advisory Council and the Nebraska community colleges.

The Engineering Technology major is a positive step toward fully utilizing the resources of the Center for Applied Technology. It derives many of its courses from those currently offered for the existing Industrial Technology major or courses common to other programs. The spacious Center for Applied Technology and the linked Gardner Hall provide adequate classroom, laboratory and student space. Two of the new courses, ITE 302 Composite Materials and ITE 208 Material Science, are mainline courses in most manufacturing programs and can be supported at nominal costs. Faculty in economics or business administration can teach the content of the third new course, ECO 345 Engineering Economics. It is clear; the Engineering Technology major will enhance Wayne State College’s ability to fully leverage the existing investment in the facilities and equipment of the Center for Applied Technology and to provide a greater return to its stakeholders.

TABLE 1: PROJECTED EXPENSES - NEW INSTRUCTIONAL PROGRAM

	FY 19-20		FY 20-21		FY 21-22		FY 22-23		FY 23-24		Total	
	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost
Personnel												
Faculty ¹	0.3	\$7,650	0.3	\$7,650	0.5	\$12,750	0.7	\$17,850	0.9	\$22,950	0.9	\$68,850
Professional											0	\$0
Graduate assistants											0	\$0
Support staff											0	\$0
Subtotal	0.3	\$7,650	0.3	\$7,650	0.5	\$12,750	0.7	\$17,850	0.9	\$22,950	0.9	\$68,850
Operating												
General Operating ²		\$1,000		\$1,000		\$1,000		\$1,000		\$1,000		\$5,000
Equipment												\$0
New or renovated space												\$0
Library/Information Resources												\$0
Other		\$1,000		\$1,000		\$1,000		\$1,000		\$1,000		\$0
Subtotal	0.3	\$8,650.00	0.3	\$8,650.00	0.5	\$13,750.00	0.7	\$18,850.00	0.9	\$23,950.00	0.9	\$73,850.00

¹ Adjunct faculty are expected to be used for the initial implementation of this new program, at a rate of \$850 per credit hour. Years One and Two will utilize adjunct faculty to teach one section of each of the three new courses for a total of 9 credits; Year Three continues the offering of one section of each of the three new courses plus accommodates two additional sections of coursework as the program grows, for a total of 15 credits; Year Four continues the offering of one section of each of the three new courses plus accommodates the need for up to four additional sections of coursework; and Year Five continues the offering of one section of each of the three new courses plus accommodates the need for up to seven additional course sections of coursework, for a total of 27 credits.

² \$1000 each year is included for general expenses for the program, which may include supplies and other costs for the materials and composite courses.

TABLE 2: REVENUE SOURCES FOR PROJECTED EXPENSES - NEW INSTRUCTIONAL PROGRAM

	FY 19-20 Year 1	FY20-21 Year 2	FY 21-22 Year 3	FY 22-23 Year 4	FY 23-24 Year 5	Total
Reallocation of Existing Funds						\$0
Required New Public Funds						\$0
1. State Funds						\$0
2. Local Tax Funds (community colleges)						\$0
Tuition and Fees ¹	\$ 21,887.50	\$ 45,963.75	\$ 72,228.75	\$ 100,682.50	\$ 113815.00	\$ 354,577.50
Other Funding (N/A)						\$0
Total revenue for new program	\$ 21,887.50	\$ 45,963.75	\$ 72,228.75	\$ 100,682.50	\$ 113815.00	\$ 354,577.50

¹ Since we do not know what tuition and fees will be after Year 1, the same amount of \$2188.75 per student has been used to compute all five years, as this would be the minimum amount of revenue that this program will generate.

Tuition and Fees Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Graduates
Existing Students	0	10	21	33	39	
Less: attrition		2	3	4	5	
Plus: New students	10	13	15	17	18	
Less: Students who graduate				7	7	14
Total Student after graduation	10	21	33	39	45	
Total Students each year (includes seniors)	10	21	33	46	52	
Tuition and Fees Revenue ¹						
Credit hour cost	\$ 177	\$ 177	\$ 177	\$ 177	\$ 177	
Average credit hours taken	12	12	12	12	12	
Total tuition revenue per student	\$ 2,124	\$ 2,124	\$ 2,124	\$ 2,124	\$ 2,124	
Per-credit fees based on 12 credits	\$64.75	\$64.75	\$64.75	\$64.75	\$64.75	
Total tuition/fee revenue per student	\$2188.75	\$2188.75	\$2188.75	\$2188.75	\$2188.75	
Total tuition/fee revenue for new program	\$ 21,887.50	\$ 45,963.75	\$ 72,228.75	\$ 100,682.50	\$ 113815.00	\$ 354,577.50