New Program Proposal for a
Bachelor of Applied Science Degree in Data Analytics

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COVER SHEET
NEW DEGREE PROGRAM PROPOSAL

Program Information

Institution Name: **Wenatchee Valley College**

Degree: **Bachelor of Applied Science – Data Analytics** CIP Code: _____

Name(s) of the existing technical associate degree(s) that will serve as the foundation for this program:

Degree: Associate of Technical Science Degree CIP Code: 11.0901 Year Began: **2001**

Degree: _____ CIP Code: _____ Year Began: _____

Planned Implementation Date (i.e. Fall 2014): **Fall 2019**

Proposal Criteria: *Please respond to all eight (8) areas listed in proposal criteria FORM D.*
Page Limit: 30 pages

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Chief Academic Officer

1/28/2019
Date

Introduction

In Summer 2018, Wenatchee Valley College (WVC) submitted a Statement of Need for a Bachelor of Applied Science (BAS-DA) in Data Analytics to the State Board for Community and Technical Colleges (SBCTC). The college was granted permission to proceed and develop the new degree program proposal, which follows.

Wenatchee Valley College (WVC) plays an essential role providing educational and cultural opportunities to the 149,000 residents of North Central Washington in Chelan, Douglas and Okanogan counties, an area covering over 10,000 square miles. North Central Washington has multiple businesses and industries that require advanced computer skills and knowledge including: information technology, networking, software development, applications development, programming and database design/development.

A Bachelor of Applied Science in Data Analytics (BAS-DA) offered through Wenatchee Valley College will be beneficial in the following ways:

- Provide students in North Central Washington the only local option for a Data Analytics degree.
- Build upon WVC's Associate of Technical Science Degree in Computer Technology, WVC's AAS-T in Business and Computer Technology, and WVC's quickly growing number of calculus and STEM pathway students, by bringing to them a related and high-demand educational opportunity.
- Provide a high-quality educational pathway for an applied baccalaureate degree to those place-bound individuals located in North Central Washington.
- Alleviate the hiring and training burden placed on local employers by producing more qualified employee candidates.
- Graduates of this degree will have access to living-wage careers.

WVC is known throughout North Central Washington for the opportunities the institution 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 and the Teaching and Learning Center (which also addresses "beaming classes" through an interactive television network).

WVC is serving an increasingly diverse student body. Approximately one-quarter of the population in WVC's district identifies as Hispanic/Latino, and about five percent is Native American. WVC met the criteria to be designated as a Hispanic-Serving Institution (HSI) in 2012, with Hispanic students exceeding 25% of the degree or certificate-seeking undergraduate enrollment. In fall 2014, 48% of WVC's total enrollment was students of color.

WVC now offers two BAS degrees: BAS-Engineering Technology and BAS–Nursing. Both the BAS-ET and BSN degrees evolved out of workforce demands in North Central Washington. Similar to the history of the BAS in Engineering Technology and BSN degree development, the BAS-DA is a response to a grass-roots call for WVC to fill a need, although in this case it has grown out of the demand in our district for more educational programs in computing technology.

After consulting with regional industry partners, holding discussions with neighboring higher education institutions, surveying employers, and receiving encouragement from WVC President Richardson and our Board of Trustees, the college believes that adding a Baccalaureate in Applied Science in Data Analytics is essential to serve the educational and workforce needs of the region. The new degree program will be for students who have completed an AAS-T with appropriate advising, and students who have received their ATS in Computer Technology. Through a combination of face-to-face, hybrid, and online classes, this full-time program will take appropriately prepared students approximately six quarters to earn the BAS-DA degree.

The degree will focus on Data Analytics. As an emerging field, Data Analytics refers to collecting, identifying and interpreting both qualitative and quantitative data. This data can be used to inform industry related to productivity or other business decisions as well as inform researchers seeking to support or argue against theories and hypotheses. The BAS-DA program at WVC will equip graduates with a broad depth of knowledge. This knowledge will be transformative for students, including topics such as applied statistics, management science, study design, modeling in discrete- or continuous-time, sampling methods, forecasting, machine learning, and current trends in business intelligence tools. All coursework has grown directly from conversations with local business partners.

Curriculum

Wenatchee Valley College's Mission Statement
The proposed Bachelor of Applied Science in Data Analytics (BAS-DA) aligns with Wenatchee Valley College's (WVC) mission: *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-DA Mission and Philosophy
The BAS-DA degree program at WVC provides students with problem-solving skills, statistical and mathematical expertise, fundamentals in programming, fluency with current software, and domain-specific knowledge in order that they may find employment in the industries based in North Central Washington.

Program Learning Outcomes
The BAS-DA degree at WVC has as its program outcomes to produce graduates who, after completing the program will be able to:

- Obtain, process, analyze and interpret data ethically.
- Interpret data findings effectively to various audiences, orally, visually and in written formats.
- Utilize critical thinking skills in order to find solutions to various industry challenges.
- Apply computing theory, languages and algorithms, as well as mathematical and statistical models, and the principles of optimization to appropriately formulate and use data analyses.
- Formulate and use appropriate models of data analysis to explain trends.
- Acquire training and education to seek employment or advance in current employment in computer technology fields.

Student Learning Outcomes
WVC promotes a climate of ongoing improvement through a variety of methods, including Student Learning Outcomes (SLOs). These SLOs cover four areas: Problem Solving, Communication, Social Interaction and Inquiry. The BAS-DA supports the SLOs in the following ways:

1. Problem Solving: The heart of the WVC BAS-DA is to develop graduates who can problem solve effectively. Data analysis requires a great deal of creativity, precision thinking, and a solid theoretical foundation that allows for and promotes novel solution techniques.
2. Communication: BAS-DA graduates will have knowledge of effective and appropriate oral and written communication skills in their interactions with various stakeholders. Their core abilities will include the skills to disseminate mathematical or statistical findings to a non-expert audience.
3. Social Interaction: BAS-DA graduates will understand the importance of culturally responsive workplace practices and demonstrate ability to embrace and integrate cultural, linguistic, ethnic and socio-economic diversity into the workplace.
4. Inquiry: Students of the BAS-DA program will be systemically exploring the nature and functioning of a vast history of older algorithms. These older codes become the modules at the backbone of any new, large-scale algorithm.

One of the external evaluators of this program, Dr. Hassan Shaban noted that these outcomes demonstrate baccalaureate degree rigor: "Yes, the learning outcomes are in line with expectations for holders of Baccalaureate degrees."

Outline

The Wenatchee Valley College BAS-DA Degree Program will prepare students to enter the workforce with a Bachelor of Applied Science Degree in Data Analytics. Graduates will be prepared to find jobs in a variety of industries particular to North Central Washington. Primarily, WVC graduates are expected to fill positions within the extensive local tree fruit industry, or find employment among the numerous opportunities in natural resource management, either at one of the many local field offices or at the nearby Colville Tribe. The local Public Utility Districts also have great need for data analysts for such projects as modeling dissolved gas levels within the dam network, improving image analysis algorithms for fish counting, or bettering their prediction and analysis of time series from sensor data. For these reasons, we have built the BAS-DA with three separate tracks, or specializations: Agriculture/Business, Systems Biology/Natural Resource Management, and Hydropower.

This program has several pathways, reflecting the varied interests of the students at WVC. For completeness reasons, we have mapped two pathways to the BAS-DA, one for students who have earned an ATS in Computer Technology or an AAS-T in Business Computer Technology. We only included the pathway for students who plan to complete the ATS Computer Technology. Students pursuing an Associate of Technical Science Degree (ATS) in Computer Technology (Network Administration) will be able to significantly broaden their skillset by following a specific pathway to the BAS-DA. Having the BAS-DA in addition to the ATS will provide graduates with well-rounded knowledge and expertise in both computer hardware and data analytics. The pathway options WVC has outlined for those with an AAS-T in Business Computer Technology will be kept on hand for advising purposes.

WVC's Associate in Technical Science Degree program in Computer Technology is one feeder program into the BAS-DA degree. We would propose that the AAS-T Business Computer Technology forms an equally viable feeder. Both programs offer two-year degrees that only require basic-level math competency. If students are interested in the BAS-DA degree, they are advised to enroll in the pre-calculus math sequence during their two-year program of study, as well as CSC 110. Students need to be ready for upper division course work in math and science when they begin the BAS-DA degree.

Both of these pathways from workforce Associate degrees into the BAS-DA degree are longer than desired. Work is underway to strengthen the mathematics and English requirements in both workforce degree programs to better streamline the process and experience for students.

The pathways to WVC's proposed BAS-DA degree have been careful to include the BAS committee's recommended minimum general education requirements: Required credits in communication skills, quantitative skills, natural sciences, humanities, and social sciences will ensure that graduates are prepared across all disciplines. It also includes in-depth 300 and 400 level classes that have all been built in close discussion with local, data-savvy, industry experts. The courses at the 300 and 400 level will require a higher level of reflection and the demonstration of more advanced skills than what is required at the Associate Degree level.

The WVC administration and faculty strongly believe that data analytics is a field where students need face time with their instructor and their peers. Thus, in cases where weekday face-to-face sessions are not the best option, online coursework will be augmented by hybrid delivery modalities as well as weekend face-to-face sessions. In each cohort, students will work with the instructor to identify the best location for the weekend sessions.

Core courses at the BAS level were designed to prepare graduates to enter the workforce immediately, or pursue a Master's degree at another university. Graduates of the BAS-DA program will meet the demands for data analysts in North Central Washington, thus alleviating issues that local employers face in terms of staffing.

The WVC BAS-DA program consists of two components: foundational course preparation in the first and second years and specialized and in-depth coursework in the third and fourth years. We have established stringent requirements for entry into the third and fourth years of the BAS program, reinforcing the value we place upon a strong foundation. The remaining Data Analytics curriculum will reflect the core principles set forth in the BAS-DA Mission and Philosophy: 1) The program will be rigorous, creating employees who can think critically and who possess the necessary computational skills to perform the duties of a data analyst; and, 2) students will understand the issues faced and the solution strategies employed by local industry. We have listened and heard what our industry partners are looking for in a graduate, and we are confident that this BAS-DA degree will deliver.

Program Evaluation Criteria and Process

Assessment for the proposed BAS-DA 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-DA 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. In addition to annual evaluation, BAS-DA will have the opportunity to evaluate each course quarterly. These evaluations help faculty and administration gauge the success of the program on a continual basis. Table I below summarizes the assessment mechanisms that will be measured to make appropriate changes to the degree program, indicated by the data collected.

Industry representatives will engage in review and recommendation of the curriculum and program elements through the BAS-DA Advisory Committee. 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 local industry will be engaged throughout the full curriculum development and implementation phase to ensure rigor of content and learning methodologies. External experts with experience in will have the opportunity to see 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. While the effectiveness of the program will be gauged continually, if changes are needed, the college will use curriculum change procedures already in place.	
Course evaluations by students (assessed quarterly)	• 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 (assessed quarterly	• 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	• 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 (assessed quarterly)	• 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-DA program faculty (assessed quarterly)	• 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 (Completed annually)	• 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 (Completed annually)	• Effectiveness of program in meeting job expectations • Observed increased skills and performance • Perceived strengths and weaknesses of current program
Oversight by BAS-DA Advisory Committee – provides ongoing support and program review	
	• 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-DA program faculty (assessed quarterly)	• Effectiveness of institutional and program resources and support • Preparedness to teach the curriculum

Note: Both the new, lead faculty Program Navigator for the BAS-DA program as well as the second full-time faculty will be tenure-track positions. The tenure-granting process includes continuous oversight by a faculty mentor, periodic performance reviews by a tenure committee of current, tenured WVC faculty, one student, and an administrator. Also included in the tenure process is quarterly student evaluations. These evaluations are monitored by each tenured committee member and the administrator. WVC's tenure process begins during the first quarter of the new faculty member's appointment and continues through year three of the new faculty member's appointment. WVC also relies on Advisory Committee input regarding all elements of the program, including curriculum. These Advisory Committees meet a minimum of twice per year. The new faculty member will attend and/or plan other meetings as necessary.

Course Preparation

The BAS-DA degree is planned for students who complete a workforce-related program; either through a transfer intent route (earning an AAS-T with specific course guidance) or through an applied pathway (Associate of Technical Science in Computer Technology – Network Administration).

General Education Components
The BAS_DA degree meets SBCTC's BAS requirements to include sixty general education credits in the subject areas identified in Table II below. Table II does note the general education requirements, but it also emphasizes the skills students need in the workplace to be successful.

Table II: General Education Requirements in the BAS-DA Program

I. Students must earn a cumulative grade point average of at least 2.00, as calculated by the degree awarding institution.
II. The general education courses will include courses earned at either/both the associate degree and/or applied bachelor's degree level, based on the total required 180 quarter hours of credit.
III. A minimum of 60 quarter hours of general education courses will be required, to include the following distribution areas:

Distribution	**Class**	**Credits**
Communication Skills (10 credits):	ENGL&101: General Composition	5
	ENGL 235: Technical Writing	5
Quantitative Skills/Symbolic Reasoning (5 credits):	MATH& 141: Precalc I	5
Humanities (10 credits):	Humanities Distribution Electives	10
Social Sciences (10 credits):	Social Sciences Distribution Electives	10
Natural Sciences (10 credits):	Natural Sciences Distribution Elective (Lab) Natural Sciences Distribution Elective	5 5
Recommended additional general education courses (15 credits to be chosen from the five distributions above if needed to achieve the required 60 credits). These should be selected with advising in order to fulfill the Pre-Major Requirements:	MATH& 142: Precalc II, MATH& 151-152: Calculus I and II, MATH& 211: Linear Algebra, MATH& 146: Intro to Statistics, BIO& 211-213: Majors Cell-Majors Animal (for Systems Biology Specialization), NATR 235: Society and Natural Resources (for Natural Resources Specialization), CSC& 141-142: Programming I and II, CSC 151-153: Web Programming I-III, CTS 221: Intro to Linux	15
Total		**60**

In completing his evaluation of the program relating to academic relevance and rigor, Dr. Shaban noted the following:

"The upper-level courses will give a solid theoretical foundation to students in a variety of topics. Besides the course material, it is important for each upper-level course to provide hands-on practical experience. The competitiveness of graduating students for data analyst positions can be greatly enhanced by ensuring that they leave WVC with a portfolio of projects (including code, reports and presentations) that they can share with potential employers. I would recommend that each upper-level course revolve around a mini-Capstone project, such that students have five or six pieces of work by the time they graduate. I also cannot emphasize enough the importance of the final Capstone project - I would recommend adding more detail in the program proposal about what it would include. In general, this project should act as an internship, allowing students to apply their skills in a real-world setting and should expose students to all aspects of a job in data analytics (requirements gathering, data extraction, analysis and communicating results)."

WVC understands Dr. Shaban's emphasis placed on the capstone element of the program. We believe that exceptionally well-prepared students will be able to extend the Capstone to as long as 25 credits over three quarters. Several industry partners commented that they would be very supportive of hosting Capstone students as interns. Also, the Master Syllabi for all program courses will be written to demand a project-based curriculum wherever possible, as a strong applied focus within the curriculum was also requested on the whole by the advisory committee.

Communication Skills Learning Outcomes
Students who complete the Communication Skills Requirement will be able to:

1. Demonstrate a familiarity with the writing process by producing a variety of original peer-reviewed essays, directed toward specific audiences' needs, in a variety of contexts.
2. Exercise skills in interpretation, analysis and critique.

Humanities Learning Outcomes
Students who complete the Humanities Requirement will be able to:

1. Distinguish and use multiple forms of expression.
2. Exercise skills in interpretation, analysis and critique.
3. Demonstrate the understanding of creative faculties and processes.
4. Express and produce work, which demonstrates empathy for the human condition.
5. Confidently and competently practice and exhibit performance skills.

Mathematics Learning Outcomes
Students who complete the Quantitative Skills Requirement will be able to:

1. Recognize the relationship between data, equations, and graphs.
2. Be well prepared for further math courses taken at a four-year institution.
3. Solve multi-step problems without guidance.
4. Reason Symbolically.
5. Confidently and competently practice and exhibit performance skills.

Natural Science Learning Outcomes
Students who complete the natural sciences requirement for the AAS or AST degree will be able to:

1. Meet transfer requirements for 4-year institutions and be prepared to major in science, technology, engineering, or mathematics.
2. Possess basic skills in the use of laboratory equipment, making experimental measurements, and making scientific observations. They also will be able to keep proper records of scientific observations and measurements, and be able to report experimental findings in a comprehensive lab report.
3. Recognize, explain, and communicate mathematical relationships in measurements and observations and the science disciplines in general.
4. Explain their experimental and observational results in terms of scientific theory.
5. Use scientific methods to determine the validity of claims about nature, explain their experimental and observational results in terms of scientific theory, and tell the difference between speculation, hypothesis, and theory.
6. Use their scientific literacy to better understand news reports about scientific topics. Students will apply scientific principles beyond the lab and classroom.

Social Science Program Outcomes
Students who complete the Social Sciences requirement will be able to:

1. Use critical and creative thinking in the scientific and discipline specific approaches to problem solving in order to explain contemporary and historical issues across Social Sciences.

2. Demonstrate an understanding of how individuals and groups interact and influence one another, our environment, and societies on multiple levels.
3. Communicate effectively in a scholarly manner using the process of invention, organization, editing, and presentation.
4. Articulate an understanding of cultural, ethnic, and social diversity in contemporary issues, while learning from different viewpoints.
5. Participate effectively in individual reflection and group experiences with emphasis on listening, critical and reflective thinking, values clarification, and responding in a respectful manner.

BAS-DA Pre-Major Requirements
Before any student can be admitted to the BAS-DA program, they must complete the following courses with a cumulative GPA of 2.5 or greater. These courses can also be used to satisfy general education distribution requirements.

- Programming: CSC 110: Intro to Data Analytics (R)
- Mathematics Requirement: MATH& 151, MATH& 152, MATH & 211 and MATH & 146
- Science Requirement/Electives: 10 credits to be chosen with advising and in line with the student's expected specialization. One course must be chosen from the physical, natural, or earth sciences, and 5 credits must be from a laboratory course
- Communications Requirement: ENGL& 101, and ENGL 235
- Pre-Major General Education Requirement: 15 credits. 5-10 credits from the Social Science Distribution, and 5-10 credits from the Humanities Distribution.

Dr. Shaban recommended some minor changes to WVC's original proposal:

"I would recommend a few minor changes to the general education requirements:
- Technical writing (ENGL 235) should be a required course not an elective- writing technical reports and documentation is an important part of data analysts' day-to-day responsibilities.
- Recommend including Web Design I/II and Introduction to Linux as electives that can satisfy lower division program requirements in addition to the Advanced Java programming course. These courses can provide a more holistic technical foundation, since data analysts are often required to be familiar with different parts of a tech stack (front-end, back-end, infrastructure). They seem to be included in Pathway 2, but can be beneficial in Pathway 1 as well."

Due to Dr. Shaban's recommended changes above, ENGL 201: Advanced Essay and ENGL 203: Composition: Research were removed and students must take ENGL 235: Technical Writing to more successfully prepare BAS-DA graduates for the responsibilities they will face daily. Our response to Dr. Shaban's second recommendation is reflected in these courses being added to the recommended elective list in Table II. However, if WVC removes Advanced Java, this would negate the possibility of implementing a 2 + 2 transfer with Washington State University.

Dr. Guimaraes' feedback on curriculum:

"1) Minor suggestion: Replace Calculus II with Discrete Math. Calculus II is not necessary for Data Science. However, the absence of Discrete Math is not seen by us as a major flaw." WVC considered this suggestion, and has in fact already built the course, checked statewide equivalencies, etc. We may very well add this course at a later date.

BAS-DA Lower-Division Program Requirements
The following courses must be completed with a cumulative GPA of 2.5 or greater before students can either be granted upper-division status or graduate from the BAS-DA program. These courses can also be used to satisfy general education distribution requirements. Students may start upper division coursework while completing lower-division requirements, provided they meet all prerequisites for their upper division BAS-DA coursework.

- Programming Sequence I: CSC& 141: Programming Fundamentals (Java), CSC& 142: Intermediate Programming (Java), CSC 243: Advanced Programming (Java)
- Programming Sequence II: CSC 210: Data Analytics Systems and Algorithms (Python), CSC 215: Advanced Data Analytics (Python)
- BAS-DA Major General Education Requirement: Five credits from either the Social Science or Humanities Distribution so that the total from each is 10 credits.

BAS-DA Upper-Division Program Requirements
The second two years of the BAS-DA is primarily focused on getting students ready for a local position. The four most likely areas within which a data analyst might find local employment are the following: 1) Natural Resource Management (Department of Fish and Wildlife, WA state wild fire prevention teams, etc.), 2) Hydropower (Chelan PUD, Grant PUD, etc.), 3) Tree fruit (Stemilt, etc.), and 4) the local service sector (Non-profits, Foray Coffee, reporting and data analysis for Confluence Health, etc.).

Thus, all BAS-DA students are required to complete 35 credits of a core set of courses covering data analysis applications, underlying theory, and techniques. Students will then pick from among courses that lie within either the Systems Biology/Resource Management, the Energy/Industrial, or the Ag/Business Specializations. They must complete 25 credits within the specialization of their choice. Their WVC education will then be completed with a substantial capstone project whose design and completion would fall at least in part under the supervision of one of our local business partners. Between the coursework in a particular specialization and the capstone within an industry of the same specialization, students should gain the domain-specific knowledge necessary to be an effective data analyst in their chosen field.

The following courses must be completed with a cumulative GPA of 2.5 or greater before graduation from the BAS-DA program. These courses can also be used to satisfy general education distribution requirements. Students may start upper division coursework while completing lower-division requirements, provided they meet all prerequisites for their upper division BAS-DA coursework.

Students must complete the core coursework:

- **Core Courses – 35 credits**
  - Mathematics: MATH 344: Applied Statistics I, MATH 345: Applied Statistics II, MATH 444: Multivariate Statistics, MATH 446: Computational Statistics – 20 credits
  - Data Analytics: CSC 315: Data Extraction and Management, CSC 410: Big Data Systems, CSC 415: Data Visualization – 15 credits

Students must also complete a capstone project with supervision from one of our industry partners:

- **Capstone Project – 10-25 credits**

Students also must complete 25 credits in the track of their choice:

- **Systems Biology/Natural Resource Management Track – 25 credits**

- Mathematics: MATH 338: Continuous-Time Modeling, MATH 339: Discrete-Time Modeling, MATH 336: Statistical Experiment Design, MATH 301-302: Sampling Theory and Methods I & II

- **Ag/Business Track – 25 credits**
  - Business: BCT 150: Database, and BCT 220: Spreadsheets II, and one of BUS 146: Business Ethics, BUS& 201: Business Law, BUS 241: Principles of Marketing, CTS 140: Server Operating Systems, CTS 221: Introduction to Linux, CTS 222: Security Fundamentals, CTS 232: Network Design, or CTS 225: Web Server Management
  - Data Analytics: CSC 450: Marketing Analysis, and CSC 465: Predictive Analysis

- **Energy/Industrial Track – 25 credits**
  - Data Analytics: CSC 465: Predictive Analysis
  - Mathematics: MATH 447-457: Time Series Analysis I & II, MATH 338: Continuous-Time Modeling, MATH 339: Discrete-Time Modeling

BAS-DA Course Work
WVC's BAS-DA 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, meaning that students will work online to complete some coursework and come to campus during evenings and weekends for some coursework.

In his evaluation of the curriculum aligning with the Statement of Needs, Dr. Shaban agreed that this program will serve to fill the employment gaps in North Central Washington:

"Yes, the program serves the gaps that were identified in the Statement of Needs. The organization of upper-level courses into industry-specific tracks is especially attractive from an employer's perspective. My one comment here is that the naming of the Hydropower track seems a bit limiting, since its courses would prepare students for work in most manufacturing facilities or other energy sector jobs. Recommend renaming it to "Energy and Industrial track" or something similar."

Dr. Shaban's note regarding the Hydropower track were noted and changed to reflect his recommendation of Energy/Industrial Specialization (p.13, 14).

ATS Computer Technology Pathway

Entrance into program requires an earned Associate of Technical Science degree in Computer Technology, (although students who enter with an Associate of Applied Sciences in Business Computer Technology would follow a similar path). We have included this particular pathway, as this is the route that produces graduates with the broadest possible base of computer skills.

Table III: ATS Computer Technology Pathway to the BAS-DA

YEAR ONE	Credits	YEAR TWO	Credits
CTS 110: Computer Hardware	5	CTS 222: Security Fundamentals	5
CTS 115: Computer Software	5	CTS 221: Introduction to Linux	5
CTS 120 Intro to Networking	5	CTS 232: Network Design	5
CTS 130: Client Operating Systems	5	CTS 225: Web Server Management	5

CTS 140: Server Operating Systems	5	CTS 235: Managing Mail and News Servers	5
CTS 150: Network Infrastructure	5	ENGL& 101: General Composition	5
CTS 160: Active Directory	5	CMST 220: Public Speaking	5
CSC 110: Introduction to Data Analysis	5	MATH& 141: Precalc I,	5
CSC& 141: Programming Fundamentals	5	MATH& 142: Precalc II	5
Total Credits:	45		45

Prior to official admission into the BAS-DA Program, students in this pathway who complete Table III will earn their Associate in Technical Science Computer Technology. While some BAS-DA Pre-Major Requirements are already fulfilled during Years One and Two, students must still complete the following with a cumulative 2.5 GPA.

Table IV: ATS Computer Technology Pathway to the BAS-DA—Additional Courses to Fulfill Pre-Major Requirements

Distribution	**Class**	**Credits**
Communication Skills:	ENGL 235: Technical Writing [Only if they did not place into this in Year Two]	5
Quantitative Skills/Symbolic Reasoning:	MATH& 151, MATH& 152, MATH& 211, and MATH& 146 [Perhaps fewer classes if they enrolled in a higher math option in Year Two]	20
Humanities:	Humanities Distribution Electives	0-5
Social Sciences:	Social Sciences Distribution Electives	5-10
Natural Sciences:	Natural Sciences Distribution Elective (Lab) Natural Sciences Distribution Elective	5 5
Total		**45**

Note: In order for students to enter the BAS-DA program, they must earn a total of 10 credits from the Humanities and Social Science distributions combined (5-10 credits from the Social Science Distribution, and 0-5 credits from the Humanities Distribution).

Upon entry to the junior year (year three), students will have earned at least 55 credits towards the overall 60 general education requirements for the BAS-DA degree program. These credits are listed in Table V below. The remaining general education requirements that must be completed in the junior year would be from the Humanities or Social Science distribution and is noted in red in Table VI.

Table V: ATS Computer Technology Pathway to the BAS-DA—General Education Requirements Fulfilled Prior to Year Three

Distribution	**Class**	**Credits**
Communication Skills:	ENGL 101: General Composition, ENGL 235: Technical Writing	10
Quantitative Skills/Symbolic Reasoning:	5 credits from MATH& 141, MATH& 142, MATH& 151, MATH& 152, MATH& 211, and MATH& 146	5
Humanities:	CMST 220: Public Speaking, Humanities Distribution Elective	5-10
Social Sciences:	Social Sciences Distribution Electives	5-10

Natural Sciences:	Natural Sciences Distribution Elective (Lab) Natural Sciences Distribution Elective	5 5
Electives:	15 credits from MATH& 141, MATH& 142, MATH& 151, MATH& 152, MATH& 211, and MATH& 146	15
Total		**55**

Table VI: ATS Computer Technology Pathway to the BAS-DA—Ag/Business Specialization

YEAR THREE	Credits	YEAR FOUR	Credits
Humanities or Social Sciences Distribution Elective	5	CSC 315: Data Extraction and Management	5
CSC 210: Data Analytics Systems and Algorithms	5	CSC 410: Big Data Systems	5
CSC 215: Advanced Data Analytics Systems and Algorithms	5	CSC 415: Data Visualization	5
CSC& 142: Intermediate Programming	5	MATH 446: Computational Statistics	5
CSC 243: Advanced Programming	5	BCT 220: Spreadsheets II	5
BCT 150: Database I	5	CSC 450: Marketing Analysis	5
MATH 444: Multivariate Statistics	5	CSC 465: Predictive Analysis	5
MATH 344-345: Applied Statistics I and II	10	Capstone Project	10
Total Annual Credits:	45		45

Students with an approved AAS-T or ATS in a related field who wish to enter the BAS-DA must also complete the Pre-Major Requirements. These students must also have a total of 60 General Education credits by the time they graduate with a BAS-DA, which may mean some additional general education courses must be taken prior to or while enrolled in the BAS-DA program.

Part-Time Programs
Two different cohort schedules have been created to best address the needs of the students in North Central Washington. Students will have the option of a full-time cohort, (see Tables III-VI) or part-time cohort. While the full-time route will most likely be taken by those who are not yet working or whom work part-time, the option of a part-time cohort will be available for those who are working full-time.

Diversity Requirement
Beginning in Fall 2018, WVC graduates will be required to complete the Diversity requirement. The following classes satisfy this requirement: ANTH 100 – Survey of Anthropology, ANTH 206 - Cultural Anthropology, ANTH 220 - Cross-Cultural Studies, CHST 112 – Chicano/a History: An American Journey, CHST 115 – La Chicana: Gender, History and Intellectualism, CHST 120 – Identity, Art and Culture, ENGL 247 – Multicultural Literature, GEOG 100 – Introduction to Geography, GEOG 102 – World Regional Geography, GEOG 150 – Introduction to Sustainability, POLS 203 – International Relations, POLS 205 – Contemporary World Problems, SOC 151 – Sociology of Race & Ethnicity ***Study Abroad Courses – Italy, Japan, Costa Rica, Germany etc. Students must individually petition to have study abroad courses meet the diversity requirement.*

Course Descriptions
See Appendix B for a list of existing courses related to the BAS-DA Degree Program. The following are courses that will be developed in the coming year under the leadership of current faculty and the Program Navigator. All classes are five credits.

CSC 110: Introduction to Data Analytics Basic concepts, principles, and tools used in data analytics. Coursework is primarily done in the R programming language. Prerequisites: Math& 141 with a "C" or better.

CSC 210: Data Analytics Systems and Algorithms Exploration of fundamental concepts, constructs, and techniques of modern data analytics systems. Coursework is primarily done in the R and python programming languages. Prerequisites: CSC& 141-143 with a "C" or better.

CSC 243: Advanced Programming Abstract data types (ADTs), lists, stacks, queues, linked lists, binary trees, recursion, interfaces, inheritance, and encapsulation. The course also introduces the notion of complexity and performance trade-offs in examining classic algorithms such as sorting and searching and classic data structures such as lists, sets, and maps. The course will include a mixture of implementing data structure and using components from the Java Collections Framework. Prerequisites: CSC& 142 with a "C" or better.

CSC 215: Advanced Data Analytics Systems and Algorithms Continuation of CSC 115. Exploration of fundamental concepts, constructs, and techniques of modern data analytics systems. Coursework is primarily done in the R and python programming languages. Prerequisite: CSC 115 with a "C" or better.

CSC 310: Database Design and SQL The relational data model and the SQL query language. Conceptual modeling: entity/relationships, normal forms. XML, XPath, and XQuery. Transactions: recovery and concurrency control. Implementation of a database system. A medium sized project using a rational database backend. Prerequisite: CSC 243 with a "C" or better.

CSC 315: Data Extraction and Management Introduces database management systems and writing applications that use such systems; data models (e.g., relational, semi-structured), query languages (e.g., SQL, XQuery), language bindings, conceptual modeling, transactions, security, database tuning, data warehousing, parallelism, and web-data management. The process of automatically extracting valid, useful, and previously unknown information from large repositories. Prerequisite: CSC 215 with a "C" or better.

CSC 410: Big Data Systems Distributed storage and parallel processing and architectures that support data analytics will be examined, and students will learn how to implement a distributed data processing system. The course will also cover critical topics in mining and knowledge discovery of big data, with applications in social analytics, cyber security, and information networks, among others that are already in public eye. Prerequisites: CSC 310, CSC 315 with a "C" or better.

CSC 415: Data Visualization Techniques for creating effective visualizations of data based on principles from graphic design, perceptual psychology, and statistics. Topics include visual encoding models, exploratory data analysis, visualization software, interaction techniques, graphical perception, color, animation, high-dimensional data, cartography, network visualization, and text visualization. Project-based course design. Prerequisites: CSC 310, CSC 315 with a "C" or better.

CSC 450: Marketing Analysis Strategic models and metrics such as competitive analysis, segmentation, targeting and positioning. The focus will be on real world examples from a variety of sources and using statistical software. Prerequisites: Math 345 with a "C" or better.

CSC 465: Predictive Analysis Predictive models such as classification, decision trees, machine learning, supervised and unsupervised learning for the purpose of practical applications. Prerequisites: Math 345 with a "C" or better.

Math 301: Sampling Theory and Methods I Simple random sampling with associated estimation and confidence interval methods, selecting sample sizes, Estimating proportions, Unequal probability sampling, Ratio and regression estimation. Stratified sampling, cluster and systematic sampling. Prerequisites: Math& 146.

Math 302: Sampling Theory and Methods II Multistage designs, double or two-stage sampling, capture-recapture sampling, and random response models. Non-sampling errors and missing data. For illustration and clarification, examples are drawn from diverse areas of application. Prerequisites: Math 301.

Math 336: Statistical Experiment Design The concepts of comparative experiments, ANOVA and mean separation procedures. Principles of randomization, blocking (complete and incomplete) and replication, randomized blocking designs, Latin square designs, full factorial and fractional factorial designs and response surface methodology. Substantial focus will be devoted to environmental and agricultural applications. Prerequisites: Math& 146.

Math 338: Continuous-Time Modeling Physical and biological problems in terms of differential equations. Density dependence, delays, demographic stochasticity, and age structure on population growth; population interactions (predation, competition, and mutualism); and application of optimal control theory to the management of renewable resources. Many models will be spatially explicit. Prerequisites: Math& 238.

Math 339: Discrete-Time Modeling Developing and analyzing mechanistic, dynamic models of physical and biological systems and processes. Applications drawn from many branches of biology, epidemiology, medicine, population dynamics, and engineering physics. Provides experiences in applying difference equations and dynamical systems theory to real problems. Many models will be spatially explicit. Prerequisites: Math 338.

Math 344: Applied Statistics I Probability theory and applications including trees and Venn diagrams, conditional probability, contingency tables, independence and Bayes theorem. Random variables and sampling distributions (binomial, Poisson, normal, exponential, geometric and hypergeometric) and their use in confidence intervals and hypothesis testing such as t-tests, z-tests, one and two sample mean and proportions, chi-squared; ANOVA. The focus will be on real world examples from a variety of sources and using statistical software such as Excel, Minitab, SAS or R. Students should expect to produce reports and presentations. Prerequisites: Math& 146 with a "C" or better.

Math 345: Applied Statistics II Linear models including simple and multiple regression, and log-linear models, as well as stepwise regression, logistic regression, and analysis of variance/covariance. The focus will be on real world examples from a variety of sources and using statistical software such as Excel, Minitab, SAS or R. Students should expect to produce reports and presentations. Prerequisite: MATH 344 with a "C" or better.

Math 444: Multivariate Statistics Multivariate normal distribution: pdf, marginal and conditional distributions, covariance matrix, correlations and partial correlations. The Wishart distribution, estimation and testing, Hotelling's test, multivariate linear models and MANOVA. Testing independence, Barlett's tests, estimators, eigenvalues, principle components, and canonical correlations. Multivariate probability inequalities and their applications to the power of multivariate tests and multiparameter confidence intervals.

Lattice conditional independence models and their applications to missing data problems and "seemingly unrelated regression" models. Prerequisites: Math 345 with a “C” or better.

Math 446: Computational Statistics Numerical optimization in statistical inference [expectation-maximization (EM) algorithm, Fisher scoring, etc.], random number generation, Monte Carlo methods, randomization methods, jackknife methods, bootstrap methods, tools for identification of structure in data, estimation of functions (orthogonal polynomials, splines, etc.), and graphical methods. Prerequisites: Math& 211, Math& 146, and CSC 215 with a “C” or better.

Math 447: Time Series Analysis I Simple descriptive techniques, trend, seasonality, the correlogram, autocovariance, and autocorrelation. Probability models: stationary and nonstationary processes, moving average, autoregressive (AR), ARMA, ARIMA, and seasonal ARIMA. Estimating autocorrelation functions and fitting ARIMA models. Fitting models to data: Model identification, parameter estimation, model selection, and model diagnostics. Prerequisites: Math 345.

Math 457: Time Series Analysis II A continuation of Math 447. Forecasting: Exponential smoothing, ARIMA forecasting. Stationary processes in the frequency domain, Fourier representations, spectral density functions, periodogram, spectral analysis. State-space models: Dynamic linear models and the Kalman Filter. The focus will be on acquiring, cleaning, visualizing, and performing methods to real sensor datasets. Prerequisites: Math 447.

Qualified Faculty

WVC projects an enrollment of 15 full-time equivalent students (FTEs) during the first year of the BAS-DA program, with full capacity at 25 FTEs and a total headcount of 40 by 2022. Full-time faculty who will teach in the program will hold a PhD or M.S. in mathematics, statistics, computer science, or a related field. Ideally, the faculty will have work experience in the field of data analytics, a familiarity with curriculum development, and possess several years of higher education classroom experience.

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 related fields. These faculty members' teaching loads support the proposed BAS-DA program. Appendix D lists all the anticipated participating mathematics, statistics, computer technology, and computer science faculty.

To offer the BAS-DA degree, WVC plans to hire a full-time BAS Program Navigator, a second, full-time faculty member with the appropriate credentials (i.e., Ph.D., or MS in mathematics, statistics, or computer science), and a part-time Computer Science Instructor responsible for 15-20 credits per year of computer science curriculum. Current faculty without these credentials will not teach 300 and 400-level classes in the BAS-DA program. While the part time instructor is only necessary for the first one or two years of the program, the Program Navigator is a critical position and will be hired before the start of the program in Fall 2019. We anticipate that the second, qualified full-time faculty will be hired after the first year. Having faculty members with these credentials will enhance the faculty talent noted above, augment WVC's overall STEM teaching capacity, and provide leadership, direction, and curriculum for the program.

Because the BAS-DA will be the second four-year degree program in the workforce education division at WVC, we intend that the BAS Program Navigator will manage both BAS programs. This person will take the lead on curriculum development for the current BAS-DA program and eventually teach a full load. WVC will begin this hiring process in Spring 2019.

In addition, full-time or part-time faculty members will be hired as needed with Ph.D. or MS credentials to teach the remaining 300-400 level courses. During our conversations with local businesses and Advisory Board members, we were excited to find that we have several qualified educators and industry experts within WVC's service district that are eager to teach the new curriculum. All WVC general education courses at the 100/200 level are taught by qualified WVC faculty members. Derin Wysham, Math Division Chair, Ph.D. in Applied Mathematics, and experienced computational systems biologist and theoretical ecologist, was granted release time to develop curriculum. Additional release time will be granted to BAS-DA faculty in the initial year for curriculum development as needed.

Dr. Hassan Shaban, who evaluated the program, noted this regarding the quality of faculty at WVC and the role of the proposed BAS Navigator:

"Existing WVC faculty from the Mathematics and Computer Science departments appear to be more than qualified to staff this program, along with a Program Navigator and one additional FTE faculty. My one observation here is that the Program Navigator role, as defined, seems to be limited to academic advising and admissions, while the Career Center seems to be responsible for post-graduation and internships. This may already be the plan, but I would recommend that these two roles be conducted in close coordination or even merged. The Program Navigator needs to be intimately aware of the needs of the market, so that they can steer students in an appropriate direction. The decision of which track to follow in the third and fourth years should be driven by the job outlook. And internships should also be driven by job placements, rather than simply to satisfy a graduation requirement. For example, the Ag/Business track is more of a generalist track with potentially wider job opportunities and more students should be steered in its direction, if the job outlook in the other two tracks do not look promising. The Program Navigator should also be aware of what internships were completed and with which firms - in a sense, they need to act as an industry liaison and

develop personal relationships with the largest potential employers, so that students can be steered appropriately, rather than having the job search and career placement be an afterthought for students after they graduate. A degree alone cannot guarantee job placement, so it is crucial that the Program Navigator have a pulse on the job market."

Dr. Shaban's comments related to the planned hire of a Program Navigator at WVC were added to this proposal and noted on page 21.

Dr. Guimaraes' feedback related to qualified faculty is listed below:

"2) Concern: Only one full time faculty assigned to CS and his major is not related to CS. The Part-time CS faculty's major is also not CS."

For the concern related to full-time computer science faculty, WVC plans to hire an additional full time faculty with computer science credentials as soon as year two of the program.

Qualified faculty for this program are listed below and in Appendix D.

Name	Dept.	FT/PT	Hire Date	Degrees
To Be Hired	**DA**	**PT**	**Fall 2019**	**Doctoral preferred**
To Be Hired	**DA**	**FT**	**Fall 2020**	**Doctoral preferred**
***Burns, D.**	**CTS**	**FT**	**9/14/2001**	**B.A., B.A., Anthropology, Education**
Cacciata, C.	**MATH**	**FT**	**9/18/2012**	**B.A., Math** **M.A., Math**
Henning, L.	**MATH**	**FT**	**3/27/2017**	**B.S., Civil Engineering** **M.A., Math**
Keys, K.	**MATH**	**FT**	**9/12/2016**	**B.A., Environmental Science/Studies** **M.A., Math**
Kraske, W.	**MATH**	**FT**	**9/11/2015**	**B.S., Engineering Physics** **M.S., Physics** **M.Div., Cross-cultural track** **D.Min., Leadership**
Painter, C.	**MATH**	**FT**	**9/12/2016**	**A.A.** **B.A., Education** **M.Ed., Math**
Ramaswamy, S.	**MATH**	**FT**	**9/15/2017**	**B.E., Mechanical Engineering** **MBA, Finance** **M.S., Industrial & Agricultural Technology** **Ph.D., Industrial & Agricultural Technology**
Redmon, A.	**MATH**	**FT**	**9/21/1998**	**B.S., Math** **M.S., Math**
Russell, A.	**MATH**	**FT**	**9/20/1996**	**B.S., Math** **M.S., Physics**
Unger, B.	**MATH**	**FT**	**9/19/1988**	**B.S., Physics** **M.S., Ph.D., Physics**

Van Dyke, B.	**MATH**	**FT**	**9/12/2016**	**B.S., Math** **M.S., Math** **Ph.D., Math**
Wiest, S.	**MATH**	**FT**	**9/13/1996**	**B.S., Math** **M.S., Applied Math**
Wysham, D.	**MATH**	**FT**	**9/13/2013**	**B.S., Mathematical Sciences** **Ph.D., Applied Mathematics**
Bard, E.	**MATH**	**PT**	**4/4/2011**	**BA, BS – Business, Geological Science, MA - Teaching**
Barnhill, L.	**MATH**	**PT**	**1/4/1998**	**BA Education Mathematics**
Browning, J.	**MATH**	**PT**	**4/3/2000**	**BA**
Hampton, G.	**MATH**	**PT**	**1/2/2014**	**Residency Teaching Certificate, BS E&E ENGR. TECH., Masters Aeronautical Science**
Henderson, L.	**CSC**	**PT**	**9/26/2011**	**BA Bible**
Lemons, K.	**MATH**	**PT**	**1/2/2013**	**AS, BS Electrical Engineering**
Madson B	**CSC**	**PT**	**3/30/2015**	**BA Business Administration**
Maher, D.	**MATH**	**PT**	**3/30/2015**	**BS Math**
McCormick, W.	**MATH**	**PT**	**6/27/2016**	**AA, BA Education Mathematics, MA Education**
Mitchell, R.	**CTS**	**PT**	**2/1/2008**	**BS – Environmental Science, MA – Education & Human Services & Guidance**
Pecha, M.	**MATH**	**PT**	**1/4/2012**	**BS – Math, M.Ed. – Education Administration**
Ryan, D.	**MATH**	**PT**	**1/5/2015**	**BS, MS Computer Science**
Wikman, C.	**MATH**	**PT**	**9/21/2015**	**Master of Arts for Teachers**

***Note:** David Burns, current CTS Program Coordinator and faculty, will not teach 300 and 400-level courses in the BAS-DA program.

Selective Admission Process
In keeping with its mission to serve the educational and cultural needs of North Central Washington, WVC will clearly define minimum qualifications and prerequisites for admission to the degree program that will help ensure student success.

Students applying for this program will successfully meet these admission requirements:

- Earned associate (or higher) degree from a regionally accredited institution
- Cumulative GPA of 2.5 before entering the program
- Interview with BAS-DA lead faculty (see Appendix E).
- The program will conduct an annual review of student composition to ensure that WVC is a designated Hispanic-serving institution (and native serving institution) in this as in all programs.

All WVC staff are trained in cultural sensitivity through All Staff trainings as well as specific trainings for our Deans and Cabinet members. All faculty in the program will receive Title IX and implicit bias training as well as training on creating inclusive environments. In addition, we will reserve at least two spots on the selection committee for those from diverse backgrounds or who represent the college on diversity and equity initiatives and have expertise in minimizing bias.

In addition, each student must have the following documentation included in their respective application packet:

- Resume
- A minimum of one professional reference
- Official Transcripts

The applications will be reviewed and scored by a team of faculty, staff and Ad Hoc committee members (if needed).

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 (College Assistance Migrant Program) CAMP program, a grant-funded student retention program at WVC. 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. Prioritization will additionally include: relevant work experience, GPA, candidate interview, and references. The interview with BAS-DA lead faculty will be a point-based rubric (see Appendix E). The goal of the BAS-DA admission process is to maintain a diverse student population in the program, thus leading to a more diverse group of data analysts in North Central Washington.

Students who are accepted into the program will attend an orientation, which will explain the Student Handbook that outlines procedures, expectations, requirements for continuation in good standing in the program, and the process for meeting all of the requirements for the BAS-DA program.

Recruitment efforts will be held throughout WVC's service district and will include outreach to local industry partners, including the Colville Tribe, various fruit industry partners and local public utility districts (PUDs). WVC already has a strong outreach effort throughout its service district and efforts to recruit for BAS-DA will benefit from these established relationships.

Student Services
WVC will provide strong academic support for its BAS-DA 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, all WVC tenured faculty will be available for face-to-face meetings on a regular basis and through email/phone. The BAS Navigator 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 anticipates hiring a BAS Navigator, who will provide student readiness, admissions, progress, and educational planning support. Ideally, the BAS Navigator will have experience with student development and with college student personnel. Deans and Lead Faculty for each BAS program will coordinate duties with this BAS Navigator and assist as needed. The BAS Navigator will be the first contact for anyone with questions or concerns related to the BAS-DA program. The BAS Navigator will also be required to have in-depth knowledge of the needs of business, industry and students in North Central Washington, including, but not limited to the local job market. In addition to Deans and Lead Faculty assisting the BAS Navigator, WVC also has a centralized Instruction Office available as support to all faculty, staff and students.

WVC faculty are committed to the success of every student throughout the BAS-DA program. To facilitate success, the college has a director/navigator/retention specialist, who currently works with numerous Workforce Education students and who will expand to assist BAS-DA students. The navigator will provide educational planning and support services to prospective BAS-DA 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 been instrumental in the launch of WVC's first two BAS degrees. 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+ undergraduate e-books. Academic journals are provided with core academic collections from ProQuest and Gale and specialized databases from other vendors. Articles not covered by WVC databases are easily accessible through the InterLibrary Loan service. The library makes available 85 databases, 49 of which are paid with the balance being free resources vetted by library staff.

WVC librarians are available to help find, evaluate and document resources in person including evenings and Saturdays. The WVC 24x7 online "Ask a Librarian" service is available to all students.

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.

The library has an E-Resources Librarian currently on staff, who acquires, evaluates and supports the online library services and databases offered to faculty, staff and students. This position supports expanding the services offered to BAS students with the introduction of this degree by dialoguing with WVC faculty and other librarians at schools in similar transitions and identifying the best resources to add.

In anticipation of the previous baccalaureate degrees, the Dean of Library and Technology Services completed conversations with WVC's faculty librarians and staff about how to scale support for 300/400

level courses. Budgets for the 2016-19 academic years have been identified for securing materials for this coursework. When the Program Navigator 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. The Workforce Dean has had several conversations with the Dean of Library and Technology Services to ensure the library can adequately support the influx of BAS students. 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 two core academic databases; access to over eight hundred academic journals on education; 3,800 books in the EBook Central; comprehensive coverage of education in the core online reference collection (Credo); and 600 online videos on education.

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. In addition, the Dean and key staff are leaders in the community and technical college system's new library consortium. That group's first project was to migrate to a common library software platform (Ex Libris' Alma and Primo). The new platform will increase access to education 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 analyze course syllabi in order 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 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 a year 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, and much of that was used to support BAS degrees in general. 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 programs.

WVC's library has also been granted additional resources from the Title III grant, which allowed the purchase of journal articles, books and book chapters, theses and dissertations. WVC will fund the library annually in the amount of $3,000.00 to continually replace aging materials and grow the education collection for all BAS programs. This annual support will help the library enhance services to enable all BAS students receive additional resources related to research.

Dr. Shaban feels that WVC's facilities and support services are currently sufficient to house the BAS-DA program:

"In general, the current facilities appear to be sufficient for students to access relevant resources. Data analytics projects require powerful computers with multiple processors and sufficient memory, which may make cloud computing resources more cost-effective for students than acquiring high-end laptops (a decent laptop for data analysis would cost at least $1000 and usually closer to $2000). I would anticipate that educational subscriptions by the College to services like Microsoft Azure or Amazon Web Services might become useful in future years in addition to or in conjunction with WVC's Virtual Desktop service."

In the future, WVC has already made plans reevaluate the computer lab needs moving forward, with the addition of this BAS 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-DA students with all aspects of the career development process, including résumé 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. The Career Center has been instrumental in finding internship partners for other BAS programs. This service will continue with BAS-DA students and helping them secure the residency requirement.

Child Care: Through a partnership with WVC and Wenatchee School District, affordable childcare 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 Write Lab: 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 support that will enhance the educational experience at WVC. The Write Lab provides help to all WVC students who have writing assignments. The Tutor Center and Write Lab are available on campus, and the eTutoring service is available online 24x7. In January 2016, 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.

Academic Supports: WVC will begin student support services from the initial interest in the BAS-DA program. WVC is aware that many BAS-DA students work full-time while attending classes. This can be a significant challenge specifically for students whose first language is not English. Along with supports from ECE faculty, the WVC write lab, and the WVC tutor center the WVC BAS-DA program has the opportunity

to partner with the WVC Continuing Education department to develop community courses focusing on student success as needed.

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-Belser, 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-DA degree program will rely on State funding. Tuition for 2018-19 is $205.36 per credit. A three-year financial plan showing expenses and income is shown in Table V below. Wenatchee Valley College is fully committed to build and sustain a successful BAS-DA 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. The college fully expects to achieve full enrollment of 35 FTES by year three. All BAS programs at WVC are counted as state-funded and not self-funded programs.

WVC anticipates little equipment will be needed for the BAS-DA program. However, two new computer labs in Sexton Hall on the Wenatchee campus were fitted with new computers within the last year. In addition, plans are underway to add to the college's ITV system, allowing students to connect to classrooms via technology in Bridgeport, Nespelem and to the program home in Wenatchee. The main WVC campus in Wenatchee has appropriate and sufficient labs and facilities to house the BAS-DA program and students. All student services are available to all students on both campuses. The main WVC campus also holds adequate office space for the new faculty when hired.

The cost of the new full-time, tenure track faculty position will be introduced into the 2019-20 budget planning process in Spring 2019. Additional adjunct faculty will be hired as the program develops. Faculty salaries and benefits are budgeted to increase by 3% each year each year.

Wenatchee Valley College tuition costs

Number of Credits	Washington Resident	Non-State Resident	Non-US Resident
1	205.36	219.08	603.91
5	1026.80	1095.40	3019.55
10	2053.60	2190.80	6039.10
15	2104.75	2245.55	6093.85
18	2135.44	2278.40	6126.70
19+ credits	194.55/credit	194.55/credit	593.10/credit

Upper division courses are offered for bachelor's degree programs in engineering and nursing. Upper division (300- and 400-level classes) are charged a fee equal to the approved upper division per-credit tuition rate. It is a higher per-credit rate than lower division (100- and 200-level) classes. The fee is attached to each class.

Table VII: Financial Plan for BAS-DA Degree Program

Estimated Program Expenses				
Cost	Year 0 (FY 20)	Year 1 (FY21)	Year 2 (FY 22)	Year 3 (FY 23)
Full-Time Faculty	$57,724	$59,456	$122,478	$126,154
Adjunct Faculty		$17,800	$18,334	$18,884
Curriculum Development Stipends	$11,200	$6,800	$2,000	$2,000
Benefits	$23,090	$30,902	$63,658	$65,568
Goods and Services	$2,000	$3,000	$3,000	$3,000
Travel	$5,000	$5,000	$5,000	$5,000
Equipment	$ -	$5,000	$5,000	$5,000
Faculty Professional Development	$1,500	$1,500	$1,500	$1,500
Library resources for BAS-DA students	$3,000	$3,000	$3,000	$3,000
Marketing	$5,000	$5,000	$5,000	$5,000
Total Costs	$108,514	$137,458	$228,970	$235,106
Estimated Program Income				
*FTEs	$ -	15	25	35
Annual BAS Tuition (3 quarters)	$ -	$9,449	$9,449	$9,449
****Tuition and Fees:**	$ -	$141,735	$236,225	$330,715

***Note:**
Part-Time Programs
Two different cohort schedules have been created to best address the needs of the students in North Central Washington. Students will have the option of a full-time cohort, (see Tables III-VI) or part-time cohort. While the full-time route will most likely be taken by those who are not yet working or whom work part-time, the option of a part-time cohort will be available for those who are working full-time.

****Note:** Annual BAS tuition: 300 and 400 level course tuition is $1,049.90/5 credit course or $209.98/credit x 2 years (98 credits) = $20,578.04, with annual tuition of approximately 45 credits = $9,449. The tuition cost reflected above is for all junior and senior level classes. Cost above does not reflect possible annual tuition increase of 2%.

Program-specific accreditation
At this time, WVC does not seek to gain program-specific accreditation for the BAS-DA program.

Pathway options beyond baccalaureate degree

WVC is currently in discussion with Eastern Washington University (EWU), St. Martin's University and Washington State University (WSU) to explore an articulation agreement for graduates from the WVC BAS-DA into relevant master's degree programs. WVC and WSU have agreed in principal to a 2 + 2 program in order to give students in North Central Washington more educational options. The two schools are in the process of passing syllabi back and forth to ensure alignment of all the topics in the lower division data analytics courses CSC 110, CSC 210, CSC 215, CSC& 141, CSC& 142, and CSC 243.

There are also a wide variety of online options students could choose from to continue their formal education including those at Western Governors' University, Walden University, Erikson Institute, and Pacific Oaks College.

External expert evaluation of the program

For this project, WVC followed SBCTC guidelines for external evaluation of this potential program. WVC asked Dr. Hassan Shaban, Data Science Lead, Empower Dataworks LLC and Senior Data Scientist, Open Energy Efficiency to review this program. Coming from an engineering background, Dr. Shaban has 8 years of experience in both the supply side and demand side of the energy industry, including energy efficiency program implementation. Prior to that, as a researcher, he worked on IoT applications in nuclear power plant safety and monitoring. He currently works as a data scientist both for Open Energy Efficiency where he develops the data science core of the OpenEEMeter software platform, as well as for Empower Dataworks LLC, where he assists clients with custom engineering and data analysis.

The evaluators' overall feedback is listed below and their full comments are utilized in Appendix C.

Dr. Shaban had these comments related to the BAS-DA proposal:

"The program proposal appears to be very well-researched and aligned with the needs of North Central Washington's employers and industries. Besides minor recommendations for curriculum modifications, I think the main challenge (and opportunity) lies in workforce preparation by aligning market needs with program guidance as students' progress through the degree. This is by no means an insurmountable obstacle, but it does require intentionality in the curriculum design and the student services associated with this program. Overall, I am very optimistic about the benefits that this program will provide to our region."

In addition to Dr. Hassan Shaban's evaluation, WVC sought feedback for program improvement from several universities. Among these providing feedback was St. Martin's University in Lacey, Washington. Dr. Mario Guimaraes, Chair of Computer Science and Professor of Computer Science gave his thoughts:

"1) Minor suggestion: Replace Calculus II with Discrete Math. Calculus II is not necessary for Data Science. However, the absence of Discrete Math is not seen by us as a major flaw.

2) Concern: Only one full time faculty assigned to CS and his major is not related to CS. The Part-time CS faculty's major is also not CS."

WVC has considered this request concerning Discrete Math, but feel that data visualization is more appropriate for our local needs. For the full-time computer science faculty, WVC plans to hire an additional full time faculty with computer science credentials as soon as year two of the program.

Also currently reviewing WVC's BAS-DA proposal are: Dr. Nathan Kutz, former UW Applied Math Chair and Data Analyst, Maureen Majury (M.Ed.), Director of Center of Excellence for Information and Computing Technology and Kevin Pintong (M.S. Electrical Engineering), Assistant Professor and Program Director Computer Engineering Technology, Oregon Tech.

Appendix A

WVC Associate of Technical Science (ATS) Degree in Computer Technology-Network Administration: Suggested Course Sequence: Associate of Technical Science (ATS) Degree in Computer Technology-Network Administration (complete both years)
Computer Technician Certificate-Help Desk/IT Support (complete first year)
Offered on Wenatchee campus

First Year - Fall Quarter		Credits
CTS 110	Computer Hardware	5
CTS 115	Computer Software	5
CTS 120	Introduction to Networking	5
First Year - Winter Quarter		
CTS 130	Client Operating Systems	5
CTS 140	Server Operating Systems	5
Support Course*		3-5
First Year - Spring Quarter		
CTS 150	Network Infrastructure	5
CTS 160	Active Directory	5
Support Course*		5
	Total credits for certificate:	43-45
Second Year - Fall Quarter		
CTS 222	Security Fundamentals	5
CSC& 141	Programming Fundamentals	5

Support Course*		5
Second Year - Winter Quarter		
CTS 221	Introduction to Linux	5
CTS 232	Network Design	5
	Elective	5
Second Year - Spring Quarter		
CTS 225	Web Server Management	5
CTS 235	Managing Mail and News Servers	5
	Elective (may use CTS 196/Internship)	5
	Total Credits for Degree	90

*Support Courses
These classes need to be completed in order to qualify for the Computer Technician Certificate or the ATS degree:
ENGL& 101**
MATH 099** or higher and one of the following: CMST& 220 or CMST& 210 or BCT 116.
**Placement score required.

Appendix B

Existing curriculum related to the BAS-DA Degree Program:

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. Prerequisites: Math& 142 with a "C" or better or appropriate placement score.

Math& 152: Calculus II Focuses on definite, indefinite, and improper integrals, techniques of integration and using integration to solve area, volume, work and other application problems. Prerequisites: Math& 151 with a grade of "C" or better or appropriate placement score.

Math& 211: Linear Algebra Focuses on matrices, determinants, systems of equations, vector spaces including the four fundamental subspaces, orthogonality, inner product spaces, least-squares solutions, eigenvalues/eigenvectors, transformation matrices, dynamical systems and diagonalization. Geometrical understanding will be emphasized. Applications in business, computer science and engineering. Introduction to mathematical proofs. Prerequisites: Math& 152 or instructor's signature.

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. Prerequisites: Math 099 with a "C" or better, a grade of "3" or higher on the Smarter Balanced exam, "C" or better in high school Algebra, Precalculus, or Calculus within past three years or appropriate placement score.

CSC& 141: 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.

CSC& 142: Intermediate Programming Introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. Topics include project management, classes, APIs, instantiation of objects, references, lists, file I/O of records, inheritance, composition, polymorphism, interfaces, exception handling, computer graphics, and basic GUI programming. Intermediate JAVA. Prerequisites: CSC 201 or CSC& 141 with a "C" or better.

BCT 150: Database Preparation for Microsoft Office Specialist Access exam. Create and manage databases, build tables, and create queries, forms and reports. Prerequisites: BCT 105 with a "C" or better or instructor permission.

BCT 230: Database II Create, format, and audit workbooks at an advanced level using database functions, macros, templates, web tools, multiple workbooks, imported/exported data, tables, scenario management, Solver and VBA. Prerequisites: BCT 150 with a "C" or better.

Appendix C: External Reviews

College Name:	Wenatchee Valley College	**BAS Degree Title:**	Bachelor of Applied Science - Data Analytics
Reviewer Name/ Team Name:	Hassan Shaban	**Institutional or Professional Affiliation:**	Lead Data Scientist at Open Energy Efficiency and Empower Dataworks
Professional License or Qualification, if any:	Ph.D. Mechanical Engineering	**Relationship to Program, if any:**	None
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?		
	The proposed Data Analytics degree addresses an important skills gap in North Central Washington. With a few minor modifications, the curriculum would prepare quality graduates to pursue careers in a variety of industries, especially ones that are relevant to the region. My one concern would be the ability of the employers in the region to absorb 15-20 graduates of the program each year. The largest employers in the region are mature in terms of size and typically advertise only a handful of relevant positions each year, mostly for experienced professionals. I believe this risk can be mitigated by emphasizing career readiness in two ways - (i) focusing on developing students' portfolios of projects using real-world data projects as part of their coursework and highlighting the importance of the Capstone project, and (ii) evolving the role of the Program Navigator to include acting as an industry liaison and adjusting the program based on employer needs as described below.		
b) Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?		
	Yes, the learning outcomes are in line with expectations for holders of Baccalaureate degrees.		

c) Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?
	Yes, the program serves the gaps that were identified in the Statement of Needs. The organization of upper-level courses into industry-specific tracks is especially attractive from an employer's perspective. My one comment here is that the naming of the Hydropower track seems a bit limiting, since its courses would prepare students for work in most manufacturing facilities or other energy sector jobs. Recommend renaming it to "Energy and Industrial track" or something similar.
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?
	The upper-level courses will give a solid theoretical foundation to students in a variety of topics. Besides the course material, it is important for each upper-level course to provide hands-on practical experience. The competitiveness of graduating students for data analyst positions can be greatly enhanced by ensuring that they leave WVC with a portfolio of projects (including code, reports and presentations) that they can share with potential employers. I would recommend that each upper-level course revolve around a mini-Capstone project, such that students have 5 or 6 pieces of work by the time they graduate. I also cannot emphasize enough the importance of the final Capstone project - I would recommend adding more detail in the program proposal about what it would include. In general, this project should act as an internship, allowing students to apply their skills in a real-world setting and should expose students to all aspects of a job in data analytics (requirements gathering, data extraction, analysis, communicating results).
e) General Education Requirements	Are the general educations requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?
	I would recommend a few minor changes to the general education requirements: - Technical writing (ENGL 235) should be a required course not an elective- writing technical reports and documentation is an important part of data analysts' day-to-day responsibilities. - Recommend including Web Design I/II and Introduction to Linux as electives that can satisfy lower division program requirements in addition to the Advanced Java programming course. These courses can provide a more holistic technical foundation, since data analysts are often required to be familiar with different parts of a tech stack (front-end, back-end, infrastructure). They seem to be included in Pathway 2, but can be beneficial in Pathway 1 as well.

f) Preparation for Graduate Program Acceptance	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable Graduate degree programs?
	N/A
g) Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
	Existing WVC faculty from the Mathematics and Computer Science departments appear to be more than qualified to staff this program, along with a Program Navigator and one additional FTE faculty. My one observation here is that the Program Navigator role, as defined, seems to be limited to academic advising and admissions, while the Career Center seems to be responsible for post-graduation and internships. This may already be the plan, but I would recommend that these two roles be conducted in close coordination or even merged. The Program Navigator needs to be intimately aware of the needs of the market, so that they can steer students in an appropriate direction. The decision of which track to follow in the third and fourth years should be driven by the job outlook. And internships should also be driven by job placements, rather than simply to satisfy a graduation requirement. For example, the Ag/Business track is more of a generalist track with potentially wider job opportunities and more students should be steered in its direction, if the job outlook in the other two tracks do not look promising. The Program Navigator should also be aware of what internships were completed and with which firms - in a sense, they need to act as an industry liaison and develop personal relationships with the largest potential employers, so that students can be steered appropriately, rather than having the job search and career placement be an afterthought for students after they graduate. A degree alone cannot guarantee job placement, so it is crucial that the Program Navigator have a pulse on the job market.
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?
	In general, the current facilities appear to be sufficient for students to access relevant resources. Data analytics projects require powerful computers with multiple processors and sufficient memory, which may make cloud computing resources more cost-effective for students than acquiring high-end laptops (a decent laptop for data analysis would cost at least $1000 and usually closer to $2000). I would anticipate that educational subscriptions by the College to services like Microsoft Azure or Amazon Web Services might become useful in future years in addition to or in conjunction with WVC's Virtual Desktop service.
i) Membership and Advisory Committee	Has the program received approval from an Advisory Committee? Has the program responded appropriately to it's Advisory Committee's recommendations?
	N/A

j)	Overall assessment and recommendations	Please summarize your overall assessment of the program.
		The program proposal appears to be very well-researched and aligned with the needs of North Central Washington's employers and industries. Besides minor recommendations for curriculum modifications, I think the main challenge (and opportunity) lies in workforce preparation by aligning market needs with program guidance as student's progress through the degree. This is by no means an insurmountable obstacle, but it does require intentionality in the curriculum design and the student services associated with this program. Overall, I am very optimistic about the benefits that this program will provide to our region.
Reviewer Bio or Resume Evaluator, please insert a short bio here		

Hassan Shaban, PhD

Data Science Lead, Empower Dataworks LLC Senior Data Scientist, Open Energy Efficiency hassan@empowerdataworks.com

BIOGRAPHY

Coming from an engineering background, Hassan has 8 years of experience in both the supply side and demand side of the energy industry, including energy efficiency program implementation. Prior to that, as a researcher, he worked on IoT applications in nuclear power plant safety and monitoring. He currently works as a data scientist both for Open Energy Efficiency where he develops the data science core of the OpenEEMeter software platform, as well as for Empower Dataworks LLC, where he assists clients with custom engineering and data analysis.

PROFESSIONAL EXPERIENCE

Empower Dataworks LLC — *Data Science Lead* - 2018 - PRESENT

Open Energy Efficiency — *Senior Data Scientist* - 2017 - PRESENT

Grassroots Dataworks — *Data Science Lead* - 2017 - PRESENT

ICF — *Senior Associate/Data Scientist* - 2015 - 2017

University of Ottawa — *Researcher (Doctoral/Postdoctoral)* - 2010 - 2015

SKILLS

Statistical data analysis and machine learning, especially with sensor data.

Impact evaluations (behavioral and non-behavioral programs).

Python, SQL, R, Airflow.

EDUCATION

PhD, Mechanical Engineering, University of Ottawa, 2015.

BSc, Mechanical Engineering, Alexandria University, 2009.

YEARS OF EXPERIENCE: 8

SELECTED PROJECTS

Data Science Consulting (with Grassroots Dataworks and Empower Dataworks)
Assisted dozens of clients with digital transformation initiatives, including solution design and implementation, and data analysis. Performed custom statistical analyses to drive operational improvements as well as for forecasting future business scenarios. **Clients:** Multiple clients in the energy and non-profit sectors.

CalTRACK Technical Lead and Backend Data Scientist (with Open Energy Efficiency)
Leading the testing process and the working group of industry experts in validating proposed updates to the CalTRACK standards for statistical analysis of energy consumption data. Building production-grade ETL pipelines and statistical libraries. **Clients:** Multiple utility clients across the US.

Analytical support for utility program implementation (with ICF)
Mined and analyzed of a wide variety of datasets for optimization of energy efficiency program operations and trade ally networks across the US and Canada. Developed a myriad of machine learning tools as client deliverables as well as for marketing, customer segmentation, and processing smart meter and smart thermostat data.
Clients: Multiple utility clients in Canada and the US.

Advanced plant monitoring systems (with University of Ottawa and Atomic Energy of Canada) Developed novel algorithms for monitoring flow conditions in power plant safety systems using machine learning applied to signals from existing sensors. Designed and built experimental facilities, instrumentation and analytical (software) infrastructure.

Appendix C: External Reviews, continued

College Name:	Wenatchee Valley College	**BAS Degree Title:**	
Reviewer Name/ Team Name:	Saint Martin's University – CS Department (Dr. Nelson, Dr. Chen, Dr. Mezei, Dr.Guimaraes).	**Institutional or Professional Affiliation:**	SMU – CS Department – Graduate Faculty
Professional License or Qualification, if any:	All are graduate faculty of Saint Martin's Computer Science Program, hold a Ph.D. and have qualifications to teach Data Science and Machine Learning	**Relationship to Program, if any:**	None
Please evaluate the following Specific Elements			
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?		
	Comment **YES, YES**		
Degree Learning Outcomes	Do the degree learning outcomes demonstrate appropriate baccalaureate degree rigor?		
	Comment **YES**		
Curriculum Alignment	Does the curriculum align with the program's Statement of Needs Document?		
	Comment **YES**		

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?
	Comment **YES**
General Education Requirements	Are the general educations requirements suitable for a baccalaureate level program? Do the general education courses meet breadth and depth requirements?
	Comment **Yes, but we have a minor suggestion. Replace Calculus II with Discrete Math.**
6. Preparation for Graduate Program Acceptance	Do the degree concept, learning outcomes and curriculum prepare graduates to enter and undertake suitable graduate degree programs?
	Comment **YES**
Faculty	Do program faculty qualifications appear adequate to teach and continuously improve the curriculum?
	Comment **Concern. Only one full time faculty in the CTS department and the corresponding degree is Anthropology (none in computer science).** **Part-time faculty in the CSC or CTS Department has majors not related to Computer Science (Bible, Business Administration. Only faculty with any degree in CS is a part-time faculty in the Math Department.**
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? YES
	Comment

Membership and Advisory Committee	Has the program received approval from an Advisory Committee? Has the program responded appropriately to it Advisory Committee's recommendations? YES
	Comment
Overall assessment and recommendations	Please summarize your overall assessment of the program.
	Comment This program is a good proposal and our committee approved it. We only had a minor suggestion (replace Calculus II with Discrete Math) and a concern (lack of faculty with a CS degree).
Reviewer Bio or Resume Evaluator, please insert a short bio here	

Mario A.M. Guimaraes, Ph.D. (US Citizen)
Contact Info: mguimaraes@stmartin.edu
4216 17th Way, Olympia, WA, 98516
Research: Educational Software and Online Learning, Database Warehouse, Data Mining and Big Data, Database Security, GIS, HCI, Video Games

1. Degrees with fields, institutions, and dates (A average at every institution)

Degree	Field	Institution	Completed
Post-Doct	Information Assurance	University of Maryland University College (UMUC)	Dec/2007
Ph.D.	Computer Science	Pontificia Universidade Católica do Rio de Janeiro (PUC-RJ), Advisor: C.J.Lucena "Thesis: An environment to teach algorithms"	May/1995
Masters	Computer Science	Pontificia Universidade Católica do Rio de Janeiro (PUC-RJ). Advisor: D.Menasce. Thesis: "Implementing B+trees for a DBMS"	June/1984
B.S.	Accounting	Universidade Federal do Rio de Janeiro (UFRJ)	July/1981

2. Work Experience

2.1 Professional Experience – full time positions

Position	Institutions	Dates	Reason Left
Professor and Chair of Computer Science (tenured)	St. Martin's University	July/2016-present	NA
Professor-of Computer Science (part time - 1st year)	Kennesaw State University	Fall/2014-May/2016	Temporary appointment
Professor & Chair, Information Systems (part time - 2nd year)	Trinity Lutheran College	Fall/2014-May/2016	College Closed
Full Professor & Internship Coordinator (interim Dean)	Zayed University	2011-2014	Family reasons
Full Professor - Information Technology	Zayed University (on leave,KSU)	2010	NA
Full Professor of Computer Science (tenured)	Kennesaw State University	2009	Opportunity to see new culture

Associate Professor of Computer Science	Kennesaw State University	2000-2009	NA
Assistant Professor & DBA	Texas A&M University-CC	1995-2000	50% salary
Visiting Computer Science	Universidade Tocantins, BRAZIL	1995	Temporary
Department Head & Project Manager	SENAC-DN, BRAZIL	1987-1995	Move to USA
Data Base Administrator (DBA)	Brazilian Navy	1984-1986	Reached top
Graduate Assistant – Informatics	PUC-RJ	1982-1983	temporary
Financial Planner	Internacional de Engenharia,BR	1980	Change to CS
Auditor	Arthur Andersen S.A, BR	1979-1980	Changing field

2.2 Relevant Professional experience

Owned a software development and consulting company (Marton) for 2 years Clients: SENAI – Industrial Training (software development)

Developed an integrated accounting system software with payroll and account receivable software. Federal Development Bank

Developed, coordinated and graded national entrance exam software

Company – partner – Ewerton Vieira

Consultant Work – USA (Data Warehouse)

Advus Corporation, New York, NY (Stock Market Data Warehouse)

Defined the Data Warehouse Star Schema, automated the download, extract and load process of stock quotes, fundamental and global indicators from popular yahoo finance and other web-sites into .cvs files to and then to databases.

Grant Activity & Educational Software

Developed software to teach: 1) security through video games at Zayed University, 2) databases at Kennesaw State University, 3) Algebra at Texas A&M-CC, programming at SENAC, 4) Trigonometry at TEMA

Corpus Christi Regional Transportation Authority (Integrate Spatial and Tabular Data)

Linked spatial with tabular data

Converted maps between raster and vector

Developed GIS software to calculate optimal locations for bus stops

Ed Rachel Foundation

Developed Predator-Prey Model Software

Consultant Work - UAE

As internship coordinator for ZU, visited many companies and made many recommendations. Example:

Recommended Oracle Database Vault to protect the data from the DBA for DU Corporation. Helped design Virtual Private Databases and implement several auditing triggers as well as the introduction of sqlmap to protect against sql injection for AUH Police.

Companies that my students developed projects (served as consultant)

At Kennesaw State	Java-Oracle Application for **Stibo**
At Kennesaw State	Complex Event Processing - **Advus Corporation**
At Kennesaw State	Storage Technology **EMC Corporation**
At Kennesaw State	Embedded Databases application **– Appforge**

At Kennesaw State	XML database system for **Cognitive Systems**
At Texas A&M-CC	Database to Keep track of **Agriculture Cooperative**
At Texas A&M-CC	Application to Pay Physicians for a **Medical Company Consultant work - BRAZIL**

Educational Software training & development – TEMA
Educational Software training & development - CELTEC
Analysis of Hardware & Software -CNC
Developing Stock Analysis Software – Merimpex

3. Publications - see list of publication upon request (over 100)

3.1 Over sixty refereed published papers at international, national and regional conferences.

3.2 Over fifty workshop, panels, short papers, invited speaker presentations/publications. Publications focus on Database Security, Database Courseware, Teaching Databases and Video Games.

4. Funding

4.1 Zayed University

Principal Investigator of a RIF Grant

Title: Video Games to Teach Security

Amount: 75,000.00 **Date:** 2012-2013

4.2 Kennesaw State University

Principal Investigator of multiple NSF grants

NSF - Course, Curriculum, and Laboratory Improvement (CCLI) Phase 2 of the National Science Foundation. Grant # 0717707 awarded **$474,258**,
September 2007. **Database Courseware**.

NSF-CSEMS, grant # 0220785, awarded **$400,000**, Oct/2002-Sept/2007

NSF-CCLI, grant # 0089412, awarded $**74,735**, May/2001-April/2003. **Database Courseware**.

4.3 Texas A&M - CC

Principal Investigator of Eisenhower (US$ 75,000), Co-PI of multiple Regional Transportation Authority Grants and Co-PI of Ed Rachel Foundation Grants (multiple)

4.4 NSF Submission pending – PI of "Cybersecurity—Building Capacity & Securing the Future".

5. NSF Panels - Chaired six National Science Foundation Grant Evaluation Panels and served on a total of 13 National Science Foundation Panels.

6. Other significant academic accomplishments:

- Tripled number of students as CS Department Chair at Saint Martin's University.
- Increased number of students as CIS Dept. Chair of TLC while institution was in bankruptcy.
- Tripled number of attendees at 2005 ACMSE Conference as Conference Chair.
- 1st place - 1995 ACM International Graduate Student Research at Nashville, Tennessee.
- Developed award winning educational software used throughout the world.
- Developed Masters in CS, Security, IT.
- Developed new CS, IS and IT undergraduate (ABET).
- Created and chaired the first and second UAE Intercollegiate Cyber Security Championship.
- Committee Member of first five Undergraduate Research Conferences at Zayed University.
- Successful Internship coordinator for Zayed University during three years.
- Participated in Cyber Security competitions at Kennesaw State for multiple years.

- Member Editorial Board of two International Journals.
- Participated in the design and implementation of a DBMS for PUC-RJ.
  - Taught nearly every course in the CS, IT and IS curriculum.
  - Taught graduate and undergraduate level, companies courses, summer VG camps Educational technology to teachers and study abroad classes to Brazil.
- Extensive experience teaching on-line and hybrid courses.
- Owned a Software Development Company
- Extensive experience in academic and industry for USA, Brazil and UAE

7. List of publications

7.1 Full Papers and Journal Publications

	Authors	Title	Conference/ Editor	Date/Location
1	Guimaraes, M.	Adding Advanced Features to an Existing Database Courseware	SDPS 2017	November 2017
2	Iqbal, A., Obaidli, Guimaraes, M.	Challenges of Cloud Log Forensics	ACMSE 2017	March 2017
3	Iqbal, A., Obaidli, Guimaraes, M.	Sandboxing: Aid in Digital Forensic Research	InfosecCD 15	Kennesaw, GA October 2015
4	Guimaraes, Jololian	Gender Differences in Videogame Development Classes: U.S. and the U.A.E.	FDG 2014	April 3-7, Fort Lauderdale, FL
5	Iqbal, A., Said, Guimaraes	The Study of the Interrelation between Law Programs and Digital Forensics in UAE Academia	InfosecCD 13	Atlanta, GA, October 11-12, 2013
6	Iqbal, A., Obaidli, Guimaraes, M.	The Study of Wireless Penetration Testing using Android Smartphones	ICTRF2013	Abu Dhabi, U.A.E.
7	Guimaraes	An Overview of the Information Technology Study Abroad to Rio de Janeiro, Brazil	ICERI2012	Madrid, Spain

8	Guimaraes, Hoganson	Synchronous versus Asynchronous Communication in Distance Learning	ICERI2012	Madrid, Spain
9	Guimaraes	An Overview of Oracle Database Security	MEOUG	Dubai, UAE April 2012
10	Guimaraes, Said, Austin	Experience with video games for security	Journal of Computing Sciences in Colleges CCSC East conference	Washington D.C October 2011
11	Said, Mutawa, Awadhi, Guimaraes	Forensics Analysis of Private Browsing Artifacts	Innovations/2011	April 2011, Abu Dhabi/ Al Ain, UAE
12	Said, Alraeesi, Al-Hashemi, Guimaraes	Secure Web Server for Iphone	Innovations/2011	April 2011, Abu Dhabi/ Al Ain, UAE
13	Guimaraes, Austin, Said, and Hoganson	Database Forensics	Infosec/2010	September/ 2010
14	Guimaraes	Teaching Video game Design with Gamemaker	DGIC09	November 20-21, 2009 Kennesaw, Georgia
15	Guimaraes and Murray	Lessons-Constructor-Animator Paradigm and the ADbC	FIE/2009	October 18-21, 2009 San Antonio, TX
16	Said, Guimaraes, Maamar, and Jololian	Database and Database Application Security	ITICSE/2009	July 6-8, 2009 Paris, France
17	Murray and Guimaraes	Animated Courseware Support for Teaching Database Design	INSITE	June 12-15, 2009 Macon, GA
18	Murray and Guimaraes	Animated Database Courseware: Using Animations to Extend the Conceptual Understanding of Database Concepts	Journal of Computing Sciences in Colleges and CCSC – SE	Augusta, GA November 7-8, 2008

19	Guimaraes and Murray	An Exploratory overview of teaching Computer Game Development	Journal of Computing Sciences in Colleges and CCSC – RM	Colorado Springs, CO October 17-18, 2008
20	Guimaraes and Murray	Overview of Intrusion Detection and Intrusion Prevention	InfosecCD 08	Kennesaw, GA September 26-27,2008
21	Murray, Perez and Guimaraes	A Model for Using a Capstone Experience as One Method of Assessment of an Information Systems Degree Program	Special Issue on IS Assessment for the Journal of Information Systems Education.	2008 JISE (Journal)
22	Guimaraes and Murray	A Contrast between the American and the Brazilian Educational Systems by Analyzing Admissions Criteria, Information Systems Degree and the Process of Copying Models	GITMA 08	June 22-24, 2008 Atlanta, GA
23	Murray and Guimaraes	Extending IT Opportunities in Brazil: Exploring the Videogame Market	GITMA 08	June 22-24 Atlanta, GA
24	Guimaraes, Murray	Animations for Database Security	SIGITE 07	Destin, FL
25	Murray, Guimaraes	Expanding the DB Curriculum	Journal of Computing Sciences in Colleges & CCSC East 07 -	New York, NY

26	Graefe, Austin, et. Al	Current Practices in Payment Card Security	InfosecCD 07	Kennesaw, GA
27	Guimaraes, Murray, Austin	Incorporating DB Security Animations into a Classroom	InfosecCD 07	Kennesaw, GA
28	Guimaraes, Mario	New Challenges In Teaching Database Security	InfosecCD 2006	September 2006, Kennesaw, GA
29	Guimaraes, Mario and Murray, Meg	A Review of the First Phase of a Project to Develop and Utilize Animated Database Courseware	SAIS 2006	March 2006, Jacksonville Florida
30	Guimaraes, Mario	The Kennesaw Database Courseware (KDC): Stong points, weak points and experience using it in a classroom	Journal of Computing Sciences in Colleges & CCSC Rocky Mountain (Published in Journal of SC)	October 2005, Denver, Colorado
31	Guimaraes, Mario, Mattord, Herb and Austin, Richard	Incorporating Security in Database Courses	InfosecCD 2004	September 2004, Kennesaw, GA
32	Im, Tacksoo and Guimaraes, Mario	Component Based Programming in Mobile Devices: The Future of Mobile Development	CITSA 2004	Orlando, Florida July 21-25, 2004
33	Guimaraes, Mario	The Kennesaw Database Courseware (KDC) with an Evaluation Component	42nd ACM Southeast Conference	April 2004, Huntsville, Alabama
34	Im, Tacksoo, Guimaraes, Mario and Hoganson, Ken	An N-Tier Client/Server Course: A Classroom Experience	42nd ACM Southeast Conference	April 2004, Huntsville, Alabama

35	Guimaraes, Mario	Database Courseware: Functionality and Classroom Usage	ACM Mid-Southeast Conference.	November 2003 Gatlinburg, Tennessee
36	Hoganson, Ken and Guimaraes, Mario	N-Tier Client Server Systems Course with emphasis to mobile devices	1 Journal of Computing Sciences in Colleges & 7th CCSC Southeast	November 2003, Dunwoody, GA
37	Guimaraes, Mario	Database Courseware: an Update	41st ACM-Southeast Conference	March , 2003, Savannah, GA
38	Guimaraes, Mario and Myers, Martha	Database Courseware: Animating SQL Queries	40th ACM Southeast Conference	April, 2002, Raleigh, NC
39	Guimaraes, Mario and Myers, Martha	Database Courseware Project	ACM Mid-Southeast Conference.	November 2001 Gatlinburg, Tennessee
40	Guimaraes, Mario	A Review of Front-End Options to Access Oracle Databases	Oracle Openworld	June 2001, Berlin, Germany
41	Guimaraes, Mario	Analysis, Design, Implementation and Evaluation of Instructional Software by Computer Science Students and Public School Teachers	AACE-SITE 2001	March 2001, Orlando, Fla
42	Guimaraes, Mario	Analysis, Design, Implementation and Evaluation of Instructional Software by Computer Science Students and Public School Teachers	AACE-SITE 2001	March 2001, Orlando, Fla
43	Guimaraes, Mario and Lowenthal, Russell	Comparisons of Rapid Application Development Environments for Educational Software	ACM Mid-Southeast	November 2000, Gatlinburg, TN

44	Guimaraes, Mario	"Experience Teaching Introduction to DBMS".	SIGCSE Bulletin. December	December 1999
45	Clipsham, D. , Huffman, B., Meissel, D. and Guimaraes, M.	"Turtlemania: A Math Game in a Distributed Environment".	ACM-SIGCUE OUTLOOK.	January 1999, Vol.27 , n.1 , p. 32-36
46	Sadovksi, Alex, Leasure, David, and Guimaraes, Mario	"Environment and Sports as a Metaphors in the Interactive Process of Teaching Mathematics and Physics.	IFIP - 14TH WORLD COMPUTER CONGRESS.	August 1998.
47	Guimaraes, Mario Leasure, David, and Sadovksi, Alex,	Student Constructed Software to Teach High-School Mathematics	Ed-Media.	June 20-25, 1998 Freiburg, Germany.
48	Guimaraes, Mario	Um Paradigma para o Desenvolvimento de Software Educacional	Boletim técnico do SENAC.	1996.
49	Guimaraes, M., Lucena, C. P.	A Software Environment for Teaching Introductory Algorithms	ACM-SIGCUE OUTLOOK	December 1995, Vol.23, n.3, p. 2-11.
50	Guimaraes, M., Lucena, C. P., & Roma, M. C.	Experience Using the ASA Algorithm Teaching System	SIGCSE Bulletin	Vol. 20, n.1, January/April 1994.
51	Guimaraes, M., Roma, M. C. e Brigido, R.	ASA: da motivação até sua utilização em sala de aula	Boletim técnico do SENAC.	Vol. 20, n.1, January/April 1994.
52	Guimaraes, M e Brigido, R.	Teorias pedagógicas e suas aplicações ao ensino por computador	Boletim técnico do SENAC.	Vol.18, n. 3, September/December 1992
53	Guimaraes, Mario	Ambientes Inteligentes para o Ensino de Algoritmos	III Simpósio de Informática na Educação	IME, October 1992.
54	Guimaraes, Mario	Design of an Algorithm Simulation and Animation Environment (ASA)	SIGCSE	Vol.24, n.2, June 1992.

55	Guimaraes, Mario	Análise Cognitiva e Automação dos Cursos de Programação do SENAC.	II Simpósio de Informática na Educação - UFRGS	October/November 1991
56	Guimaraes, Mario	Protocolos verbais, processos coginitivos e a construção de algoritmos	Bolétim técnico do SENAC.	Vol. 17, n. 2, May/August 1991.
57	Guimaraes, Mario	Projeto de um Ambiente para Animação e Simulação de Algoritmos	I Simpósio de Informática na Educação	UFRJ, November 1990.
58	Guimaraes, Mario	Uma introdução a informática educativa	Boletim técnico do SENAC.	Vol. 16, n. 1, January/April 1990.
59	Texeira, C.A. e Guimaraes, M.	Computer Assisted Cartography: a pioneer experience in Brazil	Boletim técnico do SENAC	Vol. 16, n. 1, January/April 1990.
60	Guimaraes, Mario; Lima, Darcy	Chess: Computer versus Man, just a question of time?	XVII Congresso Nacional de Informatica - SUCESU,	Rio de Janeiro, R.J., November 1984.
61	Guimaraes, M., Vieira, E.	Development of Application Systems for Microcomputers	XVII Congresso Nacional de Informatica - SUCESU,	Rio de Janeiro, R.J., November 1984.
62	Guimaraes, M., Menasce, D.	Manipulating Inverted Lists in Secondary Memory	XVII Congresso Nacional de Informatica - SUCESU,	Rio de Janeiro, R.J., November 1984.
64	Vieira, E., Guimaraes, M.	A Personal Folder System for a Local Network	XVII Congresso Nacional de Informatica - SUCESU,	Rio de Janeiro, R.J., November 1984.
65	Vieira, E., Guimaraes, M.	Implementation of an Indexed Access Method using B+ Trees	X Conferencia Latino Americana de Informatica.	Vina del Mar, CHILE, April 1984

7.2 Conferences, workshops, posters (published as short paper), panels, and invited speaker

	Title/Topic	Co-author	Type	Conference/	Date/Location
1	Data Warehouse and Data Mining with SQL Server		Workshop	CCSC-NW	October 12-13, 2018, Bothell, WA
2	Data Warehouse, ETL, SSIS	-	Workshop	CCSC-NW	October 6,7, 2017 Richland, WA
3	A Video Game to Teach Databases	-	Poster	ICER2017	August 16-19, 2017 Tacoma, WA
4	Using Video Games to Teach Security	Guimaraes	Light Talk	CCSC-SW	March 29-30, 2015 Claremont, CA
5	Tools and Template to Teach Video Game Design	Hoganson, Guimaraes, et.al.	Panel	FDG2014	April 3-7, 2014 Fort Lauderdale, FL
6	A Video Game to Teach Database Security	Guimaraes	Invited Speaker	UFMG	Juiz de Fora, BR Jan. 2014
7	Video Games, Security, GIS and IT in the U.A.E.	-	Invited speaker	Kennesaw St University -	April, 2013
8	Constructing Video Games with Game Maker, HTML5 and Unity	M.Guimaraes, K.Hoganson, L.Guimaraes	Workshop	ACMSE 2013	April, 2013, Savannah, GA
8	A Multi-Level Video Game for Teaching Security	Guimaraes, Said	Poster	SIGCSE 2013	March/2013, Denver, CO
9	Constructing Video Games to Teach Security Using Gamemaker, Flash and Unity	Guimaraes, Said	Workshop	CCSC – Mid South,	April/2012, Jackson, TN
10	Amazon Kindle Fire from a Digital Forensics Perspective	Iqbal, B, Iqbal, A., Guimaraes	Student Paper (advisor)	International Workshop on Cyber Security	Sanya, China, October/2012
11	Introduction to GIS in Academia and Industry	Guimaraes	Guest Speaker	GIS Day, GISTEC Conference	February/2012, Dubai, UAE
12	Using Videogames to teach Security	Guimaraes, Said, Austin	Poster	ITICSE 2011	June/2011, Darmstadt, Germany

13	Game Development w/ Gamemaker, Flash and Unity		Workshop	49th ACMSE	March/2011 KSU, Georgia
14	Animated Database Courseware (ADbC)	Guimaraes, Murray,	NSF-CCLI Showcase	SIGCSE 2010	March 10-13, 2010, Milwaukee, WI,
15	Database Design Courseware	Guimaraes, Murray,	Workshop	ERPD - 28th international Conference – ER modeling	Nov. 9-12 Gramado, RS, Brazil
16	ADbC and the Database Design Module	Guimaraes, Murray	Demo Session	ERPD - 28th international c. ER modeling	Nov. 9-12 Gramado, RS, Brazil
17	"Software de Ensino de Banco de Dados"	Guimaraes	Invited Speaker	LNCC – 09 Guest speaker	LNCC, Petropolis, RJ, Brazil, Nov. 3, 2009
16	The Animated Database Courseware (ADbC)	Guimaraes, Murray,	Workshop	CCSC - Eastern	October 30-31, 2009 Villanova University, PA
17	ADBC, other Coursewares and the NSF	Guimaraes, Murray	Invited Speaker	Graduate Symposium Invited Speaker	October 23, 2009 Corpus Christi, TX
18	ADBC – Release 2.0, with EMPHASIS TO THE SECURITY MODULE	Guimaraes, Murray	Workshop	InfosecCD 09	Kennesaw, GA September 25-26, 2009
19	Animated Database Courseware (ADbC): Interactive instructional materials to support the teaching and learning of database concepts	Murray, Guimaraes	Workshop	CCSC Southwestern	April 18-19, 2009 San Diego
20	Animated Database Courseware (ADbC)	Guimaraes, Murray,	NSF-CCLI Showcase	SIGCSE	March 4-7, 2009, Chattanooga, TN

21	Teaching Database Design with Software Animations	Murray, Guimaraes	Workshop	15th Int'l Academy for Information Management Conference	December 12-13, 2008 Paris, France
22	Incorporating Animation Courseware into the Teaching of Complex Database Concepts	Murray, Guimaraes	Workshop	CCSC - RM	Colorado Springs, CO October 17-18, 2008
23	Recent updates to the Animated Database Courseware (ADBC), with Emphasis to the Security Module	Guimaraes, Murray,	Workshop	InfosecCD 08	Kennesaw, GA *September 26-27, 2008*
24	ADBC - Evaluation	Guimaraes, Murray,	Workshop	NSF PI conference	Washington, D.C. August 13-15, 2008
25	"Software de Ensino de Banco de Dados"	Guimaraes, Murray,	Tutorial	LNCC – 08 Guest speaker	LNCC, Petropolis, RJ, Brazil, May 19, 2008
26	"Current Updates pm ADBC" and the American Education System"	Guimaraes, Murray	Presentation	UFF – 08 - Coloquium	UFF, Niteroi, RJ, Brazil, May 15, 2008
27	Animated Database Courseware (ADbC): Database Design, SQL, Transactions and Security	Guimaraes, Murray	Workshop	CCSC- NE 2008	Staten Island, NY April 11-12, 2008
28	Recent Upgrades to an Animated Database Courseware (ADbC	Murray, Guimaraes	Poster	ACMSE 2008	Auburn, March 28-29, 2008
29	Teaching Fundamental Database Concepts Including Database Security Using Animation Software	Guimaraes, Murray	Workshop	SIGCSE 2008	Portland, Oregon March 12-15. 2008
30	Supporting The Teaching of Database Concepts with Animation Courseware	Murray, Guimaraes	Workshop	SAIS 2008	Richmond, VA March 2008
31	Using Animation to Support the Teaching of Fundamental Database Concepts	Murray, Guimaraes	Workshop	IAIM 2008	Montreal, Quebec, Canada, Dec. 11-12, 2007

32	Animated Database Courseware (ADbC) with Security Topics	Guimaraes, Murray,	Guest Speaker	SPSU Colloquium	November 29, 2007
33	Database Security	Guimaraes	Guest Speaker	ISSA	Atlanta, GA, October 24, 2007
34	Database Security Software	Murray, Guimaraes	Poster	CCSC East 07	NY
35	Database Security, Collabor.	Guimaraes	Tutorial	UFF - 07 Coloquium	Niteroi, RJ, Brazil
36	Database Security, Collabor.	Guimaraes	Tutorial	UFJF – 07	Juiz de Fora, MG, Brazil
37	Database Security, Collabor.,	Guimaraes	Tutorial	PUC-RJ- 07	Rio de Janeiro, RJ, Brazil
38	Database Security	Guimaraes, Paul Wanger	BOF	SIGCSE 07	Covington, KY
39	Strategies to Incorporate a Database Courseware into Introductory Database Classes	Guimaraes, Murray,	poster	37th ACM SIGCSE Conference	Houston, Texas March 1-5, 2006
40	Constructing Database Applications for PDA Using the .NET Framework	Guimaraes	workshop	ITCSE 05	Lisbon, Portugal June 26-30, 2005
41	Database Course	Guimaraes, Myers	NSF-CCLI showcase	36th ACM SIGCSE	St. Louis, MO February 23-27, 2005
42	Courseware to Aid Database Design	Alyson Boyd and Tanya Lawson, Guimaraes	Student paper/poster advisor	43rd ACM Southeast Conference	Kennesaw, GA March 18-20, 2005
43	Integrating the Kennesaw Database Courseware in Database Classes	Guimaraes	workshop	43rd ACM Southeast Conference	Kennesaw, GA March 18-20, 2005
44	Integrating Multiple Database Courseware	Guimaraes	workshop	18th CCSC	Spartanburg, SC, November 5-6, 2004

45	Kennesaw Database Courseware: Recent Enhancements and Evaluation Component	Guimaraes	poster	35th ACM SIGCSE International Conference	February 3-7, 2004, Norfolk, VA
46	Teaching Database Management Systems with the Kennesaw Database Courseware	Guimaraes	workshop	PUC University for Database Faculty	December 16th-17th 2003, Rio de Janeiro, Brazil
47	Integrating a Database Courseware in Database Classes	Guimaraes	workshop	ACM Mid-South East Conference	November 2003 Gatlinburg, Tennessee
48	Integrating Oracle into DBMS Courses, Lessons Learned	Several	panel	ACM Mid-South East Conference	November 2003 Gatlinburg, Tennessee
49	Database Courseware: Support for the 1st Database Systems Course	Guimaraes, Martha Myers	poster	34thACM-SIGCSE	February -2003, Reno, NV
50	The Power of Animation in Learning Database Concepts	Martha Myers	poster	33rd ACM SIGCSE	March, 2002, Covington, KY
51	The Database Course: What Must be Taught	several	Panel	31st ACM SIGCSE	March 2000, Austin, TX
52	Visual Programming Languages	Guimaraes, Russel Lowenthal	Workshop	30th ACM SIGCSE	March 1999, New Orleans, LA
53	Constructing Educational Software	Guimaraes	5 day workshop	Conference of Computers in Education	January 4-8, 1999, Porto Alegre, RS, Brazil
54	Instructional Technology for Teachers	Guimaraes	Workshop	41st CAST Conference	November 1998

Short Biography
Professor Kutz was awarded the B.S. in Physics and Mathematics from the University of Washington in 1990 and the PhD in Applied Mathematics from Northwestern University in 1994. Following postdoctoral fellowships at the Institute for Mathematics and its Applications (University of Minnesota, 1994-1995) and Princeton University (1995-1997), he joined the faculty of applied mathematics and served as Chair from 2007-2015.

Research Interests
Numerical methods and scientific computing, data analysis and dimensionality reduction (PCA, POD, etc.) methods, dynamical systems, bifurcation theory, linear and nonlinear wave propagation, perturbation and asymptotic methods, nonlinear analysis, variational methods, soliton theory, nonlinear optics, mode-locked lasers, fluid dynamics, Bose-Einstein condensation, neuroscience, gesture recognition and video & image processing

Academic History

Adjunct Professor (9/09-present):	Electrical Engineering and Physics
Professor (9/05-present) and Chair (7/07-2/15):	Department of Applied Mathematics
Associate Professor (9/01-8/05):	University of Washington , Seattle, WA
Assistant Professor (9/98-8/01):	
Visiting Research Fellow (9/95-8/97):	Program in Applied and Computational Mathematics Department of Mathematics, Princeton University, Princeton, NJ
Visiting Fellow (9/95-8/97):	Mathematical Sciences Research Center and Division of Theoretical Physics AT&T Bell Laboratories, Murray Hill, NJ
Postdoctoral Fellow (9/94-8/95):	Institute for Mathematics and its Applications School of Mathematics , University of Minnesota, Minneapolis, MN

Visiting Academic Positions

8/12-7/13: Radcliffe Institute for Advanced Studies , Harvard University, Boston, MA
8/12-7/13: Department of Mathematics , Massachusetts Institute of Technology, Boston, MA
8/08-9/08: Instituto de Matematica Pura e Aplicada , Rio de Janeiro, Brazil
3/08-6/08: Department of Mathematics , University of Bergen, Bergen, Norway
1/07-3/07: Department of Physics , Universita di Roma "La Sapienza", Rome, Italy
3/06-5/06: Department of Mathematics , University of Surrey, Guildford, United Kingdom
7/04-12/04: Department of Physics , University of Sydney, Sydney, Australia
4/03-6/03: Department of Electrical Engineering , Columbia University , New York City, NY

6/98-8/98: Optique Nonlineaire Theorique, University Libre de Bruxelles, Brussels, Belgium
3/98-5/98: Fondazione Ugo Bordoni, Rome, Italy
9/97-2/98: Department of Electronic Engineering, Hong Kong Polytechnic University, Hong Kong, China
7/96-8/96: Department of Mathematics, Stanford University, Stanford, CA

Editorial Activities

2015- Associate Editor, Science Advances
2012- Associate Editor, SIAM Journal of Applied Mathematics

Honors and Awards

2012-2013 Fellow of the Radcliffe Institute for Advanced Studies, Harvard University
July 2009 Best Paper Award: International Conference of Applied and Engineering Mathematics
June 2007 Applied Mathematics Boeing Award of Excellence in Teaching
2001-2006 National Science Foundation CAREER Award
2001-2002 Woodrow Wilson National Fellowship Foundation: Career Enhancement Fellowship
March 2000 Department of Applied Mathematics Excellence in Teaching Award
1998-2000 3M Corporation New Faculty Award
1997-1999 Hughes Research Laboratories Research Award
1997-1998 NSF International Research Fellow Award
1997-1999 NSF-NATO Postdoctoral Fellowship
1995-1997 NSF Mathematical Sciences University-Industry Postdoctoral Fellowship
1991-1994 DOD-National Defense Science and Engineering Graduate Fellowship

Robert Bolles and Yasuko Endo Professor
Adjunct Professor of Physics
Adjunct Professor of Electrical Engineering
Senior Data Science Fellow, eSciences UW Institute for Neuroengineering
Center for Sensorimotor Neural Engineering
Fellow, Pacific Northwest National Labs

Appendix D: Qualified faculty

Name	Dept.	Campus	FT/PT	Hire Date	Degrees	Classes Taught
To Be Hired	**DA**	**PT**	**Fall 2019**	**Doctoral preferred**		
To Be Hired	**DA**	**FT**	**Fall 2020**	**Doctoral preferred**		
Burns, D.	CTS	Wenatchee	FT	9/14/2001	B.A., B.A., Anthropology, Education	110, 115, 120, 130, 140, 150, 160, 221, 222, 225, 232, 235
Cacciata, C.	MATH	Wenatchee	FT	9/18/2012	B.A., Math M.A., Math	93, 98, 107, 141, 142, 173
Henning, L.	MATH	Wenatchee	FT	3/27/2017	B.S., Civil Engineering M.A., Math	93, 98, 99, 107, 141
Keys, K.	MATH	Wenatchee	FT	9/12/2016	B.A., Environmental Science/Studies M.A., Math	90, 99, 141, 142, 151, 152, 153, 171, 172
Kraske, W.	MATH	Omak	FT	9/11/2015	B.S., Engineering Physics M.S., Physics M.Div., Cross-cultural track D.Min., Leadership	99, 100, 107, 141, 142, 146, 148, 151, 152, 153
Painter, C.	MATH	Wenatchee	FT	9/12/2016	A.A. B.A., Education M.Ed., Math	90, 93, 98, 99
Ramaswamy, S.	MATH	Wenatchee	FT	9/15/2017	B.E., Mechanical Engineering MBA, Finance M.S., Industrial & Agricultural Technology Ph.D., Industrial & Agricultural Technology	99, 146
Redmon, A.	MATH	Wenatchee	FT	9/21/1998	B.S., Math M.S., Math	107, 142, 146, 151, 152, 153, 200

Russell, A.	MATH	Wenatchee	FT	9/20/1996	B.S., Math M.S., Physics	93, 98, 99, 107, 142, 146
Unger, B.	MATH	Wenatchee	FT	9/19/1988	B.S., Physics M.S., Ph.D., Physics	98
Van Dyke, B.	MATH	Wenatchee	FT	9/12/2016	B.S., Math M.S., Math Ph.D., Math	99, 107, 141, 142, 146, 151, 152, 211
Wiest, S.	MATH	Wenatchee	FT	9/13/1996	B.S., Math M.S., Applied Math	99, 140, 141, 146, 148, 151, 152, 153, 238
Wysham, D.	MATH	Wenatchee	FT	9/13/2013	B.S., Mathematical Sciences Ph.D., Applied Mathematics	107, 140, 141, 142, 146, 200, 254, 298. 151, 152, 153, 238, 148
Bard, E.	MATH	Wenatchee	PT	4/4/2011	BA, BS – Business, Geological Science, MA - Teaching	93
Barnhill, L.	MATH	Wenatchee	PT	1/4/1998	BA Education Mathematics	90, 93, 98
Browning, J.	MATH	Wenatchee	PT	4/3/2000	BA	90, 92, 93, 98, 99, 100
Hampton, G.	MATH	Wenatchee	PT	1/2/2014	Residency Teaching Certificate, BS E&E ENGR. TECH., Masters Aeronautical Science	90, 93, 98, 99
Henderson, L.	CSC	Wenatchee	PT	9/26/2011	BA Bible	141, 142
Lemons, K.	MATH	Wenatchee	PT	1/2/2013	AS, BS Electrical Engineering	93, 98, 99
Madson, B.	CSC	Wenatchee	PT	3/30/2015	BA Business Administration	151, 152
Maher, D.	MATH	Wenatchee	PT	3/30/2015	BS Math	93, 98, 99
McCormick, W.	MATH	Omak	PT	6/27/2016	AA, BA Education Mathematics, MA Education	90, 99
Mitchell, R.	CTS	Wenatchee	PT	2/1/2008	BS – Environmental Science, MA –	196, 296

					Education & Human Services & Guidance	
Pecha, M.	MATH	Omak	PT	1/4/2012	BS – Math, M.Ed. – Education Administration	98
Ryan, D.	MATH	Wenatchee	PT	1/5/2015	BS, MS Computer Science	90, 93, 98, 99
Wikman, C.	MATH	Wenatchee	PT	9/21/2015	Master of Arts for Teachers	98, 99, 107, 146

Appendix E: Admissions Interview Rubric

ORAL SKILL - INTERVIEW – LIFE EXPERIENCE

A maximum of 10 points may be added in regards to the criteria outlined below. Decisions may be based on interview, reference letters, essay and student diversity and life experiences.

• Candidate articulates a strong passion for learning and growth.
• Candidate has developed leadership skills, volunteer experience and dedication to equity and personal introspection and growth.
• Candidate consistently and communicates information in an organized and articulate manner. Options for this assessment also include a minimum score of 26 on the internet-based TOEFL (International Student Admissions policy at WVC).
• Candidate will contribute professional understanding of diversity, which is reflective of our diverse communities.
• Candidate shows commitment to creating childhood educational opportunities for all people.
• Candidate is able to articulate ideas concisely, proficiently and culturally appropriately.

ORAL SKILL TOTAL: _____

Adapted from West Texas A&M University Graduate Admission Rubric

All WVC staff are trained in cultural sensitivity through all staff trainings as well as specific trainings for our Deans and Cabinet members. All faculty in the program will receive Title IX and implicit bias training as well as training on creating inclusive environments. Also, we will reserve at least two spots on the selection committee for those from diverse backgrounds or who represent the college on diversity and equity initiatives and have expertise in minimizing bias.

APPENDIX F: Roster of BAS-DA Degree Advisory Board

Redmon, Angela, WVC Instructor: ARedmon@wvc.edu

Wysham, Derin, WVC Instructor: DWysham@wvc.edu

Burns, David, WVC Instructor: DBurns@wvc.edu

Morgan, Riva, WVC Instructor: RMorgan@wvc.edu

Batch, Sompheng, WVC Instructor: SBatch@wvc.edu

Henderson, Larry, WVC Instructor: LHenderson@wvc.edu

Jones, Ariahna, WVC Instructor: AJones@wvc.edu

Maher, Dan, WVC Instructor: DMaher@wvc.edu

Van Dyke, Ben, WVC Instructor: BVanDyke@wvc.edu

Curtis Cole, Chelan County PUD: curtis.cole@chelanpud.org

Kirsten Cook, Okanogan Conservation District: kirsten@okanogancd.org

Josh Williams, WDFW: josh.williams@dfw.wa.gov

Jon DeVaney, Washington State Tree Fruit Association: jon@wstfa.org

MaryAnn Wood, Chelan County PUD: maryann.wood@chelanpud.org

Carol McCormick, Chelan Douglas Health District: carol.mccormick@cdhd.wa.gov

Hassan Shaban, Empower Dataworks LLC: hassan@empowerdataworks.com

Andrew Gohl, Stemilt Growers: Andrew.gohl@stemilt.com

Matthew Evey, Dignity Health: MatthewEvey@gmail.com

Ryan Beebout, Sabey Data Centers: RyanB@sabey.com

Steve Wright, Chelan County PUD: steve.wright@chelanpud.org

Alex Smith, Chelan County PUD: alex.smith@chelanpud.org

Paige Beuhler, Community Clinic Contracting Network: paige.beuhler@ccnwa.com