



New Degree Program Proposal for a
Bachelor of Applied Science in Engineering Technology Degree Program

Presented to the State Board for Community and Technical Colleges
April 2016

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FORM C

COVER SHEET
NEW DEGREE PROGRAM PROPOSAL

Program Information:

Program Name: Bachelor of Science in Engineering Technology
Institution Name: Wenatchee Valley College
Degree: BAS Engineering Technology
Level: Bachelor
Type: Engineering
CIP Code: 15.0805 Mechanical Engineering Technology

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Chief Academic Officer

5/1/16

Date

INTRODUCTION

In Summer 2015, Wenatchee Valley College (WVC) submitted a Statement of Need for a Bachelor of Applied Science (BAS) in Engineering Technology to the State Board for Community and Technical Colleges (SBCTC). The college was granted permission to proceed with the new degree program proposal, which follows.

WVC is known throughout North Central Washington for the opportunities it provides for residents of its three-county district. From dual enrollment programs with our K-12 partner institutions to highly sought-after workforce education programs, WVC serves this predominately rural region of Washington State. As the only comprehensive community college for 100 miles in any direction, WVC provides opportunities for people to pursue numerous pathways, needs, and wants, through its basic education, community education, workforce education, and transfer programs. WVC is also well equipped to meet the large geographic reaches of its district. The Omak extension site, located 100 miles north of Wenatchee, provides basic education, workforce education, and transfer programs on a smaller scale to serve the needs of the northern reach of the district. In addition, WVC provides a very strong online education experience through Canvas (learning management system) and the Teaching and Learning Center (which also “beams classes” through an interactive television network).

WVC is close to offering its first BAS degree with the implementation of the Bachelors in Science of Nursing (BSN) program. The BSN degree evolved out of a community need to meet external educational credentialing demands of nurses in the workforce, while being place-bound in North Central Washington. Similar to the history of the BSN degree development, the evolution of the BAS in Engineering Technology grew out of the demand in our district for a “hands on” educated workforce in industrial technology and engineering technology.

After consulting with regional industry partners and neighboring higher education partners, surveying employers, and receiving encouragement from WVC President Richardson and our Board of Trustees, the college determined that adding a Baccalaureate in Applied Science in Engineering Technology (BAS ET) was essential to serve the educational and workforce needs of the region. The new degree program will be for two groups of students: 1. Students who have completed a related technical associate degree; and, 2. Students who have completed an Associate of Arts and Sciences-Direct Transfer Agreement. Through a combination of face-to-face, hybrid, and online classes, this full-time program will take traditional students four years to earn the BAS ET degree. Students who have an earned associate degree can complete in two to three years depending on coursework previously taken (see pathways in section on Curriculum).

The degree will focus on electronics and mechatronics. As an emerging field, mechatronics is comprised of multiple facets of engineering, including mechanical engineering, electrical engineering, telecommunications engineering, control engineering and computer engineering.

The need for “hands on” engineering technologists is rapidly growing, and many industrial partners are interested in an educated workforce that not only can communicate well but also has the applicable knowledge, skills, and the ability to use critical thinking in solving problems.

As the college explored whether to pursue a four-year engineering degree or a four-year engineering technology degree, consideration was given to employers’ needs and to outside accrediting agencies such as the Accreditation Board for Engineering and Technology, Inc. (ABET), which is a non-governmental organization that accredits post-secondary education programs in applied science, computing, engineering, and engineering technology.

ABET identifies the difference between an engineering and an engineering technology program by noting that an engineering program focuses on theory while the engineering technology program focuses on application. According to the 2010-11 edition of the Occupational Outlook Handbook published by the Bureau of Labor Statistics, U.S. Department of Labor, graduates of these two types of programs are differentiated as “engineering graduates spend their time planning while engineering technologists spend their time making plans work. Furthermore, graduates of four year engineering technology programs are hired to work as entry-level (electrical) or (electronics) engineers or applied engineers but not as technicians, who hold two-year degrees.”

Given the strong background in electronics, pre-engineering, and industrial technology, Wenatchee Valley College is well positioned to offer this degree. The curriculum has been designed to ensure baccalaureate-level rigor and is based on Accreditation Board for Engineering and Technology (ABET) accreditation standards. The curriculum has been reviewed by subject experts who have taught in comparative programs and their reviews are included.

WVC administration, program faculty, and Board of Trustees are committed to building a high-quality long-term program that will be successful. The following proposal provides essential details of the program plan.

CURRICULUM

Wenatchee Valley College's Mission Statement.

Wenatchee Valley College enriches North Central Washington by serving educational and cultural needs of communities and residents throughout the service area. The college provides high-quality transfer, liberal arts, professional/technical, basic skills and continuing education for students of diverse ethnic and economic backgrounds.

BAS-ET Mission and Philosophy.

The BAS-ET degree program at WVC provides students with the depth of knowledge, critical thinking skills, problem solving skills, and practical skills in key engineering areas that are necessary to begin a career in engineering technology.

Program Learning Outcomes.

Graduates of the BAS-ET degree program at WVC will:

- Apply their knowledge of the discipline to identify, analyze, synthesize, and solve problems within the field of engineering technology.
- Possess the technical skills to be immediately productive in the workforce and have successful careers in regional, state, or national electronic and mechanical product and system development industries.
- Utilize effective management methods with a commitment to quality, timeliness, and efficiency.
- Be able to successfully communicate in oral, written, and visual modalities.
- Demonstrate increasing levels of leadership and responsibility during their careers.
- Have demonstrated professionalism and ethics understanding, respect for diversity, and awareness of societal and global issues.
- Display a desire and commitment for life-long learning through continued education, technical training, and / or professional development.

Program Evaluation Criteria and Process:

Assessment for the proposed BAS ET degree program is based on the comprehensive student achievement and program assessment processes used for all programs at Wenatchee Valley College. Program review occurs every three years and provides a thorough and comprehensive assessment of every aspect of the program. It includes strategic planning program enrollment data, such as student headcount, full-time equivalent student (FTES), and schedule trend analysis; program enrollment data, including student-faculty ratios, and analysis of full-time and part-time faculty ratios; student performance evaluation; review of curriculum coherency and currency, including an evaluation by the workforce advisory committee; program viability, including employment placement data and market analysis; and analysis of student demographics, program costs and revenues, retention and advising, articulation agreements, course delivery methods, and other pertinent data.

Until the first three-year program review occurs, staff will annually evaluate the BAS ET degree program's effectiveness by collecting and analyzing trending data on student satisfaction, preparedness, and retention; and faculty assessment of student preparedness and effectiveness of

courses to meet the program outcomes. Table I summarizes the assessment mechanisms that will be measured to make appropriate changes to the degree program, indicated by the data collected.

Industry representative will engage in review and recommendation of the curriculum and program elements through the engineering technology advisory committee. Committee members include representatives from local industries, utility districts, and K-12 partners. The advisory committee's role will be to advise the program on recommended curriculum improvements, help keep the program abreast of changes in the field, assist in student recruitment and placement, and make recommendations for additional changes that will keep the program current.

Experts from engineering, industry, and higher education will be engaged throughout the full curriculum development and implementation phase to ensure rigor of content and learning methodologies. External experts with experience in engineering and in higher education have assessed the overall curriculum and the courses to ensure rigor, consistency, and quality.

Table I: Program Assessment

Effectiveness of curriculum/program – continuously refine curriculum and program design (including discipline-based, general education, and electives) keeping the program current.	
Course evaluations by students	<ul style="list-style-type: none"> • Effectiveness of curriculum and teaching methodology within courses • Effectiveness of program in skills and knowledge progression • Effectiveness of program in meeting course learning outcomes
Industry/work experience evaluation by students and by employers	<ul style="list-style-type: none"> • Adequate balance of knowledge and skills, theory and practice • Effectiveness of program in meeting students' expectations • Effectiveness of program in meeting employers' expectations
Student survey mid-point through the program and at graduation	<ul style="list-style-type: none"> • Effectiveness of the program in skills and knowledge progression • Adequate balance of knowledge and skills, theory and practice • Effectiveness of program in meeting students' expectations • Effectiveness of institutional and program resources and support • Preparedness of faculty • Preparedness of students upon entering individual courses
Program statistics	<ul style="list-style-type: none"> • Student retention • Student course success • Student progression through program • Correlation of student success and training/job experience prior to entry into the program
Survey of BAS ET program faculty	<ul style="list-style-type: none"> • Preparedness of students upon entering individual courses • Preparedness of students upon entering the program
Graduate follow-up and industry feedback – assesses effectiveness of program in meeting career goals and employer expectations and employs findings to refine curriculum and teaching methodologies.	
Survey of program graduates six months after graduation	<ul style="list-style-type: none"> • Effect of program completion on career • Effectiveness of program in meeting job expectations • Wage and career progression

Survey of employers of program graduates six months after graduation	<ul style="list-style-type: none"> • Effectiveness of program in meeting job expectations • Observed increased skills and performance • Perceived strengths and weaknesses of current program
Oversight by BAS ET Advisory Committee – provides ongoing support and program review	
	<ul style="list-style-type: none"> • Completeness and relevance of curriculum to employer needs • Trends in field, technologies, practices, and job markets
Survey of faculty satisfaction – assesses adequacy of program support and faculty training	
Survey of BAS ET program faculty	<ul style="list-style-type: none"> • Effectiveness of institutional and program resources and support • Preparedness to teach the curriculum

Course Preparation:

The BAS ET degree is planned for two student pathways—through a transfer intent route (earning an AAS-DTA with specific course guidance) or through an applied pathway (Associate of Technical Science in Industrial Technology). The degree focus is on mechatronics which allows for graduates of all pathways to be prepared for the engineering technology curriculum.

General Education Components:

The BAS ET degree meets SBCTC's BAS requirements to include sixty general education credits in the subject areas identified in Table II. However, the Advisory Board for the program encouraged additional foundational coursework in physics, mathematics and chemistry. Table II does note the general education requirements, but it also emphasizes the skills students need in the workplace to be successful. In addition, WVC will be seeking accreditation from ABET and will ensure that the specific requirements for both accreditation bodies will be followed. This accounts for the emphasis on quantitative skills and natural sciences.

Table II: General Education Requirements in the BAS ET Program

Distribution:	Class:	Credits:
Written Skills:	ENGL&101: General Composition	5
	ENGL 201 or 235 Technical Writing	5
Quantitative Skills:	MATH&141: Pre-Calc I	<i>MATH&151 Calculus I</i> 5
	MATH&142: Pre-Calc II	<i>MATH&152 Calculus II</i> 5
	MATH&146: Statistics	<i>MATH&153 Calculus III</i> 5
Humanities:	CMST&220: Public Speaking	5
Natural Sciences:	PHYS&114: General Physics I with Lab	<i>PHYS& 221 Engineering Physics I</i> 5
	PHYS& 115: General Physics II with Lab	<i>PHYS& 222 Engineering Physics II</i> 5
	PHYS& 116: General Physics III with Lab	<i>PHYS& 223 Engineering Physics III</i> 5
	CHEM&161 General Chemistry with Lab	5
	CHEM&162 General Chemistry II with Lab	5
Social Sciences:	ECON& 201 or 202 Micro or Macro Economics	5
	ECON 305 Professional Ethics	5
	PSYC& 100 Introduction to Psychology	5
Total:		70

BAS ET Course Work:

WVC's BAS-ET degree program is designed to accommodate the needs of working adults in our community and/or place-bound students. Courses will be taught as a hybrid model which means that students will work online to complete some coursework and come to campus during evenings and weekends for some coursework.

Program Requirements		
Course Number	General Education Requirements (70)	Credit Hours
CHEM&161	General Chemistry I with Lab	5
CHEM&162	General Chemistry II with Lab	5
CMST&220	Public Speaking	5
ECON&201	Micro Economics	5
ECON 305	Professional Ethics	5
ENGL&101	Composition General	5
ENGL&235	Technical Writing	5
MATH&141	PreCalculus I	5
MATH&142	PreCalculus II	5
MATH&146	Introduction to Statistics	5
PSYC&100	General Psychology	5
PHYS&114	General Physics I with Lab	5
PHYS&115	General Physics II with Lab	5
PHYS&116	General Physics III with Lab	5
Course Number	Program Credits (50)	Credit Hours
ENGR 102	Engineering Graphics and Design	4
ENGR 105	Computer Aided Design	5
ENGR 201	Introduction to Engineering Safety	1
ELEC 115	Applied Electricity	5
ELEC 225	Industrial Electricity and Controls	5
ELEC 226	Wireless	5
ELTRO 240	Industrial Hydraulics and Pneumatics	5
ENGR&214	Engineering Statics	5
MATH&151	Calculus I	5
MATH&152	Calculus II	5
MATH&153	Calculus III	5
Course Number	Upper Division Degree Requirements (60)	Credit Hours
ELEC 325	Instrumentation	5
ENGR 310	Introduction to Project Management	2
ENGR 315	Introduction to Materials Science	5
ENGR 325	Mechanical I: Strength of Materials	5
ENGR 326	Mechanical II: Fluid Mechanics	5
ENGR 327	Mechanical III: Dynamic Systems and Control	5
ENGR 328	Hydraulic Control System	5
ENGR 329	Mechatronics	5
ENGR 401	Advanced Engineering Safety	2
ENGR 405	Engineering Technology Capstone Preparation	1
ENGR 410	Advanced Engineering Project Management	5
ENGR 412	Engineering Technology Internship	5
ENGR 415	Engineering Technology Capstone Project	10
The BAS ET is composed of 180 credits.		

There are two pathways to the BAS ET degree:

1. **Pathway One:** Entrance into program with an Associate of Arts and Sciences Direct Transfer Agreement (AAS-DTA) degree earned.
2. **Pathway Two:** Entrance into program with an earned Associate of Technical Science degree in Industrial Technology-Electronics.

Pathway One:

The academic pathway to the BAS ET degree through the AAS-DTA has specific guidelines for supporting successful transition into the BAS degree program. This pathway suggests the following coursework during the completion of the AAS-DTA (as denoted by Years One and Two):

Writing Skills:	ENGL& 101 and ENGL&235	10
Quantitative Skills:	MATH& 141, MATH& 142, MATH& 146	15
Humanities Distribution:	CMST& 220, PHIL 211, and SPAN 121	15
Natural Sciences:	PHYS& 114, 115*, 116* (or 221, 222, 223)	5 (10*)
	CHEM&161 and 162*	5 (5*)
	MATH&151, 152*, 153*	5 (10*)
Social Sciences:	ECON&201; PSYC& 100; SOC&101	15
Suggested Electives:	ENGR 102, 105 ELEC 115	4, 5 5
	<i>All classes noted with * correspond with the DTA requirements of 30 electives.</i>	<i>Choose from electives noted with *.</i>
		90

AAS-DTA Pathway to the BAS ET:

YEAR ONE:	Credits:	YEAR TWO:	Credits:
PHYS& 114, 115, 116	15	MATH&151, 152, 153	15
ENGL& 101: General Composition	5	ENGL&235: Technical Writing	5
PSYC&100: Introduction to Psychology	5	ECON&201 or 202 Micro or Macro Economics	5
MATH& 141, MATH& 142, MATH& 146	15		
PHIL 211: Philosophy of Ethics	5	SOC&101: Intro to Sociology	5
		SPAN& 121 Intro to Spanish	5
		CMST&220 Public Speaking	5
		ENGR 201: Intro to Engineering Safety	1
		ENGR 102: Engineering Graphics and Design	4
Total Annual Credits:	45		45
		Total Credits for the Two Years:	90

In order to provide a foundation for students unfamiliar to engineering and electronics, the following sequence is recommended prior to the start of the BAS ET degree program: ELEC 115: *Applied Electricity*; ELEC 125: *Wiring Diagrams & Schematics*, and ELEC 135: *Control Fundamentals*. This can be completed during the summer between the first and second year of the program or via directed study as arranged with the program faculty.

Prior to official admission into the BAS Program, students in this pathway must successfully earn the AAS-DTA degree with a 2.5 cumulative GPA.

YEAR THREE	Credits:	YEAR FOUR	Credits:
ENGR 105: Computer Aided Design	5	ELTRO 240: Industrial Hydraulics and Pneumatics	5
ELEC 225: Industrial Electricity and Controls	5	ENGR 310: Project Management	2
ELEC 226: Wireless	5	ENGR 328: Hydraulic Control System	5
ELEC 325: Instrumentation	5	ENGR 329: Mechatronics	5
ENGR 315: Materials Science	5	ENGR 401: Advanced Engineering Safety	5
ENGR 325: Mechanical I: Strength of Materials	5	ENGR 405: Engineering Technology Capstone Preparation	1
ENGR 326: Mechanical II: Fluid Mechanics	5	ENGR 410: Advanced Engineering Project Management	5
ENGR 327: Mechanical III: Dynamic Systems and Control	5	ENGR 412 (Internship—can be done in summer)	3-5
ENGR&214: Engineering Statics	5	ENGR 415: Engineering Technology Capstone Project	10
		ECON 305: Professional Ethics	5
Total Annual Credits:	45		45
Total Degree Credits:			180

Pathway Two:

WVC's Associate in Technical Science Degree programs in Industrial Technology--Electronics and Machining are two feeder programs into the BAS-ET degree. Both programs offer two year degrees that only require basic level math competency. In addition, the one year welding certificate can serve as a feeder program to the degree as well. If students are interested in the BAS ET degree, they are advised to enroll in the pre-calculus math sequence during their two year program of study, as well as CHEM&121. Students need to be ready for upper division course work in math and science when they begin the BAS ET degree.

Both of these pathways from Associate in Technical Science degrees into the BAS ET degree are longer than desired. Work is underway to strengthen the mathematics and English requirements in both of these degree programs to better streamline the process and experience for students. WVC also recognizes the newly adopted common course numbered machining curriculum, which we will be looking at adopting in the coming year. Therefore, at this time, WVC would like to offer a pathway to the BAS ET degree through the Associate in Technical Science Degree program in Industrial Technology—Electronics.

Industrial Technology—Electronics Program and Pathway to the BAS ET:

YEAR ONE:	Credits:	YEAR TWO:	Credits:
ELEC 125: Writing Diagrams & Schematics	5	CTS 110: Computer Hardware	5
ENGR 102: Engineering Graphics and Design	4	PSYC&100: Introduction to Psychology	5
BCT 116: Professional Work Relations	3	ELTRO 202: Introduction to the NEC	2
ELTRO 101: Basic DC-1	5	ELTRO 210: Programming Software for PLCs	5
ENGL 100: Writing in the Workplace or higher	5	ELTRO 223: Programming Software for Tag- Based PLCs	3
ENGR 105: Computer Aided Design	5	ELTRO 220: Control Devices and Motor Drives	3
ELEC 115: Applied Electricity	5	INDT 164: Plant Maintenance	5
ELTRO 121: Digital Electronics	5	ELTRO 221: Graphic Interface Programs for PLCs	5
MATH 100T: Technical Math or higher	5	ELEC 225: Industrial Electricity and Controls	5
OCED 130: Industrial Safety	5	ELTRO 230: Programmable Logic Controller Network	5
ELTRO 132: Intro to Computer Controls and PLCs	5	ELTRO 231: Troubleshooting Electronic PLC Control Systems	5
ELEC 135: Control Fundamentals	3	ELTRO 240: Industrial Hydraulics and Pneumatics	5
WELD 128: Basic Welding (*consider Summer offering)	3*	ECON 201 or 202 Micro or Macro Economics	5
Total Credits:	58* or 55		58

Prior to official admission into the BAS Program, students in this pathway must earn the Associate in Technical Science—Electronics, and complete the following coursework with at least a 2.5 GPA:

MATH&140, MATH&142, and MATH&146 [Maybe two instead of three classes if they took the higher math option in Year One]

ENGL&101, ENGL 235 [Only if they did not take the higher option in Year One]

CHEM&161, CHEM&162

PHYS&114, PHYS&115, and PHYS&116

Upon entry to the junior year (year three), students will have earned at least 30 credits towards the overall 60 general education requirements for the BAS ET degree program. These credits are highlighted in red above. The remaining general education requirements are noted below in blue.

YEAR THREE	Credits:	YEAR FOUR	Credits:
MATH&151, 152, and 153 [Calculus Series]	15	ENGR 310: Project Management	2
ENGR&214 Engineering Statics	5	ENGR 328: Hydraulic Control System	5
ELEC 325: Instrumentation	5	ENGR 329: Mechatronics	5
ENGR 315: Materials Science	5	ENGR 401: Advanced Engineering Safety	5
ENGR 325: Mechanical I: Strength of Materials	5	ENGR 405: Engineering Technology Capstone Preparation	1
ENGR 326: Mechanical II: Fluid Mechanics	5	ENGR 410: Advanced Engineering Project Management	5
ENGR 327: Mechanical III: Dynamic Systems and Control	5	ENGR 412 (Internship—can be done in summer)	3-5
CMST&220: Public Speaking	5	ENGR 415: Engineering Technology Capstone Project	10
		ECON 305: Professional Ethics	5
		Humanities Elective	5
Total Credits:	55		46

Curriculum Development:

The following are courses that will be developed in the coming year under the leadership of current faculty and the new faculty program director. All classes are 5 credits, unless otherwise noted.

ECON 305: Professional Ethics: *This course will examine and critically analyze not only the general relationship between ethics and professional life but the particular consequences of ethical considerations within the student's own profession and the professions of others with whom the student must live and work. [WVC anticipates sharing this course with all of its future BAS degree programs].*

ELEC 226 Wireless. *This course introduces principles and techniques used to analyze and design wireless communication systems. Topics include electromagnetic waves, antennas, propagation and digital modulation. Mobile and cellular systems are emphasized; other selected applications such as wireless local area network (WiFi), broadband wireless (WiMAX) and Bluetooth (wireless PAN) are also covered. Students use computer software to simulate, analyze and solve problems.*

ELEC 325: Instrumentation: *This course covers sensors, transducers, signal conditioning devices and computer-based instrumentation. Input/output (I/O) characteristics of sensors for pressure, distance, light, airflow, temperature, Hall effect and humidity are evaluated using data acquisition equipment and virtual instrumentation. Emphasis is placed on industrial applications, troubleshooting and determining I/O requirements to interface actuators such as AC, DC, stepper and servo motors to programmable logic controllers (PLCs).*

ENGR 201: Introduction to Engineering Safety (2) *Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students. An introduction to lock-out tag procedures, electrical arc flash protection, personal protection equipment (PPE) safety gear, and hands-on safety training.*

ENGR 310: Introduction to Project Management (2): *Issues and case studies of policy development, strategy, planning and management of technology in the overall corporate environment. Including understanding of LEAN manufacturing principles.*

ENGR 315: Introduction to Materials Science: *Crystal structure, microstructure, and physical properties of metals, ceramics, polymers, composites, and amorphous materials. Also includes elementary mechanical behavior and phase equilibria.*

ENGR 325: Mechanical I: Strength of Materials: *The mechanics of materials emphasizing the analysis and design of statically determinate beams, columns, and structural members in torsion and application of the three moment equations to statically indeterminate beams.*

ENGR 326: Mechanical II: Fluid Mechanics : *A course in fluid mechanics. Topics include: fluid properties, hydrostatics, conservation laws, infinitesimal and finite control volume analysis,*

Navier-Stokes equations, dimensional analysis, internal and external flows. Students will build upon knowledge gained in ENGR 325 and analyze, troubleshoot, predict and problem-solve complex structures.

ENGR 327: Mechanical III: Dynamic Systems and Control *Modeling and analysis of dynamic systems and introduction to feedback control. Topics include dynamic modeling and response of mechanical, electrical, fluid, and thermal systems; and feedback control systems analysis. Students will build upon skills learned in the sequence of courses that will allow them to draw conclusions about complex problems and provide solutions.*

ENGR 328: Hydraulic Control System: *Analysis of hydraulic control components and systems. Topics include pumps, valves, actuators, and industrial and mobile control systems.*

ENGR 329: Mechatronics: *Design of systems which require the integration of mechanical and electronic components. Topics include microcontrollers, sensors, actuators, mechanical systems, real time control system programming, and modeling of electronic and mechanical systems.*

ENGR 401: Advanced Engineering Safety: *Safety and health in the manufacturing, construction, and utilities industries, including pertinent laws, codes, regulations, standards, and product liability considerations. Organizational and administrative principles and practices for safety management and safety engineering, accident investigation, safety education, and safety enforcement.*

ENGR 405: Engineering Technology Capstone Preparation (1). *Prepare and plan for capstone project.*

ENGR 410: Advanced Engineering Project Management. *Issues and case studies of policy development, strategy, planning and management of technology in the overall corporate environment.*

ENGR 412: Engineering Technology Internship (3-5). *Supervised on-the-job training with a manufacturer, processor, or related industrial firm. Students will need a letter of recommendation and faculty director permission.*

ENGR 415: Engineering Technology Capstone Project (10)
Students can choose projects in electronics, renewable energy systems, wireless/data communications and automation/robotics. Typical project activities include the research and design phase, the execution phase, and the project report phase. A written report and oral presentation is required.

QUALIFIED FACULTY and STAFF

WVC projects an enrollment of 15 full-time equivalent students (FTEs) during the first year of the BAS ET program, with full capacity at 25 FTEs and a total headcount of 35 by 2020. Faculty who will teach in the program will hold a PhD, or a master's degree, in engineering or a related field. Ideally, the faculty will have work experience and industrial certification.

The college currently employs several full-time and adjunct (part-time) faculty, all of whom have their educational background and training (including certifications and applicable workplace experience) in their respective fields. These faculty members' teaching loads support the Industrial Technology (INDT) programs (Aerospace Electronics, Electronics, Machining, as well as Environmental Systems and Refrigeration Technology {ESRT}).

To offer the BAS ET degree, WVC will hire a full time faculty with the appropriate credentials (i.e., MS or PhD in field of engineering) to serve as the lead over the BAS ET program. Having a faculty member with these credentials will enhance the faculty talent noted above and provide leadership for the first four year degree program in the workforce education division at WVC. In addition, part-time faculty members will be hired from industry with PhD or MS credentials to teach the remaining 300-400 level courses. There are several credentialed engineers with the public utility districts, and with hydro power facilities that are eager to teach. WVC anticipates, with glee, the need to hire another full-time faculty member once the program is underway.

TABLE V: Faculty

Faculty	FT/ PT	Hire Date	Credentials	Certs/ Licenses	Classes Taught
Rob Anderson	PT	2012	ATS, Industrial Technology-- Electronics	None	Industrial Technology - Electronics (ELTRO) 220, 221, and 223
David Burns	FT	2001	B.A., B.A., Anthropology, Education, Western Washington University/ Computer Systems	None	Computer Technology (CTS) 110, 115, 120, 130, 140, 150, 160, 221, 222, 225, 232, and 235
Larry Cordes	PT	2010	B.A., Mathematics, Wartburg College B.S., Civil Engineering, Iowa State University M.S., Civil Engineering, Oregon State University	PE	Math 098, 093 and ENGR&214
Awanthi Hewage	FT	2014	B.A., Chemistry, University of Columbo PhD, Chemistry, University of Nevada, Reno	None	Chemistry (CHEM) 121, 161, 162, and 163

Zack Jacobson	FT	1999	A.S., A.A., Wenatchee Valley College B.A. Physics, Central Washington University	Licensed Electrician	Industrial Technology - Electronics (ELEC) 115, 125, 135 (ELTRO) 121, 240 (INDT) 100, 164
Micky Jennings	FT	2015	A.A.S. Precision Machining, Walla Walla Community College	None	Machining (INDT) 105, 205, 115, 215, 125, and 225
Greg Jourdan	FT	1985	A.S. Applied Refrigeration Science, B.S. Industrial Engineering, Central Missouri University. M.A.C.Ed Adult & Continuing Education, Washington State University	Licensed Electrician	Environmental Systems and Refrigeration (ESRT) 102, 110, 120, 114, 130, 136, 200, 205, 210, 215, 220, 222, 223, 230, 238, 295
Bruce Unger	FT	1988	B.S., Physics, State University of New York-Oswego M.S., Ph.D., Physics, Washington State University	None	Physics (Phys&) 100, 114, 115, 116, 221, 222, and 223
Craig VanderHart	FT	2012	B.A., Religion and Philosophy, Northwest University M.A., Philosophy, Gonzaga University	None	PHIL 211
Sharon Wiest	FT	1997	BS Math, Gonzaga University MS Applied Math, University of Colorado	None	Math (Math&) 099, 141, 142, 146, 211
Derin Wysham	FT	2013	BS Mathematical Sciences, University of California PhD Applied Mathematics, University of Colorado	None	Math (Math&) 098, 140, 141, 148, 151, 152, 153, 254
TBD	FT	2016	PhD or Masters Prepared in Engineering/Related Field	Not Known	ENGR 325-329 ENGR 401, 405, 412, 415
TBD	PT	2016	PhD or Masters Prepared in Engineering/Related Field	Not Known	ENGR 310, ENGR 315, 325, 410
(Cannot share yet—he is not officially hired!)	FT	2016	PhD, Economics from University of Washington	None	ECON 305

SELECTIVE ADMISSION PROCESS

In keeping with its mission to serve the educational and cultural needs of North Central Washington, WVC will employ minimum requirements for admission to the degree program that will help ensure student success.

As noted in the Course Preparation section of this proposal, admission pathways can be done in two ways.

Admissions Requirements:	Pathway One: Entrance into program with an AAS-DTA earned.	Pathway Two: Entrance into program with an earned Associate of Technical Science degree in Industrial Technology-Electronics.
Resume	X	X
Interview with faculty director.	X	X
Letter of recommendation.	X	X
Earned degree.	X	X
GPA 2.5	X	X

If there are more applicants than available seats in the program, first consideration will be given to qualified applicants who meet the priority deadline which is the first week of Spring Quarter preceding Fall enrollment. From there, priority consideration will be given to graduates of the CAMP program. One of WVC's most successful student retention programs is CAMP (College Assistance Migrant Program). In our second five year grant cycle, students in CAMP are being retained at a higher level and therefore completing at a higher level than their non-CAMP counterparts. The success of this program is its strong scaffolding of student support services and a case management approach to advising. The CAMP program maintains a STEM specialist on their staff who works alongside faculty, students, and transfer institutions to best assist students and their goals.

Recruitment efforts will be held throughout WVC's service district and will include visits to secondary schools, outreach to industry and community partners, and participation in college fairs. WVC already has a strong outreach effort throughout its service district and efforts to recruit for BAS ET will benefit from these established relationships.

In addition, WVC is involved with recruitment efforts that target women and unrepresented populations through the Apple STEM Network¹ and the anticipated HSI STEM Grant offered through the Title III Program with the federal government.

¹ The Apple STEM Network is a three-dimensional alliance of K-12, Higher Ed and community partners seeded at the confluence of the Wenatchee and Columbia rivers, including the cities of Cashmere, Wenatchee and East Wenatchee in Chelan and Douglas counties. It represents a

Over the past few years, WVC has participated in several outreach efforts to encourage female and unrepresented student participation in STEM fields. “Try a Trade” and “Expanding Your Horizons” are both events hosted by WVC in the past that have had this focus. Later in May of this year, WVC is hosting the “Pizza, Pop and Powertools” event to encourage female students in middle school to think about careers in workforce education. This is in partnership with the Wenatchee Skill Center and the Wenatchee School District. Over 100 students will be participating.

Within the faculty roster in the Science Division, there are four female scientists (three with PhDs and one with a masters degree; and two are from diverse backgrounds) who routinely participate and lead efforts to connect female students with opportunities in STEM fields. Most recently, in February, two of our female science faculty members took fifteen female students to the University of Washington for the Women in STEM Summit. WVC looks forward to continuing this outreach work with the introduction of the BAS ET degree program.

diverse region with tremendous potential for STEM industry in agriculture, energies and innovation. With its collective efforts the network intends to: provide a constructive support system for educators who aim to meet the rising challenge for all students to develop 21st century skills and STEM literacy, to integrate community mentorship and promote authentic project-based learning and field experiences for all levels of education, and engage students in exploring the world of opportunities on the horizon through STEM (www.washingtonstem.org).

STUDENT SERVICES

WVC will provide strong academic support for its BAS ET students to facilitate their success. The college anticipates the majority of students enrolled in this program will be working adults. These students will be taking hybrid, online, face-to-face, and weekend/evening courses. In order to ensure access to program advising, the faculty program director will be available during face-to-face instruction on a regular basis and through email/phone. The faculty program director will be the primary point of contact for the students before admission, through the program, and into transition to master's degrees for those who wish to progress academically. As the program grows, as well as other BAS offerings, WVC anticipates hiring a BAS Director that would help manage and advise baccalaureate seeking students.

WVC faculty is committed to the success of every student throughout the BAS-ET program. To facilitate success, the Workforce Education Division has a director/navigator/retention specialist, who currently works with numerous Workforce Education students and who will expand to assist BAS-ET students. The navigator will provide educational planning and support services to prospective BAS-ET students. These services include: providing assistance with the application process and applying for financial aid; help with selecting and registering for classes; and referrals to Student Support Services as needed.

Student Services and Instruction personnel have started meeting together to plan for the start of the college's first BAS degree. Monthly meetings have helped the college maintain a dialogue to get this underway—especially focusing on Curriculum, Financial Aid, Advising, and Admissions. The dedicated advisor for the program will be the faculty director at first, and as the program grows, the above noted BAS Director will be hired.

Library and Technology Services: Library resources extend beyond the book collection to include Ebrary's Academic Complete, a collection of 100,000+ academic e-books. Academic journals are provided with core academic collections from ProQuest and Gale. Articles not covered by WVC databases are easily accessible through the InterLibrary Loan service.

WVC librarians are available to help find, evaluate and document resources. The WVC 24x7 online "Ask a Librarian" service is available to all students. Additional library resources are available through the Regional Library Distribution Center.

The library's study rooms can be reserved online, and two computer labs and plentiful wireless access support students' needs. WVC's Virtual Desktop service allows students to access their WVC desktop wherever they have internet access.

WVC has numerous services available electronically, including online registration, online tutoring, 24/7 access to librarians, extensive research databases suitable for baccalaureate-level research, degree audits and transcript requests. For face-to-face support, many services have evening and weekend hours available. Last year, WVC hired an E-Resources Librarian who provides services to faculty, staff and students with online materials, especially open educational resources. This position supports expanding the services offered and needed to BAS students

with the introduction of this degree by dialoguing with other librarians at schools in similar transitions.

In anticipation of the first baccalaureate degree, the Dean of Library and Technology Services has begun conversations with WVC's faculty librarians and staff about how to scale support for 300/400 level courses. Budgets for the 2016-17 academic year have been identified for securing materials for this coursework. When the faculty director is hired, additional materials will need to be purchased based on their areas of expertise and analyzation of the collection.

The WVC library system is well positioned to support this degree. While the library does maintain a current print collection supporting the curriculum, the majority of resources are electronic and are easily discoverable using Primo, a search tool that simultaneously searches the college catalog and all of its electronic databases. Current electronic resources include 8 databases focusing on science, math and engineering; 4 general resources, including 8,600 books in the eBrary collection on engineering, and two reference resources, including a comprehensive database that includes 42 reference titles on technology and engineering.²

The library's Dean and staff are in a unique position to support this degree by virtue of the fact that the Dean's department includes the district's library system, information technology unit, distance learning and content production unit and the core tutoring services. The Dean is an equal partner with the district's academic deans in ensuring the success of the district's academic programs. The department can respond quickly and cohesively to teaching and learning needs and can leverage budget as well as revenue from distance learning and technology fees. Also, the Dean and key staff are leaders in the community and technical college system's current implementation of a common library software platform. The new platform will increase access to engineering materials held in libraries across the Northwest, by virtue of the fact that SBCTC libraries will be on the same platform as four-year colleges in the Orbis-Cascade and WIN networks.

New support will include assigning a librarian to liaise with the Dean responsible for this degree to ensure that course syllabi are analyzed to ensure they can be supported with library resources, to design appropriate library instruction for these students, to identify new library resources needed to support the degree and to liaise with peers at other institutions offering the same

² *Existing Science & Engineering Resources Include:*

- arXiv.org: Electronic pre-print database in physics, astronomy, math, and computer science. Provided by Cornell University Libraries.
- CogPrints: Database of preprint scholarly articles on Computer Science, Neuroscience, Philosophy, and Psychology.
- Directory of Open Access Journals: Categorized, searchable links to free, full text, quality controlled scientific and scholarly journals.
- GreenFILE: Abstracts and full text journal articles on ecology and the environment.
- PNAS: Proceedings of the National Academy of Sciences.
- Science.gov: Search across the scientific reports and pages of 13 government agencies.
- Science Journals: Contains more than 1,270 unique titles in full text, covering Physics, Engineering, Astronomy, Biology, Earth Science, Chemistry
- Science Magazine: Scientific articles, news, images and more from Science Magazine.

degree. The library has a demonstrated ability to devote resources to new courses and programs, and has significant flexibility with its budget to support both the implementation and maintenance of programs. In addition, the district has three years of Title III grant funds remaining which include funds aimed at acquiring library materials in support of new programs. Close to \$70, 000 was allotted for new materials for transitions to existing or new programs in this grant period. The Title III grant (awarded in 2013) has helped WVC change its culture with online resources and support; thus positioning the college well to take on a four year degree program.

Financial Aid: The WVC Financial Aid Office assists students in finding and applying for financial assistance, including grants, work study opportunities, veteran benefits, scholarships and student loans. Programs available include the Federal Pell Grant, Federal Supplemental Education Opportunity Grant, Federal Direct Student Loans, Federal Direct Parent Loan to Undergraduate Students, Veteran Administration Benefits, Federal Work Study, Washington State Need Grant, Washington State Opportunity Grant, Washington State Work-Study Program, Wenatchee Valley College Institutional Grant, Wenatchee Valley College Tuition Waiver, and Wenatchee Valley College Tuition Payment Plan. The Financial Aid Director has been involved with the planning for offering a BAS at WVC and is creating training for all Financial Aid personnel.

Career Center: The WVC Career Center can support BAS ET students with all aspects of the career development process, including resumé and cover letter reviews, interview preparation, job hunting strategies, and overall career and life planning targeted towards the student's individual career goals. In addition, the Career Center can help prepare students for their required internships.

Child Care: Through a partnership with WVC and Wenatchee School District affordable child care services are available to WVC students at the Westside Early Learning Center. The program provides quality, licensed childcare for children from one month to five years of age while their parents(s) attend class, study or work.

Counseling: Counselors provide academic, career and personal counseling. The services are free, voluntary, and confidential for WVC students. Student services/counseling is dedicated to supporting students in their pursuit of academic and personal growth.

Computer Labs: There are over a dozen computer labs and learning labs available for students in Wenatchi Hall, Wells Hall, and in the Brown Library. In addition, the Library lends Chromebooks and other technology to students for short term and long term use.

Disability Resource Center: The Disability Resource Center provides assessment and accommodations for students with documented disabilities. They provide special course materials, coordinate testing for disabled students and assist faculty to provide appropriate accommodations.

The Tutor Center and WriteLab: Tutoring services are available free of charge to all currently enrolled students, regardless of number of credits being sought. The goal of tutoring is to provide

supplemental instructional support that will enhance the educational experience at WVC. The WriteLab provides help to all WVC students who have writing assignments. The Tutor Center and WriteLab are available on campus, and the eTutoring service is available online 24x7. Recently, a new coordinator for tutoring services was hired. She comes to WVC with a wealth of experience from the WSU tutoring center in Pullman, where she was university trained to provide specific tutoring services. WVC Tutoring Center is also offering an evening schedule to bring industry partners into the center to assist with upper level coursework.

Veterans Administration Programs: The Veterans Affairs Office assists all eligible veterans, reservists, dependents and VA chapter 31 students. A Veterans Study Lounge is also available in the Brown Library. Over \$20,000 is made available to veteran students for work study opportunities throughout WVC each academic year. Veterans Affairs Coordinator, Laura Murphy, works with veteran students to address challenges in veteran benefits and non-face-to-face course-work.

COMMITMENT TO A SUSTAINABLE HIGH-QUALITY PROGRAM

Although tuition will be set at the same level as bachelor's degree state-support programs, the BAS ET degree program will be funded as a self-support program. Tuition for 2016-17 is \$202.47 per credit. A three-year financial plan showing expenses and income is shown in Table V. Wenatchee Valley College is fully committed to build and sustain a successful BAS ET degree program. The college will provide financial support until the program is completely self-sufficient, which is expected by year two. As demonstrated in the Statement of Need, community partners in the North Central Region are extremely supportive of the degree program. Public utilities, fruit warehouses, and manufacturing companies are all eager for the new program to begin as soon as possible. The college fully expects to achieve full enrollment of 35 FTES by year three.

Building upon the strength of the current Welding, Machining, and Industrial Technology programs, the BAS ET will need minimum equipment. The program will need specialized classrooms for teaching, which are under design development. In addition, funds have been allocated in the college's general fund budget for instructional technology (IT) equipment so that faculty are able to use web-enhanced technology that will capture lectures and allow students to review them online.

WVC will hire a full time faculty member who will lead the BAS ET degree program and serve as the program director. The cost of this full-time, tenure track position will be introduced into the 2016-17 budget planning process in Spring 2016.

Table V: Financial Plan for BAS ET Degree Program

Estimated Program Expenses				
Cost	Year 0 (FS 16)	Year 1 (FY17)	Year 2 (FY 18)	Year 3 (FY 19)
Full Time Faculty	0	53,431	53,431	53,431
Part Time Faculty	0	17,800	17,800	17,800
Curriculum Development Stipends	11,200	6,800	2,000	2,000
Benefits	2,000	23,993	23,993	23,993
Goods and Services	2,000	3,000	3,000	3,000
Travel	1,000	2,000	2,000	2,000
Equipment	0	5,000	5,000	5,000
Faculty Professional Development	1,500	1,500	1,500	1,500
ABET accreditation	0	5,000	675	675
Total Costs	18,700	118,529	109,399	109,399
Estimated Program Income				
FTEs	0	25	30	35
Annual BAS Tuition (3 quarters)	0	6,228	6,228	6,228
Tuition and Fees:	0	155,705	162,545	186,636

PROGRAM SPECIFIC ACCREDITATION

The BAS ET degree program is being designed along the program accreditation standards for Accreditation Board for Engineering and Technology. Within ABET, there are four accreditation commissions depending upon focus and intent of degree program. WVC is working within the accreditation framework outlined by ABET's Engineering Technology Accreditation Commission (ETAC). This commission focuses exclusively on engineering technology at both the Associate and Bachelor levels.

Programs accredited by ETAC prepare baccalaureate degree graduates for careers as engineering technologists and prepare associate degree graduates for careers as engineering technicians. As with all ETAC accredited programs, the BAS ET, will be structured in compliance with ABET requirements, including using the words "engineering technology" in the program name. ABET provides a very specific eighteen month, five-step process that constitutes the accreditation evaluation, which the college will follow.

WVC currently does not have an ABET accredited program. The college will draft and submit a preliminary Self-Study Report (also called a Readiness Review) in compliance with ABET requirements for the BAS ET program for which the college is seeking initial accreditation. This will commence once the faculty program director is hired and be one of the primary duties of the position during the first year of employment.

The Program Self-Study Report, or Readiness Review, for accreditation under the ABET and ETAC requirements will provide background information that will include a history of the program development, identify options that are available to students within the program under the degree and will specify program delivery modes. The report requirements are very similar to the development process for a BAS degree within the SBCTC.

The report includes seven criteria:

1. **Students:** The College will specify the requirements and process for accepting new students into the program; discuss the process to evaluate student performance, and monitor student progress.
2. **Program and Student Educational Objectives:** Review of mission and program learning outcomes for consistency; process of evaluation for the identified objectives for both students and the program; and process for the establishment and revision of the student learning outcomes.
3. **Continuous Improvement:** Assessment of program outcomes, student learning outcomes, and incorporation of changes determined through this assessment.
4. **Curriculum:** Program curriculum development; progression of coursework, and evaluation. Role of advisory committee in curriculum development and progress.
5. **Faculty:** Faculty Qualifications, faculty workload, faculty numbers, and professional development.
6. **Facilities:** Guidance, computer resources, offices, classrooms, labs, and maintenance.
7. **Institutional Support:** Leadership, budget, and faculty hiring and retention

POST BACCALAUREATE EDUCATION PROCESS

As noted in the Statement of Need, graduates of the BAS ET degree program from WVC will be highly employable in North Central Washington. Many of our students are already working full time and we anticipate with this additional degree our graduates will be able to progress at their place of employment.

For a graduate with a BAS ET degree, there exists a pathway to becoming licensed as a Professional Engineer (PE) in the State of Washington. Once a student earns a BAS degree, they can apply for and pass the Fundamentals of Engineering Exam (aka, certification as engineer in training, EIT). They will need to earn eight years of profession-level experience under the direct supervision of a licensed engineer (but formal education may substitute for a portion of this time). Once that apprenticeship is complete, a graduate can apply for, and pass, the Principles and Practices of Engineering exam, which grants a license as a professional engineer (PE). This is a longer path to attain the license; however, there is still a possibility through the pathway of the BAS ET program.

Other options include graduate school programs that would specialize in engineering technology.

Currently there are no programs in WVC's service area that would address these employment needs. Central Washington University, which is located in Kittitas County, approximately 70 miles south of Wenatchee, currently offers two Bachelor of Science degrees in Engineering Technology among the six programs in its Engineering Technologies, Safety, and Construction department. Data from the CWU program websites indicate that the two programs produced 33 graduates in 2013 – 13 in Electronics Engineering Technology and 20 in Mechanical Engineering Technology. WVC's existing related programs are at the associate degree level and produce graduates qualified for technician-level occupations. WVC's projected 10 annual BAS graduates combined with CWU's graduates will not exceed the current regional supply gap and will aid local employers in recruiting qualified personnel.

WVC's BAS ET degree would dovetail nicely into CWU's program. The academic leadership (Provost and Associate Provost) at CWU has transitioned several times since the conception of this proposal and WVC continues to keep the university in the loop. The Director of the Masters in Science for Engineering Technology, Dr. Darren Olson, has reviewed WVC's BAS ET degree proposal and noted the following:

Thank you for sending the materials to me. In my opinion the proposed curriculum is fundamentally sound and, as the coordinator for the MSET program at CWU, I can verify that students who successfully complete this program will be eligible for admission to the MSET (pending compliance with all of the CWU Graduate School admission requirements). I wish you success moving forward with establishing the program. (Email communication April 28, 2016)

WVC looks forward to the continued partnership and conversation with CWU regarding this endeavor.

EXTERNAL EXPERT EVALUATION

Wenatchee Valley College has sought the expertise of three engineers—two in the world of higher education and one who serves in industry.

Mr. Mike Newtown is the Dean of the Canino School of Engineering Technology at the State University of New York at Canton. He served as professional engineer, then as a faculty member for the past twenty years. Close to four years ago, he was asked to serve as the Dean for Engineering Technology. Mr. Newtown has worked to transform the engineering programs from two year offerings to four year offerings. He also successfully led the program specific accreditation processes for ABET.

Mike Newtown

Dean of Canino School for Engineering Technology
State University of New York, Canton
34 Cornell Drive
Canton, NY 13617
(315) 386-7411
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Dr. Stephen Silliman is the Dean of the School of Engineering and Applied Science at Gonzaga University in Spokane, Washington. He has served as the dean for four years and prior to that held successive faculty positions and titles as a professor of civil engineering at the University of Notre Dame. He earned a BSE in Civil Engineering from Princeton University and a MS and PhD in Hydrology from the University of Arizona.

Dr. Stephen Silliman

Dean of the School of Engineering and Applied Science
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Mr. Ryan Fancher is the Manager of Engineering at Confluence Health in Wenatchee, WA. He has overseen engineers, supervisors, and maintenance personnel with over 60 personnel reporting to him. He earned his Bachelors of Science degree in Materials Science and Engineering from Washington State University and has been in food and manufacturing industries in North Central Washington for 16 years.

Ryan Fancher

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Incorporating Expert Evaluator Feedback:

The feedback received from our expert evaluators provided WVC with a direction forward to strengthen the BAS ET degree program proposal. The majority of feedback was positive and in alignment with the scope of the SBCTC rubric for BAS degrees. Included in the review from both evaluators were suggestions for strengthening the program. The following list includes those suggestions and how WVC addressed or plans to address these components of the degree.

- On the Program Learning Outcome that reads: *Be able to successfully communicate in oral and written modalities*, the suggestion was made to add “visual” to the list of modalities noted. The idea being that a large component of the curriculum is related to visual communication—especially with CAD drawings and schematics. The Program Learning Outcome now reads: *Be able to successfully communicate in oral, written, and visual modalities*.
- Clarification was requested in the timing of the welding sequence in the suggested degree program guide. The welding sequence was recommended to be taken by students between their first and second years during the summer quarter. The suggestion was made to incorporate some welding coursework into the sophomore year, thus building toward student readiness for the INDT course sequence.
- In review of the budget, the suggestion was made to set aside \$675 annually for ABET program accreditation. At this time, the budget proposes a \$5,000 program cost in the second year to provide funds for this initial accreditation need until ABET accreditation is achieved. Once the accreditation is achieved, then the ongoing expense of \$675 will be part of the operating cost for the program.
- In review of the faculty expertise at WVC, a concern was noted about the lack of a masters prepared professor over the upper level engineering sequence of courses. The reviewer’s concern was moot (as he noted himself) because the planning for this degree includes an appropriately credentialed faculty program director.

SUMMARY

Wenatchee Valley College has a successful history of offering technical associate degrees to the residents of the North Central Washington. With the curricular development of the Bachelor of Applied Science in Engineering Technology degree program, WVC is expanding the possible education attainment level in the region thus helping meet the national and state goals for four-year degree completions. The creation of the BAS ET degree program is a collaborative effort with WVC's college community of faculty and our regional industrial partners. In addition, WVC has the support of its Board of Trustees, President Richardson, its K-12 partners, and its current student body, to develop the BAS ET degree program. WVC has already been recognized for its capacity to offer and expand its curriculum through its selection and participation in AIR Washington and Aerospace High Demand programs. As the curriculum continues to be developed, ABET accreditation standards are at the forefront of our planning, as will the requisite criteria established by the SBCTC and by the Northwest Commission on Colleges and Universities (NWCCU) as we seek approval for this new degree option at the College.

APPENDICES

- A. Existing Curriculum Related to BAS ET Degree Program
- B. BAS ET Degree Advisory Board Roster
- C. External Evaluations:
 - 1. Evaluation Rubric from Mike Newtown
 - 2. Evaluation Rubric from Ryan Fancher
 - 3. Evaluation Rubric from Dr. Stephen Silliman

APPENDIX A:

List of WVC Courses (all are 5 credits unless otherwise noted):

Existing Courses:

BCT 116: Professional Work Relations (3) This course focuses on inter personal skills in the workplace. Topics include: leadership, teamwork, employers expectations, and real world tools for resolving conflict in a simulated workplace.

CHEM&161: General Chemistry I with Lab. Study of the state of matter, molecular structure, thermodynamics and reactions. For science majors, engineers and other students requiring a year or more of college chemistry.

CHEM&162: General Chemistry II with Lab. Study of periodic trends, molecular structure, chemical bonding, liquids and solids, kinetics, solutions, equilibrium and acid base chemistry.

CHEM&163: General Chemistry III with Lab (6): Descriptive chemistry of metals, aqueous chemistry, equilibria related to solubility and thermodynamics, and electrochemistry. Discussion and measurement of the qualitative and quantitative chemistry of common cations and anions.

CMST&210: Interpersonal Communications: Principles, processes, and practices of interpersonal communication related to motivation, knowledge, and skills to appropriately and effectively communicate in given interpersonal situations. Focus is on perception of self-concept and others, including diversity, verbal and nonverbal cues, and strategies for understanding and improving interpersonal relationship dynamics.

CMST 220: Public Speaking. Preparation and delivery of speeches to a public audience. Focus is on improvement of one's communication skills through topic, choice, research, organization and outlining of content; use of voice, body and self-confidence.

CSC 201: Programming Fundamentals

Introduces programming fundamentals using a procedural, object-oriented language. Topics include expressions, simple I/O, data storage, variable usage, decision and repetition control structures, functions and parameter passing, design principles, and problem solving strategies. Prerequisites: MATH 099, word processing competency.

ECON& 201: Micro Economics

Study of consumer behavior and the revenue concepts, firm behavior and the cost concepts, price and employment theory, industrial organization, labor, agricultural and international economics.

ELEC 115: Applied Electricity

An introduction to applied electricity in the industrial trades, this course discusses basic alternating (AC) and direct (DC) current, transformers, motors, relays, reactance, electrical power generation and power distribution systems. Prerequisites: MATH 096 or MATH 093 or instructor's signature.

ELEC 125: Wiring Diagrams and Schematics

In-depth study of ladder and pictorial wiring diagrams and schematics as applied to various industrial applications specifically in electronics, manufacturing, industrial food processing, refrigeration and industrial equipment manufacturers' circuits.

ELEC 135: Control Fundamentals (3)

Basic introductory course for understanding control theory and principles of automatic controls used for residential, commercial and industrial equipment. Includes application, service and installation procedures for electrical, electronic and mechanical control systems. Prerequisites: ELEC 125 or instructor's signature.

ELEC 225 Industrial Electricity and Controls

Review of industrial electricity to include discussion on generation, power distribution, wiring, electrical code, transformers, solid-state motor starters, AC and DC motors, power-factor correction, speed controllers and schematics. Prerequisite: ELEC 115.

ELTRO 240: Industrial Hydraulics and Pneumatics

Introduction to hydraulic and pneumatic systems, fluids, pumps, sensors, control devices, control valves, hydraulic cylinders, and receiver controllers. Includes system energy requirements, hydraulic and pneumatic logic, and the requirements and examples.

ENGL&101: Composition General. Development of written composition skills emphasis on both rhetorical and mechanical skills.

ENGL&235: Technical Writing. Refines the writing process from ENGL&101 through technical and professional writing. Emphasizes print and electronic sources, logic, avoiding plagiarism, documentation, addressing multiple audiences, oral presentations.

ENGR 102: Engineering Graphics and Design (4). This introductory course in graphical drawing and blueprint interpretation includes orthographic projections, pictorials, lettering, scales, basic dimensioning, blueprint reading plus interpretation of documents related to blueprints such as construction contract documents, specifications, and addendum, emphasizing commercial and industrial building construction.

ENGR 105: Computer Aided Design. This course provides familiarization with computer-aided drafting techniques using an interactive microcomputer CAD system. Students create, edit, and store basic drawings using a tablet digitizer and/or screen menu consisting of geometric forms and alphanumeric characters.

ENGR 106: Advanced Computer Aided Design (4). This course provides a continuation of the topics introduced in ENGR 105 with an emphasis on basic customization. Topics include configuration profiles, script files, user-created menus, slide files, attribute creation and extraction, 3-D construction, and solid modeling. Laboratory included.

ENGR&214: Engineering Statics. Principles of engineering statics including basic concepts, resultants, force-couple relationships, equilibrium diagrams, equilibrium analysis, three-dimensional structures, two-dimensional frames, trusses, beams and friction.

HUMA&101: Introduction to Humanities. An introduction to the critical thinking, arts, and philosophical ideas that enrich human experience.

INDT 135 Metal Fabrication I

Designed to introduce commonly used metal fabrication techniques. Including but not limited to: measuring instrumentation, metal preparation, welding, machines (drills, saws, grinders, mills and lathes), and metal bending devices. Emphasis placed on the safe use of tooling, preplanning and fabrication of structurally sound projects. Prerequisites: WELD128,131,132 (or concurrent enrollment in any of the three).

INDT 136 Metal Fabrication II (3)

Introduces an intermediate level of fabrication techniques such as measurement instrumentation, metal preparation, welding, machines (drills, saws, grinders, mills and lathes) and metal benders. Emphasis is placed on the safe use of tooling, pre-planning and fabrication of structurally sound projects. Prerequisites: INDT 135.

INDT 137 Metal Fabrication III Sheet Metal (3)

Designed to introduce commonly used sheet metal fabrication techniques, including but not limited to: measuring, shearing, bending, lay-out, metal preparation, welding, machines (drills, saws, grinders, brakes, shears) and hand-held specialized sheet metal tooling. Emphasis placed on the safe use of tooling, preplanning, proper fitment and the fabrication of structurally sound projects. Prerequisites: WELD 128 or WELD 131 or WELD 132 or appropriate industry experience.

MATH&141: Precalculus I. Function and their graphs (including elementary, exponential, and logarithmic functions, and the conic sections) and their inverses in the context in which they are used in calculus.

MATH& 142: Precalculus II. Introduction to trigonometric functions as they relate to the unit circle and right triangle. Graphs of the functions, applications, problem solving, identities, inverse functions, complex numbers, vectors, and analytic geometry including polar coordinates and parametric equations.

MATH& 146: Introduction to Statistics.

Fundamental concepts and applications of descriptive and inferential statistics. Includes measures of central tendency and variability, statistical graphs, probability, the normal distribution, hypothesis testing, confidence intervals, ANOVA testing and regression analysis. Graphing calculator or statistical software techniques are used throughout the course.

MATH& 151: Calculus I: Introduction to limits, derivatives, higher-order derivatives and implicit differentiation. Applications involving maximums and minimums, and related-rates. Analysis of graphs of functions.

MATH& 152: Calculus II: Definite and indefinite integrals, techniques of integration. Application of the integral to areas, volumes and work problems. Derivatives and antiderivatives of the transcendental functions.

MATH& 153: Calculus III: More techniques and applications of integration. Parametric equations and polar coordinates, vectors and vector-valued functions, infinite series and sequences.

PHIL 211: Introduction to Ethics. Survey of the ethical perspectives of various philosophers in the context of current ethical issues. How our ideas about freedom, responsibility, and values have an impact on ethical and moral decisions.

PSYC& 100: General Psychology. This course offers an overview of psychology as a scientific study. Both theories and research findings concerning all major branches of psychology including neuro-science, health, social, psychopathology and therapy.

SOC& 101: Introduction to Sociology. An introduction to the basic principles of sociology with emphasis on the sociological perspective. Areas of study include the economy, government, deviance, stratification, race and ethnicity, family, education and social change.

PHYS&114: General Physics I with Lab. Study of the fundamental principles and applications of mechanics, including vectors, static equilibrium, linear and rotational motion, Newton's laws, work, energy, and momentum.

PHYS& 115: General Physics II with Lab. Study of the basic principles and applications of fluids, harmonic motion and waves, thermodynamics, and geometric optics.

PHYS& 116: General Physics III with Lab. Study of the basic principles and applications of electricity and magnetism and an introduction to modern physics.

PHYS& 221: Engineering Physics I. The study of kinematics, statics, rotational motion and collisions. Topics include one and two dimensional motion for point masses and rigid bodies, conservation laws for momentum and energy, and equilibrium conditions.

PHYS& 222: Engineering Physics II. The study of simple harmonic motion, waves, temperature and heat. Topics include the ideal gas laws, the laws of thermodynamics, and thermodynamic systems. Electrostatics through Gauss' Law covered.

PHYS& 223: Engineering Physics III. The study of electrical and magnetic phenomena, starting with electric potential and continuing on into optics and quantum mechanics. Topics include electrostatics, magnetostatics, DC and AC circuit theory, and geometric ray optics.

WELD 128 Basic Welding (3)
Theory, application and practice of arc and oxyacetylene welding and cutting.

WELD 131 Gas Welding (3)

Fundamentals and experience in the operation of oxyacetylene welders and cutters in flat, horizontal, vertical and overhead positions, and an introduction to aluminum and stainless steel welding and brazing using TIG welding machines.

WELD 132 Arc Welding (3)

Fundamentals and experience in operation of AC and DC welders in flat, horizontal, vertical and overhead positions using a variety of welding electrodes, including low-hydrogen rods. Introduction to MIG (Metallic Inert Gas) or GMAW (Gas Metal Arc Welding) included.

APPENDIX B:

Roster of BAS ET Degree Advisory Board

Wiest, Sharon, WVC Instructor SWiest@wvc.edu
 Jourdan, Greg, WVC Instructor GJourdan@wvc.edu
 Elvikis, Arius, WVC Instructor AElvikis@wvc.edu
 Unger, Bruce, WVC Instructor BUnger@wvc.edu
 Wysham, Derin, WVC Instructor DWysham@wvc.edu
 Burns, David, WVC Instructor DBurns@wvc.edu
 Jacobson, Zack, WVC Instructor ZJacobson@wvc.edu
 Morgan, Riva, WVC Instructor RMorgan@wvc.edu
 Janis, Anita, WVC Instructor AJanis@wvc.edu
 Kane, Susan, WVC Instructor SMorarie@wvc.edu
 Cordes, Larry, WVC Instructor LCordes@wvc.edu
 Hampton, Greg, WVC Instructor GHampton@wvc.edu

Steve Wright, Chelan County PUD steve.wright@chelanpud.org
 Jim White, Chelan County PUD james.white@chelanpud.org
 Dan Garrison, Chelan County PUD dan.garrison@chelan.pud.org
 Ruth Ewert, Chelan County PUD ruth@chelanpud.org
 Matt Kline, Wenatchee High School kline.m@wenatcheeschools.org
 Doug Merrill, Wenatchee High School merrill.d@wenatcheeschools.org
 Dennis Conger, Wenatchee School District conger.d@wenatcheeschools.org
 Nelson Settles, Pacific Aerospace and Electronics nsettles@pacaero.com
 Ed Phinney, Pacific Aerospace and Electronics ephinney@pacaero.com
 Jim Walters, Emerson Process Management jim@paineelectronics.com
 Garry Beaudette, Keyes Fibre Packaging gbeaudette@keyespackaging.com
 Brian Haun BrianH@vandorensales.com
 Jay Fulbright, Stemilt Fruit Growers jay.fulbright@stemilt.com
 Lad Holden Central Washington University holdenl@cwu.edu

Steve King, City of Wenatchee sking@wenatcheewa.gov

David Elwell, Douglas County PUD davidericelwood@gmail.com

Ryan Fencer, Con Agra ryanfancher@hotmail.com

Brady Hargraves ALCOA brady.hargraves@alcoa.com

Robert Tyson, ALCOA tysonanda@gmail.com 509-886-2026

Salim Qazi, ALCOA sqazi@nwi.net 509-881-7220/hm – 664-8611/wk

Jenny Rickel, Greater Wenatchee Area Technology Alliance (GWATA),
jenny.rickel@gmail.com (509) 667-5100

Richard Taylor, Pathways Planner at ESD (Retired) rctaylor@nwi.net 509-881-5166

APPENDIX C:**External Evaluator Comments and Resumes**

Applied Baccalaureate External Review Rubric

Instructions for colleges submitting a BAS degree proposal:

1. As part of completing a program proposal, colleges must select two external experts to review the program.
2. Reviews should be completed by an independent, third-party person or team with subject/discipline expertise.
3. At least one of these external expert reviewers should come from a university level institution, i.e. departmental professor, academic dean or department head.
4. A second external expert reviewer may be a professional/practitioner who works for a private or public organization other than the university.
5. External Expert Reviewers should be instructed by colleges to address the criteria listed in this rubric.

Instructions for External Expert Reviewers:

1. External Expert Reviews provide critical feedback to colleges so that they may address potential concerns, issues or criticisms prior to final submission of a program proposal to the State Board of Community and Technical Colleges.
2. Reviewers should be independent, third-party persons or teams with subject/discipline expertise.
3. The goal of a review is to assess the credibility, design, relevance, rigor, and effectiveness of the proposed BAS program.
4. Reviewers should also validate the congruency and consistency of the program's curriculum with current research, academic thinking and industry standards.
5. This form is designed to assist External Expert Reviewers to complete assessments of baccalaureate degree program proposals. External Expert Reviewers are not restricted to the use of this rubric template. Reviewers may choose, instead, to provide a college with a written narrative. In whatever format they choose, reviewers should address the criteria outline in the rubric.

Applied Baccalaureate External Review Rubric

College Name:	Wenatchee Valley College	BAS Degree Title:	Bachelor of Applied Science in Engineering Technology
Reviewer Name/ Team Name:	Michael J. Newtown, P.E., Interim Dean, Canino School of Engineering Technology	Institutional or Professional Affiliation:	State University of New York at Canton (SUNY Canton)
Professional License or Qualification, if any:	Licensed in NY #083532	Relationship to Program, if any:	No relationship to program
Please evaluate the following Specific Elements			
a) Concept and overview	<p>Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?</p> <p>Comment This proposed program is relevant to the needs of industry at this time. Engineering and manufacturing have become a true multi-discipline endeavor, requiring the skills put forth in this proposal.</p>		
b) Degree Learning Outcomes	<p>Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?</p> <p>Comment I would suggest that the program learning outcome 'Be able to successfully communicate in oral and written modalities' include a visual outcome. As visual representation such as CAD is a large part of our profession. It also is a significant portion of the coursework proposed for your students.</p>		

Applied Baccalaureate External Review Rubric

c) Curriculum Alignment	<p>Does the curriculum align with the program's Statement of Needs Document?</p> <p>Comment The curriculum aligns with the statement of needs. I see merit in all the topics offered in this proposal. A well-rounded graduate should be able to serve industry.</p>
d) Academic Relevance and Rigor	<p>Do the core and elective courses align with employer needs and demands? Are the upper level courses, in particular, relevant to industry? Do the upper level courses demonstrate standard academic rigor for baccalaureate degrees?</p> <p>Comment I find the upper-level course description to be accurate to the needs of the industry. The area of confusion was with the welding sequence 'Recommended' during the 2nd summer. INDT 135 and INDT 137 list the welding course as a prerequisite. If this is the case then should the recommendation be a requirement. I also believe this might be confusing to students planning for courses.</p>
e) General Education Requirements	<p>Are the general education requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?</p> <p>Comment The general education requirement will ensure that graduates are well balanced to serve industry and be an active member of society.</p>
f) Preparation for	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable

Applied Baccalaureate External Review Rubric

Graduate Program Acceptance	graduate degree programs? Comment As long as a student can find a graduate program for engineering technology this program will prepare them well. If the goal of a student is to transfer to an engineering college, then more advanced theoretical courses are necessary. I would also strongly recommend to a student desiring to pursue a masters degree at an engineering college to take Phys 221 through 223. The program faculty may plan for a calculus-based course through advisement, which would ensure success.
g) Faculty	Do program faculty members appear qualified to teach and continuously improve the curriculum? Comment I have a concern regarding the qualification of the faculty listed while being exceptional in their field, may not hold a high enough degree to challenge students at a bachelor level. I am not trying to insult anyone, just offering my opinion on the level of rigor. Your proposal also states the desire to hire another faculty with experience and degree qualifications to challenge students. If this is successful then you faculty qualifications is not a concern on my part.
h) Resources	Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities? Comment In the area of ABET accreditation, there is an annual fee currently \$675 annually. The other budget entries are appropriate. Every program across the country would like more budget support. The budget is fair and responsible in support of this new program.
i) Membership and Advisory	Has the program received approval from an Advisory Committee? Has the program responded appropriately to it Advisory Committee's recommendations?

Applied Baccalaureate External Review Rubric

Committee	Comment I find clear intentions to utilize an advisory board in making assessment and program evaluation. the use of an advisory board is a stated object for ABET, so this plan if executed fully will ensure compliance with accreditation.
j) Overall assessment and recommendations	Comment Please summarize your overall assessment of the program. In general, this program will serve students, faculty, Wenatchee Valley College, and industry. I see many similarities with my school's program which allows me to conclude that you are following best practices for this field.
Reviewer Bio or Resume Evaluator, please insert a short bio here	<p style="text-align: center;">CURRICULUM VITAE Michael J. Newtown, P.E.</p> <hr/> <p style="text-align: center;">Address:</p> <p style="text-align: center;">Canino School of Engineering Technology, Interim Dean Associate Professor, Mechanical & Energy Department Nevaldine North 105 State University of New York College of Technology at Canton 34 Cornell Drive, Canton, NY 13617 Phone: (315) 386-7219 Email: newtownm@canton.edu</p> <hr/> <p>(a) Professional Preparation</p> <ul style="list-style-type: none"> • Clarkson University, Potsdam, NY., Mechanical Engineering, Ph.D. Student (Current) • Clarkson University, Potsdam, NY, Engineering & Global Operations, M.S., 2003 • Rochester Institute of Technology, Rochester, NY, Mechanical Engineering Tech., B.T., 1987

Applied Baccalaureate External Review Rubric

- SUNY Canton, Canton, NY, Mechanical Engineering Technology, A.A.S., 1984
- New York State Professional Engineer, License Number 083532

(b) Appointments

- 1/2013 to present: Interim Dean, Canino School of Engineering Technology, SUNY Canton
- 9/2012 to 12/2013: Assistant Dean, Canino School of Engineering Technology, SUNY Canton
- 7/2006 to 8/2012: Department Chairman, Mechanical & Energy Department, SUNY Canton
- 9/2011 to present: Associate Professor, Mechanical & Energy Department, SUNY Canton
- 9/2004 to 9/2011: Assistant Professor, Mechanical & Energy Department, SUNY Canton
- 9/1999 to 8/2004: Instructor, Mechanical Engineering Technology, SUNY Canton
- 9/2004 to 12/2010: Director of Training, Building Performance, SUNY Canton

(c) Papers and Presentations

Papers:

- Sriiram R. Chandrasekaran, Philip K. Hopke, Arthur Hurlbut, and Mike Newtown, "Characterization of Emissions from Grass Pellet Combustion", Energy and Fuels, 27, pp 5298-5306 (2013)
- Sriiram R. Chandrasekaran, Philip K. Hopke, Michael Newtown, and Arthur Hurlbut, "Residential-Scale Biomass Boiler Emissions and Efficiency Characterization for Several Fuels", Energy and Fuels, 27(8), pp 4840-4849 (2013)

Presentations:

- k) May 2011- Presentation on Initial findings of Grass Pellet Combustion to Northeast Biomass Heating Expo, NYSERDA Agreement # 10673
- l) May 2012- Follow-up presentation on Grass Pellet Combustion to Northeast Biomass Heating Expo, NYSERDA Agreement # 10673 & Panel member for discussion on the Future of Biomass Heating.
- m) June 2015 – Project Briefing on Wood Pellet Buffer Tank Demonstration NYSERDA Agreement 32978 to NYSERDA.

(d) Significant Activities

- NYSERDA Agreement # 32978 Wood Pellet Heating System Combustion Demonstration
- NYSERDA Agreement # 10673 Testing of Combustion Performance of Domestic and European Grass Pellet Boiler and Furnace
- NYSERDA Agreement # 10052 Field Demonstration of Grass Pellet Production

(e) Synergistic Activities

Applied Baccalaureate External Review Rubric

o)	•	Dissertation Research, Surface Water Geothermal Heat Exchangers Effect on Winter Lake Conditions
p)	•	Performed energy load analysis and HVAC designs for residential & small commercial construction projects.
q)		
(f)		
		Collaborators and Other Affiliations
s)	•	Collaborators and Co-Editors
t)	1.	Chandrasekaran, S. R, Doctoral Candidate, Clarkson University, Potsdam, NY
u)	2.	Hopke, P. K, Professor, Clarkson University, Potsdam, NY
v)	3.	Hurlbut, A. Dean Emeriti, Canino School of Engineering Technology, SUNY Canton, Canton, NY
w)		
x)	•	Graduate Advisor
y)		Dr. Daniel Valentine. Clarkson University, Potsdam, NY

Applied Baccalaureate External Review Rubric

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3. At least one of these external expert reviewers should come from a university level institution, i.e. departmental professor, academic dean or department head.
4. A second external expert reviewer may be a professional/practitioner who works for a private or public organization other than the university.
5. External Expert Reviewers should be instructed by colleges to address the criteria listed in this rubric.

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2. Reviewers should be independent, third-party persons or teams with subject/discipline expertise.
3. The goal of a review is to assess the credibility, design, relevance, rigor, and effectiveness of the proposed BAS program.
4. Reviewers should also validate the congruency and consistency of the program's curriculum with current research, academic thinking and industry standards.
5. This form is designed to assist External Expert Reviewers to complete assessments of baccalaureate degree program proposals. External Expert Reviewers are not restricted to the use of this rubric template. Reviewers may choose, instead, to provide a college with a written narrative. In whatever format they choose, reviewers should address the criteria outline in the rubric.

Applied Baccalaureate External Review Rubric

College Name:	Wenatchee Valley College	BAS Degree Title:	Engineering Technology
Reviewer Name/ Team Name:	Ryan Fancher	Institutional or Professional Affiliation:	Confluence Health
Professional License or Qualification, if any:	Manager of Engineering	Relationship to Program, if any:	External Expert
Please evaluate the following Specific Elements			
a) Concept and overview	Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?		
	Yes, the program will fulfill employer requirements for engineering technology requirements and will lead to job placement. I have found it difficult to hire and retain engineers in NCW due to lack of qualified applicants and knowledge of the geographical area. Engineers who have a connection with the area (schooling, family, etc) are more likely to stay in NCW as engineers.		
b) Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?		
	I do not have the knowledge or expertise to properly answer this question.		
c) Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?		
	There are currently limited resources available in North Central Washington that allows students to pursue an engineering degree. Most students who want to pursue an engineering degree must move out of the area to obtain their degree; while businesses hope they move back to the area for employment. This program will allow high school graduates as well as employed individuals an opportunity to obtain an engineering degree		

Applied Baccalaureate External Review Rubric

	without having to move outside of NCW. The curriculum will allow graduates to be productive engineers in local business with minimal impact on family life.
d) Academic Relevance and Rigor	<p>Do the core and elective courses align with employer needs and demands? Are the upper level courses, in particular, relevant to industry? Do the upper level courses demonstrate standard academic rigor for baccalaureate degrees?</p> <p>The core elective courses and upper level courses have been modified from the original proposal to meet employer demand based on the feedback from the advisory committee meeting. The upper level courses will prepare graduates for employment and are on par with other engineering technology baccalaureate degrees.</p>
e) General Education Requirements	<p>Are the general education requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?</p> <p>While most knowledge will be learned through on-the-job training, the general education classes will provide graduates with a broad background of written skills and humanities to accompany natural and social sciences. The general education requirements also match the AAS transfer degree program.</p>
f) Preparation for Graduate Program Acceptance	<p>Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?</p> <p>The curriculum and concepts presented in classes will prepare graduates from continuing education towards an EIT and PE certification, or a masters in engineering technology currently being offered at Central Washington University.</p>
g) Faculty	<p>Do program faculty members appear qualified to teach and continuously improve the curriculum?</p> <p>I have met several of the members of the faculty listed in the proposal. The combination of existing staff and the additional staff outlined in the proposal, WVC should have qualified staff to teach and continuously improve the program.</p>

Applied Baccalaureate External Review Rubric

h) Resources	<p>Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities?</p> <p>My experience with WVC staff has been a 'student-first' culture. The computer labs, internet availability, library, and student services provide adequate access to resources to allow the program to continuously improve. The WVC campus has recently acquired land that will allow expansion when necessary.</p>
i) Membership and Advisory Committee	<p>Has the program received approval from an Advisory Committee? Has the program responded appropriately to it Advisory Committee's recommendations?</p> <p>An advisory committee of community members and potential employers reviewed the proposal and gave feedback on the initial proposal on January 29th. WVC took the recommendations and made modifications to the proposal based on the advisory committee's suggestions. Most of the recommendations of the advisory committee were addressed in the modification to the proposal.</p>
j) Overall assessment and recommendations	<p>Please summarize your overall assessment of the program.</p> <p>WVC has submitted a solid program that will meet employers' needs to hire and retain engineers in North Central Washington and will continue to evolve and adapt the program as the employer needs in the area change.</p>
Reviewer Bio or Resume	<p>I am the Manager of Engineering at Confluence Health in Wenatchee, WA. I have managed engineers, supervisors, and maintenance personnel with over 60 personnel reporting to me. I earned a Bachelors of Science degree in Materials Science and Engineering from Washington State University and have been in food, manufacturing, and healthcare industries in North Central Washington for 16 years.</p>



April 8, 2016

Dr. Carli Schiffner
Vice President for Instruction
Wenatchee Valley College
1300 Fifth Street
Wenatchee, WA 98801

Dear Dr. Schiffner,

I want to thank you for the opportunity to review your "New Degree Program Proposal for a Bachelor of Applied Science in Engineering Technology Degree Program". I have reviewed the proposal and the Statement of Need, and very much support this proposal. I congratulate you and your College for pursuing this interesting opportunity.

My review and a truncated version of my CV are attached below. If you require any additional information, please do not hesitate to contact me.

Best of luck with this proposal.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen E. Silliman". The signature is fluid and cursive, with the first and last names being more prominent.

Stephen Silliman
Dean, School of Engineering and Applied Science
Gonzaga University
Spokane, Washington

502 E. Boone Ave.
Spokane, WA 99258-0026
509.313.3522
www.gonzaga.edu

External Review
Bachelor of Applied Science in Engineering Technology Degree Program
Wenatchee Valley College
April 8, 2016

College Name: Wenatchee Valley College
BAS Degree Title: Bachelor of Applied Science in Engineering Technology
Reviewer Name: Stephen E. Silliman, Ph.D.
Institutional Affiliation: Gonzaga University
Professional Qualification: Dean, School of Engineering and Applied Science, Professor of Civil Engineering, Ph.D.
Relationship to Program: None

(a) Concept and Overview: Is the overall concept of the degree program relevant and appropriate to current employer demands as well as to accepted academic standards? Will the program lead to job placement?

The proposed degree program will serve a well identified need in a region of the state currently not served by equivalent programs. It can therefore be anticipated that this degree will serve a population seeking this type of bachelor level degree program related to engineering technology (as documented in the Statement of Need). Further, the degree will likely remain a strong offering based on the growing demand in the industrial technology sector in this part of the state for bachelor level graduates well trained in the practical aspects of engineering technology (particularly in the agricultural sector). The focus on electronics and mechatronics would appear to be a good match to regional needs.

(b) Degree Learning Outcomes: Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?

The degree learning outcomes appear to be consistent with ABET outcomes. Further, they cover the critical aspects of preparing a student for a life-long career in engineering technology, namely: (a) ability to identify, analyze and solve complex problems, (b) possess appropriate level of technical skills, (c) possess appropriate level of communication skills, (d) demonstrate professionalism (including ethics), and (e) be prepared to continuously improve skills through life-long learning. I therefore conclude that the learning outcomes of the proposed program fully support rigor at the level of the baccalaureate degree.

(c) Curriculum Alignment: Does the curriculum align with the program's Statement of Needs Document?

The Statement of Needs provides a very clear picture of the need for experts in application of technology in the agricultural and other engineering / industrial sectors in this region of Washington State. WVC has active programs currently serving this population through certificate and associate degrees. Their analysis clearly indicates an existing (and expected to be long-term) gap in the professional workforce of more than 50 annual openings at the level of the bachelor degree. Based on these identified needs, the Needs Document provides a convincing argument for this degree program, with specific emphasis on electronics and mechatronics. I conclude, therefore, that there is very strong alignment of the curriculum being proposed and the Statement of Needs.

(d) Academic Relevance and Rigor: Do the core and elective courses align with employer needs and demands? Are the upper level courses, in particular, relevant to industry? Do the upper level courses demonstrate standard academic rigor for baccalaureate degrees?

I am impressed with the curriculum provided in the proposal. In the early courses, students are exposed to basics in math, chemistry, physics, writing, communication and business relations. These will all provide solid foundation for employment in regional industry. In the latter quarters, the student will be exposed to an appropriate range of technical skills (controls, wireless, fabrication, etc.) plus a number of advanced topics (e.g., fluids, dynamics, and hydraulic control). The social sciences also remain in the latter years to help ensure well-rounded graduates. Finally, the Capstone Experience, combined with an advanced course in project management, will provide students with the opportunity to practice skills that are in significant demand in the industrial sector. I am very satisfied that these courses demonstrate standard academic rigor for baccalaureate degrees.

(e) General Education Requirements: Are the general education requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?

As noted in response to item (d), I find the general education requirements to be quite solid. In particular, the focus on communication and proper performance in the business world will be of substantial value to many of the program graduates.

(f) Preparation for Graduate Program Acceptance: Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?

While it is not clear to me that a primary intention of this program is to prepare students for graduate programs, the introduction of multiple semesters of calculus, fluid mechanics, dynamic systems, and

both electrical and hydraulic controls would, I believe, provide the foundation for a graduate program focused on applied engineering / technology. Further, with minimal further study, this program could open research-based programs to graduates of this program.

(g) Faculty: Do program faculty members appear qualified to teach and continuously improve the curriculum?

If there is an area of concern with this proposal, it would be in the realm of the “paper credentials” of the faculty. What I mean by “paper credentials” is the actual degrees, certifications, and licenses listed by the faculty. It is important to note that, in my experience, some of the most influential impacts on a student often come from those with significant practical experience and a willingness to interact with the students. Often, these influential educators are not those with the highest educational degrees. Therefore, I applaud the program in terms of the breadth and apparent practical experience of its faculty.

Rather than a concern on the educational experience to be offered, my concern focuses particularly in the realm of ABET and their rather structured evaluation of programs (and possibly in the reception of the faculty qualifications by a graduate program should a student pursue graduate studies). The ABET criterion of faculty for engineering technology programs states:

Each faculty member teaching in the program must have expertise and educational background consistent with the contributions to the program expected from the faculty member. The competence of faculty members must be demonstrated by such factors as education, professional credentials and certifications, professional experience, ongoing professional development, contributions to the discipline, teaching effectiveness, and communication skills. Collectively, the faculty must have the breadth and depth to cover all curricular areas of the program. (www.abet.org, referenced April, 2016 for the 2016-17 accreditation cycle)

My concern in this realm, therefore, is the small number of highest level degrees (PhD or equivalent) or significant credentials (e.g., the PE) in engineering related fields. I do not think that this concern should stop this program from moving forward, but WVC might look to increase the number of PEs and/or add one or more Ph.D. faculty closer to engineering technology (including electrical engineering or mechanical engineering) prior to preparing for initial ABET accreditation review (which would likely occur in approximately 5-6 years after establishing this program). It is good to see this need reflected in the proposal through the statement that WVC would seek someone with such credentials as a new faculty member to run the program.

(h) Resources: Does the college demonstrate adequate resources to sustain and advance the program, including those necessary to support student and library services as well as facilities?

The library and student support services appear to be strong and therefore adequate for this program. A bit more information would help determine whether the physical facilities are adequate to support the student projects and experiences required in the proposed curriculum. However, judging by the courses and degrees already offered through the WVC, it would appear that the physical facilities are likely adequate for the program. Should this program become highly popular in the future (e.g., 25 or more graduates per year), expansion of the welding and project activities beyond the current Refrigeration building may be desirable.

(i) Membership and Advisory Committee: Has the program received approval from an Advisory Committee? Has the program responded appropriately to the Advisory Committee's recommendations?

The document indicates that this proposal has been reviewed by a number of constituencies including: subject experts from similar programs, industry partners, neighboring higher education partners, the WVC administration, program faculty and the Board of Trustees. The proposal also speaks to review of the program by appropriate industry and engineering technology advisory committees. It therefore appears that this proposal has been reviewed from multiple viewpoints (including advisory committees) with appropriate modifications incorporated into the final version of the proposal.

(j) Overall Assessment and Recommendation: Please summarize your overall assessment of the program.

Although my expertise is in bachelor of engineering (versus bachelor of engineering technology) programs, I am impressed with this proposed degree program in engineering technology. WVC has clearly identified a need, as well as available students, for this new program. With the hire of a credentialed faculty lead, I believe that this program has the potential to both be a successful educational offering, and a significant contributor to the future economy of north-central Washington. The curriculum appears well thought out, and a rigorous assessment / improvement program is identified. Based on this review, I recommend approval of this new degree program.

Brief Resume Attached on Next Page

BIOGRAPHICAL SKETCH
STEPHEN E. SILLIMAN, Ph.D.

February, 2016

Dean, School of Engineering and Applied Science
Gonzaga University, Spokane, Washington
Silliman@gonzaga.edu
(509) 313-6117

Education:

1979 B.S.E. Civil Engineering, Princeton University (Magna Cum Laude)

1981 M.S. Hydrology, University of Arizona: Eugene Simpson, Advisor

1986 Ph.D. Hydrology, University of Arizona: Shlomo Neuman, Advisor

Professional Experience in Academia:

2012 - present: Dean, School of Engineering and Applied Science, Gonzaga University

2000 - 2012: Professor of Civil Engineering and Geological Sciences, University of Notre Dame (UND), Notre Dame, Indiana

- 2009 – 2012: *Associate Chair, Department of Civil Engineering and Geological Sciences, University of Notre Dame*
- 2008: *Fellow of the Institute, Kellogg Institute for International Studies, University of Notre Dame.*
- 2008 - 2013: *Special Appointment to Graduate Faculty, Department of Engineering Education, Purdue University*
- 2002- 2008: *Associate Dean for Undergraduate Programs, College of Engineering, University of Notre Dame, Notre Dame, Indiana*

1992 - 2000: Associate Professor of Civil Engineering and Geological Sciences, University of Notre Dame, Notre Dame, Indiana

1990 - 1992: Associate Professor of Civil Engineering, University of Notre Dame, Notre Dame, Indiana.

1986 - 1990: Assistant Professor of Civil Engineering, University of Notre Dame, Notre Dame, Indiana

Courses Taught: Approximately 20 courses taught at U.S. Universities (Gonzaga and Notre Dame) on topics including introduction to engineering, basic / advanced groundwater hydrology, physical geology, and basic / advance probability and statistics for engineers. Approximately 10 short courses taught (in French) to upper level hydrogeology students in Benin, West Africa.

Graduate Students: Primary Advisor to 17 Masters and 7 Ph.D. degree recipients. Secondary advisory on multiple Masters and Ph.D. students.

Undergraduate Students: Numerous undergraduate students involved in research and service opportunities at both Gonzaga University and the University of Notre Dame.

Honors and Awards:

Darcy Lecturer, National Ground Water Research and Educational Foundation, NGWA, 2011
(presented lectures at ~60 locations, world-wide during 2011)

Nominated, University of Oklahoma, World Water Prize, 2009

Groundwater Project in Benin identified as Groundwater Research Project, UNESCO International Year of Planet Earth, 2008-2011.

ASEE, Global Engineering and Engineering Technology Educator Award, International Division, 2006.

ASEE, Outstanding Teaching Award, Illinois-Indiana Section, 2006.

Fulbright Grant for Research in Israel, 1997-98.

Peer-Reviewed Publications: Approximately 80 peer-reviewed publications in professional journals and proceedings of professional conferences. Topics include technical research in groundwater hydrology, development efforts in Africa and Haiti, and research in pedagogical methods for engineering education.

Invited Presentations and Workshops: Approximately 20 invited talks and workshops on topics including groundwater hydrology, international development efforts, and research in pedagogical methods for engineering education.

Project Funding (approximately \$4.8M as project PI / co-PI): Project funding for technical research, international development, and research in engineering education received from government, foundation, and private funding.

