**Shepherd University**  
**WV-HEPC Title 133, Series 11-6: New Program Proposal**

<table>
<thead>
<tr>
<th>Date:</th>
<th>February 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of Action:</td>
<td>Implementation Plan (Title 133-11-6)</td>
</tr>
<tr>
<td>Title of Degree:</td>
<td>Master of Science, Data Analytics and Information Systems (M.S., DAIS)</td>
</tr>
<tr>
<td>Location:</td>
<td>Shepherd University, Shepherdstown, WV</td>
</tr>
<tr>
<td>Effective Date of Proposed Action:</td>
<td>Fall 2017</td>
</tr>
</tbody>
</table>

**Shepherd University**

Dr. Mary J.C. Hendrix, President  
Dr. Christopher Ames, Provost  
Dr. Colleen Nolan, Dean, School of Natural Sciences and Mathematics

**Planning Committee and Document Preparation:**

Dr. Ralph L. Wojtowicz, Associate Professor, Mathematics  
Dr. Weidong Liao, Associate Professor, Computer and Information Sciences  
Reza Mirdamadi, Chair, Department of Computer Science, Mathematics and Engineering  
Dr. Scott Beard, Associate Provost
Shepherd University, M. S., Data Analytics and Information Systems

Table of Contents

6.1. Summary.................................................................................................................................4

6.2. Program Description...........................................................................................................4
  6.2.a. Program Objectives...........................................................................................................5
  6.2.b. Program Identification......................................................................................................5
  6.2.c. Program Features.............................................................................................................6
  6.2.c.1. Admissions and Performance Standards.....................................................................6
  6.2.c.2. Program Requirements...............................................................................................9
  6.2.d. Program Outcomes...........................................................................................................9
  6.2.e. Program Content.............................................................................................................10
  6.2.e.1. Content and Length of Program................................................................................10
  6.2.e.2. General Education Component..................................................................................11
  6.2.e.3. Minimum General Education Requirement...............................................................11

6.3. Program Need and Justification.........................................................................................11
  6.3.a. Relationship to Institutional Goals/Objectives..............................................................11
  6.3.b. Existing Programs...........................................................................................................15
  6.3.c. Program Planning and Development............................................................................16
  6.3.d. Clientele and Need..........................................................................................................16
  6.3.e. Employment Opportunities............................................................................................17
  6.3.f. Program Impact................................................................................................................19
  6.3.g. Cooperative Arrangements.............................................................................................19
  6.3.h. Alternatives to Program Development..........................................................................20

6.4. Program Implementation and Projected Resource Requirements....................................20
  6.4.a. Program Administration..................................................................................................20
  6.4.b. Program Projections.......................................................................................................21
    Form 1: Five-year projection of Program Size........................................................................21
  6.4.c. Faculty Instructional Requirements................................................................................22
  6.4.d. Library Resources and Instructional Methods...............................................................22
  6.4.e. Support Service Requirements.......................................................................................24
  6.4.f. Facilities Requirements...................................................................................................24
  6.4.g. Operating Resource Requirements (Form 2).................................................................27
  6.4.h. Source of Operating Resources.....................................................................................29
6.5. Program Evaluation

6.5.a. Evaluation Procedures

6.5.b. Accreditation Status

APPENDICES:

Appendix A: Program Curriculum

Appendix B: Catalog Course Descriptions and Course Topics

Appendix C: Graduate Coordinator Letter of Agreement

Appendix C: Graduate Faculty Qualifications

Appendix E: Faculty vitae
Summary
Shepherd University is submitting a new program proposal (WV-HEPC Series 11) for a Master of Science, Data Analytics and Information Sciences (MA, DAIS). The proposed program is a graduate degree comprised of 36-credits, is interdisciplinary in nature, and is designed for students to utilize their understanding of data in the exciting field of data analytics and in the computer-oriented study of information systems. The intent-to-plan proposal was approved by the Shepherd University Board of Governors on November 16, 2016 and by the Chancellor on December 19, 2016. Following approval of the implementation plan by the West Virginia Higher Education Policy Commission (WV-HEPC), and approval of the program through the substantive change process with the Higher Learning Commission (HLC), the University would be poised to begin offering this graduate program in fall 2017.

6.2. Program Description
Shepherd University’s proposed 36-credit M.S. in Data Analytics and Information Systems graduate degree program will develop students who have advanced capacity to derive knowledge from data, communicate an understanding of that knowledge, and to develop and manage computer information systems that are used in data analytics and other areas. This includes skills in data collection, preparation (‘munging’), representation using mathematics, data analysis using custom or developed software, as well as storage and retrieval.

This process involves selection of and processing with appropriate methods, development and analysis of algorithms in a modern distributed and cloud-based computing environment, and implementation in computer programming languages. Shepherd’s proposed degree program requires breadth of knowledge in many domains. We expect graduates of our program to enjoy long, successful, and productive careers in a fast-growing big data mainstream. We also anticipate this advanced degree in Data Analytics and Information Systems will facilitate the connection from data scientists to business ventures.

6.2.a. Program Objectives
As stated in the program description, this 36-credit graduate program requires knowledge in two major areas: 1.) The exciting new field of data analytics, and, 2.) The long-standing field of information systems.

Data Analytics is a multi-disciplinary field of study with significant historical context, modern relevance, and future promise. It is more than a hot new field that will quickly dim, or in the 2009 words of Google’s chief economist Hal Varian, “the sexy job of the next ten years” (The McKinsey Quarterly, Jan 2009). In order to build a successful and enduring program and to prepare leaders in data analytics, we must understand and communicate its depth.
Information Systems (IS) has been a long-standing field of study ever since computers were adopted in business. IS teaches students how to use information technology to improve business decision making and gain a more competitive edge and strategic advantage over competitors. Information Systems is the enabling component behind Data Analytics. To build upon outcomes of existing program, at the undergraduate level, Shepherd University offers fields of study in both Data Analytics and Information Systems, either as a standalone major or as a concentration in Computer Information Sciences (CIS) degree program.

The prospects for long-term growth of the field and sustainability of our proposed program are strong. Major lending institutions such as Bank of America and PNC are building on the infrastructure that they have developed for bi-annual stress tests to enable real-time analysis of financial strength. Other companies are designing products that use social media data to extend credit to consumers in under-served parts of the world (see “Commonwealth Bank to use TYME to expand in India, China and Vietnam” by J. Eyers in Financial Review, 11 Feb 2015).

Defense agencies seek to achieve information dominance through increased system connectivity and improved automation in data analysis (see U.S. Navy Information Dominance Roadmap 2013–2028). Health care organizations, including the Kaiser Foundation and United Health Group, desire to use their multi-petabyte and growing data sets to decrease response times, increase hospital throughput, and improve outcomes (see “Better Health Care Through Data” by K. Pretz in The Institute, Sept 2014). A health-care industry vision is to improve patient-specific care by integrating genomic data. In science, opportunities for the future data analyst will arise from major new instruments such as the Large Synoptic Survey Telescope and on a small scale through simple, inexpensive micro-controllers and sensors. The automobiles that we drive and those that do the driving for us will be a source of new data analysis challenges. The future Internet-of-Things may even include data contributed by our appliances, clothes, and streetlights.

6.2.b. Program Identification

The appropriate CIP Code for the M.S., Data Analytics and Information Sciences is 11.0802, Data Modeling/Warehousing and Database Administration. The detail of the CIP code is listed below:

**Title:** Data Modeling/Warehousing and Database Administration, CIP Code 11.0802.

**Definition:** A program that prepares individuals to design and manage the construction of databases and related software programs and applications, including the linking of individual data sets to create complex searchable databases (warehousing) and the use of analytical
search tools (mining). Includes instruction in database theory, logic, and semantics; operational and warehouse modeling; dimensionality; attributes and hierarchies; data definition; technical architecture; access and security design; integration; formatting and extraction; data delivery; index design; implementation problems; planning and budgeting; and client and networking issues.

References:
National Center for Education Statistics

6.2.c. Program Features
The proposed M.S. in Data Analytics and Information Systems program is designed to be a 36-credit degree program at the graduate level. The curriculum will consist of:

- A core set of data analytics courses (12 credits).
- A core set of information systems courses (12 credits).
- Elective and special topics courses, including applied research projects in the area and internships (12 credits).

The curriculum for the proposed degree program is outlined in Appendix A, with catalog course descriptions in Appendix B and sample syllabi in Appendix E.

As one of the few programs in the region that will combine coursework in data analytics statistics, mathematics modeling and information systems, the program will also offer opportunities for an applied research project and/or internship as culminating experiences.

6.2.c.1. Admissions and Performance Standards
The MS, DAIS program will adhere to admissions standards as outlined in the Shepherd University Board of Governors’ policy 7. Details regarding admission to Shepherd’s graduate programs, as well as additional requirements for individual programs may be found here: http://www.shepherd.edu/graduate-studies/apply-graduate

Admissions standards and procedures are outlined for international students at: http://www.shepherd.edu/admissions/international-students
Admission Requirements
Shepherd University grants full, conditional, and provisional admission status for graduate students.

Full Admission
Full admission status, upon the recommendation of the academic program admissions committee, in consultation with the graduate dean, may be granted to an applicant who meets the minimum admission requirements of the Division of Graduate Studies. It should be noted that some programs may have higher and/or other admission requirements. For full admission status in the Division of Graduate Studies, an applicant must, as a minimum:

1. Hold a baccalaureate degree granted by a regionally accredited institution (for international students, a degree granted by a recognized institution).
2. Have earned a minimum cumulative grade point average of 2.75 in all undergraduate coursework; or have earned a minimum cumulative grade point average of 3.0 in the last 60 hours of undergraduate coursework; or have earned a minimum cumulative grade point average of 3.0 in the applicant’s major field of study; or have earned a minimum cumulative grade point average of 3.0 in all courses taken at the graduate level.
3. Where required, submit programmatically acceptable scores in the General Test of the Graduate Record Examination (GRE) or, where applicable, other appropriate standardized measures. These include a score of 390 or higher on the Miller Analogy test, and
4. Satisfy and/or meet any and all additional admission requirements of the program where admission is being sought.

Conditional Admission
Conditional admission is intended for those students whose undergraduate record does not reflect their current capacity to successfully complete graduate work. In those circumstances conditional admission status, upon the recommendation of the graduate program coordinator, admissions committee, and graduate dean, may be granted. It should be noted that some academic units may have higher or other admission requirements. Conditional admission has a maximum time limit of one academic year. Applicants admitted on a conditional basis must maintain a minimum cumulative grade point average of 3.0 while enrolled. A final admission decision shall be reserved by the academic unit until an applicant’s performance has been evaluated after one academic year of enrollment. For conditional admission status, an applicant must, as a minimum:

1. Hold a baccalaureate degree granted by a regionally accredited institution (for
international students, a degree granted by a recognized institution).

2. Have earned a minimum cumulative grade point average of 2.3 in all undergraduate coursework; or have earned a minimum cumulative grade point average of 2.5 in the last 60 credit hours of undergraduate coursework; or have earned a minimum grade point average of 2.5 in the applicant’s major field of study.

3. Submit programmatically acceptable scores in the General Test of the Graduate Record Examination (GRE) or, where applicable, other appropriate standardized measures.

4. Satisfy and/or meet any and all additional admission requirements of the program where admission is being sought.

**Provisional Admission**

Provisional admission is intended for students meeting regular or conditional admission requirements who are missing admissions materials other than an application and application fee. Provisional admission status may be granted upon the recommendation of the graduate program coordinator, admissions committee, and/or Graduate Dean. Final decision on an applicant admitted on a provisional basis shall be reserved until all missing documents are received. The time period for provisional admission may not exceed one semester. For provisional admission status, an applicant must, as a minimum:

1. Meet the criteria for regular or conditional admission.
2. Submit official transcripts or test scores.

**Specific admissions requirements for the MS, DAIS program:**

In addition to the general requirements for graduate admission to Shepherd University, potential students must also provide one of the following meet the following for admission into the MS, DAIS program:

1. A score in the 75th percentile on the quantitative section of the Graduate Record Exam, known as GRE, or the Graduate Management Aptitude Test, known as GMAT
2. One of the following industry certifications:
   a. IBM certification in Cognos, Risk Analytics, or SPSS
   b. SAS certification in Foundation, Analytics, Administration, Data Management, or Enterprise Business Intelligence
   c. Microsoft certification, such as MCITP, MCSA, MCSE, MCSM, or MCDBA
   d. Certified Business Intelligence Professional
   e. Certified Analytics Professional
   f. Certified Data Management Professional
   g. Certified Health Data Analyst
3. Two letters of recommendation that speak to the applicant’s ability in the field and potential for success in a graduate program.
6.2.c.2. Program Requirements

The proposed graduate degree in Data Analytics and Information Systems requires 36 credits for completion.

- 12 Hours of Data Science Requirements
- 12 Hours of Information Systems Requirements
- 1 Elective Course (3 hours)
- 9 Hours of elective credits

Details regarding the specific courses in the curriculum are found in Appendix A, with course catalog descriptions in Appendix B and sample syllabi in Appendix E.

In accordance with institutional policy, to successfully complete a graduate program, the student must be in good academic standing. Students must maintain a 3.0 semester GPA, as well as a cumulative GPA of 3.0. Information regarding these policies is found in numerous places on the Shepherd website:

- [http://www.shepherd.edu/graduate-studies/graduate-policies](http://www.shepherd.edu/graduate-studies/graduate-policies)
- [http://catalog.shepherd.edu/content.php?catoid=10&navoid=1404](http://catalog.shepherd.edu/content.php?catoid=10&navoid=1404)

6.2.d. Program Outcomes

The M.S. in Data Analytics and Information Sciences is a graduate degree program comprised of 36 credits. As such it has the following outcomes:

- Integrate components of data analytics to produce knowledge-based solutions for real-world challenges using public and private data sources.
- Evaluate data management methods and technologies used to improve integrated use of data within the framework on information sciences.
- Construct data files using advanced statistical and data programming techniques to solve practical problems in data analytics.
- Develop team skills to ethically research, develop, and evaluate analytic solutions to improve organizational performance.
- Evaluate machine learning methods and strategies for advanced data mining.
Institutionally, the following outcomes/performance indicators are expected:

- Steadily increasing enrollment in this program, enhancing graduate culture at the institution.

- Enhanced recruiting efforts regionally, nationally, and internationally.

- Cross-fertilization among existing Shepherd University programs, leading to collaborative publications and grant-writing efforts.

- New research, internship and employment opportunities for our students.

- Cultivation of new relationships with business, government and other institutions especially schools that have established their own data analytics programs and those who are planning to. These ties will result in joint research and marketing efforts.

- New professional development opportunities for faculty

### 6.2.e Program Content
The proposed program is consistent with the Shepherd University mission and vision statements, core values, as well goals university’s strategic plan and institutional compact. Details are provided in section 6.3.a.

### 6.2.e.1. Program Content and Length
The M.S., DAIS at Shepherd University features project-based, interdisciplinary curriculum that ensures students obtain the in-demand technical, analytical and communication skills required to manage large data sets,

As noted in 6.2.e.2, as a graduate program, general education requirements are completed at the baccalaureate level and are not a part of graduate programs.

To graduate with a M.S. in Data Analytics and Information Sciences, students must be in good academic standing each semester; this includes a minimum GPA of 3.0 for both the semester and cumulative GPA. It is expected that students will be pursuing the graduate degree with full-time status (9 credits), taking courses in fall, spring and summer, thus completing the program in four semesters. Students who take fewer credits during the summer three session (11 weeks) may require additional time to complete the masters degree program.
6.2.e.2. General Education Content
Students entering the Master of Science, Data Analytics and Information Systems must have completed their baccalaureate degree as part of the admissions requirements. As a graduate program, there is no general education content.

6.2.e.3. Minimum General Education Requirement
See 6.2.e.2. for information regarding the general education content.

6.3. Program Need and Justification
Governments across the globe act on the conviction that knowledge- and technology-intensive (KTI) economies create well-paying jobs, contribute high-value output and ensure economic competitiveness. KTI industries are a growing part of the global economy. In 2007, KTI was 29% of the world GDP compared with 26% in 1992. In contrast, the percent of the West Virginia workforce employed in science and engineering dropped from 3.32% in 2004 to 2.80% in 2012. Those percentages were in the fourth quartile nationally (See Science and Engineering Indicators 2014 published by the National Science Board of the National Science Foundation: www.nsf.gov/statistics/seind14). Offering opportunities for students with potential in science and mathematics, planning not only for the undergraduate degree, but also advance graduate study, will help to address the proficiency gaps that occur with students throughout the region. Our proposed data analytics program will contribute to reducing these gaps and enhancing our state’s competitiveness in the 21st-century global economy.

6.3.a. Relationship to Institutional Goals and Objectives
“Shepherd University, a West Virginia public liberal arts university, is a diverse community of learners and a gateway to the world of opportunities and ideas. We are the regional center for academic, cultural, and economic opportunity. Our mission of service succeeds because we are dedicated to our core values: learning, engagement, integrity, accessibility, and community.”

Shepherd University’s proposed M.S. in Data Analytics and Information Systems program supports the mission of Shepherd University by providing affordable access to a subject that has significant academic merit, cultural impact, and high economic value regionally, nationally, and globally. This would be the only graduate program in this emerging field in the Eastern Panhandle of West Virginia, and one of the few in the region that includes both data analytics and information sciences.

Governments across the globe act on the conviction that knowledge- and technology-intensive (KTI) economies create well-paying jobs, contribute high-value output, and ensure economic competitiveness. KTI industries are a growing part of the global economy. In 2007, KTI was
29% of the world GDP compared with 26% in 1992. In contrast, the percent of the West Virginia workforce employed in science and engineering dropped from 3.32% in 2004 to 2.80% in 2012. Those percentages were in the fourth quartile nationally (See Science and Engineering Indicators 2014 published by the National Science Board of the National Science Foundation: http://www.nsf.gov/statistics/seind14). Moreover, K–12 student proficiency in science and mathematics lags national averages and the gap tends to widen with grade level. Shepherd University’s proposed data analytics program will contribute to reducing these gaps and enhancing our state’s competitiveness in the 21st century economy.

The M.S. in Data Analytics and Information Systems program supports multiple activities outlined in the Institutional Compact Comprehensive Plans Shepherd University submitted to the HEPC in November 2014. Strategy 3 of our Career Pathways Comprehensive Plan is to “Maintain and enhance formal partnerships with businesses, non-profit organizations, and other employers.”

Recruiting in the data analytics field is strong. We will seek to leverage our proposed program to attract businesses to campus career fairs, increase internship opportunities, and improve student job search outcomes. These efforts will align well with Strategy 2 of our Critical Regional Issues Comprehensive Plan to build an educated work force and strengthen collaboration between Shepherd University and potential employers. This program also has much potential in terms of Shepherd’s Center for Regional Innovation initiative (http://www.shepherd.edu/innovation)

Strategies of Shepherd’s Graduate Studies Comprehensive Plan include increasing recruitment efforts around international students and expanding graduate degree program offerings. A graduate program in data analytics will be a valuable tool in meeting our international student recruiting goals. The proposed program will also raise our university’s profile and help to realize our vision statement:

“Shepherd — a premier liberal arts university. We will be a nationally respected community of learners where passion, purpose, and experience unite to inspire individuals to shape the world. “

Special Features that Make the Institution a Desirable Place to Initiate a Program

The location of Shepherd University is central to a variety of Federal agencies and private industries that require employees with an exposure to critical thinking, data analysis, and advanced problem-solving skills associated with a background in Data Analytics. Building upon the strong groundwork of Shepherd’s liberal arts education, this is a strong foundation on which to build an integrative, interdisciplinary program in Data Analytics. Shepherd University
has a strong institutional commitment to the liberal arts, weaving international perspectives into the institutional fabric and educating students to be articulate, engaged citizens in a global century.

Over the past several years at Shepherd University, we have been building physical infrastructure, faculty capability, course material, and experience in data analytics. This work has been supported through numerous grants and faculty initiatives, including the following:

- **2012. WV-EPSCoR Instrumentation Grant to establish the Shepherd University Laboratory for Big Data Analytics. PI: Dr. R. Wojtowicz.**
- **2012. WV-INBRE Predominantly Undergraduate Institutions Research Award to conduct stability analysis of mixed immune-chemotherapy by impulse control. PI: Dr. Q. Wang.**
- **2013. Shepherd University Technology Oversight Committee Grant to purchase an additional server for our Big Data Analytics Laboratory. PI: Dr. R. Wojtowicz.**
- **2014. Shepherd University Technology Oversight Committee Grant to provide new workstations for our Big Data Analytics Laboratory. PI: Dr. R. Wojtowicz.**
- **2014-2017. WV-INBRE Predominantly Undergraduate Institutions Research Award to research an integrated approach to study the efficacy of cancer immunotherapy. PI: Dr. Q. Wang.**
- **2015. NASA WVSGC College Course Development grant to develop a 3 credit hour big data course. PI: Dr. R. Wojtowicz.**
- **2015. NASA WVSGC Research Enhancement Award to develop tools for undergraduate activities involving processing of image, video and audio data. PI: Dr. R. Wojtowicz.**

Shepherd University faculty have been actively engaged in the data analytics community research activities and teaching graduate courses in IS. These include the following:

- **2013. Dr. Q. Wang. Conference assistant and reviewer: Third International DCDIS Conference on Engineering Applications and Computational Algorithms, Guelph, Ontario.**
- **2014. Dr. R. Wojtowicz. Research talk on complex system performance given at NASA IV&V Workshop in Morgantown, WV.**
- **2014. Dr. R. Wojtowicz. Poster presentation on knowledge management technologies at the Office of Naval Research Focus Area Forum: Data Science for Decision-Making in Support of Naval Tactical Missions.**
2014. Dr. R. Wojtowicz. Organized and chaired Big Data panel session at Create WV in Glenville, WV.

2014. Dr. R. Wojtowicz. Presentation on undergraduate data analytics at the WV Higher Education Technology Conference in Morgantown, WV.

2015. Dr. R. Wojtowicz. Poster presentation on Development of an Undergraduate Program in Data Analytics at the Innovation & Entrepreneurship Day at the State Capitol in Charleston.

2014. Dr. R. Wojtowicz. Research talk on knowledge management frameworks given at NASA IV&V Workshop in Morgantown, WV.

2014–2015. Dr. R. Wojtowicz. Consulting project for Flexible Plan Investments, LLC to develop and analyze statistical models for financial data.

2015. Dr. Z. Wang restructured related courses such as CIS 321 Data and File Structures and CIS 324 Artificial Intelligence to meet the need for Data Analytics and Information Systems.

2015. Dr. R. Wojtowicz. Consulting project for PNC Bank to support transition of credit loss models from SAS to Hadoop/Spark.

2015. Dr. R. Wojtowicz. Invited to participate in the NIST Computational Category Theory Workshop in Gaithersburg, MD.

2015. Dr. Weidong Liao. Poster presentation on *A Universal Java API for Extracting Social Network Data* in Morgantown, WV.

2015. Dr. Weidong Liao served as a Local Organizing Committee member in Interface 2015 Conference. The conference focuses on big data and statistics based data analytics.

2012–2015 Dr. Weidong Liao and Dr. Osman Guzide have taught MBA 581: Web Programming; MBA 582: Management Information Systems; MBA 588: Database Management Systems; MBA 580 - Introduction to Networking.

During this same period, Shepherd University faculty have been actively engaged in developing Data Analytics and Information Systems courses and course content and integrating this material into the curriculum. Activities include:

- A Big Data course has been created through a grant from the WV NASA Space Grant Consortium. Course texts will include *Mining of Massive Datasets* by Leskovec, Rajaraman, and Ullman (www.mmds.org). The course will be held in our Laboratory for Big Data Analytics.
- The faculty redesigned MATH 354 Operations Research. The course is held in our Laboratory for Big Data Analytics. Students use the Python programming language daily in and out of class to implement and experiment with optimization algorithms.
6.3.b. Existing Programs

Nationally, regionally, and within our state, graduate degree programs or certificate programs in Data Analytics and Information Systems are being developed gradually, with a very low density of programs in our region. Shepherd University would offer the best opportunity for IT professionals in Eastern Panhandle and the quad-state area to pursue a graduate degree in Data Analytics and Information Systems at a public liberal arts institution, coupled with a reasonable rate of tuition. The following website lists numerous analytics programs at the masters level, outlining area of focus and cost: http://analytics.ncsu.edu/?page_id=4184

With an in-state tuition rate of less than $500 per credit hour, Shepherd’s graduate program in data analytics and information sciences would cost approximately $16,000 with tuition and fees, comparing quit favorably to online institutions with lower rates of tuition and to the in-state rate found in Maryland and Virginia. For out-of-state students, the total cost is approximately $22,600.

West Virginia Institutions

West Virginia University offers a 12-month online graduate program in Business Data Analytics, which focuses on analyzing business data while our proposed program spans from data analytics and its supporting information technology.

Regional Institutions

The following degree programs in Analytics are focused on Business.

- American University offers a M.S. in Business Analytics (http://www.american.edu/kogod/graduate/MS-ANLT.cfm). George Washington University School of Business offers a M.S. in Business Analytics (http://business.gwu.edu/programs/specialized-masters/m-s-in-business-analytics/)
- Johns Hopkins University offers a M.S. in Information Systems program, which includes statistical analysis and decision models in its Business Foundations component (http://carey.jhu.edu/academics/master-of-science/ms-in-information-systems/).
- The University of Maryland offers an M.S. degree in Marketing Analytics (www.rhsmith.umd.edu/ms/analytics).

Two institutions offer a Master in Analytics that are similarly science based; however, Shepherd offers a more affordable option for in-state students and competitive tuition for out-of-state students. Shepherd’s program is unique in its ability to also include information systems in conjunction with data analytics.
• Georgetown University offers a M.S. with a concentration in Data Science ([http://analytics.georgetown.edu](http://analytics.georgetown.edu))
• University of Maryland University College offers an online M.S. in Data Analytics ([http://umuc.edu/academic-programs/masters-degrees/data-analytics.cfm](http://umuc.edu/academic-programs/masters-degrees/data-analytics.cfm)).

6.3.c. Program Planning and Development

The CME program has taken deliberate and targeted steps to prepare for the future implementation of both its current undergraduate program in data analytics and proposed graduate program in data analytics and information sciences. The need for a graduate degree in the sciences has been an on-going discussion among Dean of the School of Natural Sciences and Mathematics, the chair of the Department of Computer and Information Sciences, Mathematics and Engineering departments and the departmental faculty for the last several years. This has also been a topic of discussion with the Dean of Graduate Studies, Provost and the President. These stakeholder discussions resulted in the creation of the Computer Science, Mathematics and Engineering department by merging the existing Mathematics, Engineering and Computer Information Science departments in 2005.

The merger was followed by recruitment of mathematics faculty with professional and academic qualifications in a variety of fields. As noted on pages 13-14 of this document, the CME department had developed the organization, faculty expertise, and scholarship outcomes to support a graduate program in the sciences. This is demonstrated through the development of relevant courses, grants, presentations and publications related to the fields of data analytics and information sciences. The proposed graduate program is part of an interdisciplinary field of study that draws the expertise of and curriculum developed by Shepherd’s CME faculty. Faculty qualifications, research and scholarship outcomes are demonstrated in Appendix E-Faculty vitae.

6.3.d. Clientele and Need

The Eastern Panhandle has experienced notable population growth in the past decade. That growth has generated a demand for more degree options. Governmental agencies, small businesses, and multi-national corporations seek broadly educated, articulate, and technologically savvy employees. The Veteran’s Administration, for example, is planning to move its Veterans Health Information System and Technology Architecture (VISTA) from Falling Waters, WV to Shepherdstown. VISTA provides an integrated inpatient and outpatient electronic health record for VA patients, and administrative tools to help VA deliver the best quality medical care to Veterans. In recent meetings with Reza Mirdamadi, chair of the Shepherd University CME Department, and Charles Blatchford, co-director of the Shepherd
University Research Corporation, VA technical staff expressed a strong interest in our proposed program. SkyTruth, located here in Shepherdstown, has employed several of our students. It is a non-profit with strong data analysis capabilities. Proctor & Gamble, Macy’s, the National Institutes of Health, and major defense contractors are a growing part of our regional economy. A workforce with advanced data analytics skill will support this growth and offer to these regional employers an educated workforce.

Constituents in the Eastern Panhandle express a growing interest in programs that prepare our students for life in a dynamic and interconnected world.

The applicant pools that will be specifically targeted by recruitment efforts for this program include, but are not limited to the following groups:

- Current Shepherd University students pursuing undergraduate majors in the CME department, specifically in data analytics and CIS. Without this graduate program, these students would need to transfer to other institutions to pursue a graduate degree in this field. The proposed program would aid in retaining these students both at Shepherd and within the state.
- To help students plan for future advanced study, students at local two-year institutions such as Hagerstown Community College and Blue Ridge Community and Technical College who wish to continue their studies to achieve a four-year degree and then matriculate into Shepherd’s graduate MS, DAIS would be a potential pool of students. Working with the Office of Enrollment Management, faculty and administrators will develop articulation agreements (i.e., 2+2 +2 programs) to coordinate curricula, allowing graduates of two-year institutions to easily transition into a four-year program at Shepherd and then into the graduate degree, MS, DAIS.
- In working with the Office of International Initiatives at Shepherd, as we develop relationships with potential agents, the field of data analytics is one of the top requests among potential students from China, India, Vietnam and Russia.
- As Shepherd University recruits heavily in the quad-state region, marketing and recruitment efforts would cover this territory for potential students. There would also be targeted “open house” events to market the program to students internally and to those students who would come from institutions within a 100-mile radius.

6.3.e. Employment Opportunities

By establishing Shepherd University early as a source of high-quality, data analytics education at the undergraduate and graduate level, we will raise the profile of the university and, arguably, the state. As discussed in Section 6.3.b. above, there is a low density of data
analytics programs both regionally and nationally. There are as yet none in the state of West Virginia that combine data analytics and information sciences at the graduate level. In contrast, the job market in this field is quite strong. According to the Dice.com 2015 Salary Survey (http://marketing.dice.com/pdf/Dice_TechSalarySurvey_2015.pdf), seven out of the top ten highest paying tech skills are big data analytics tools. These include Hadoop, MapReduce, Cassandra, Cloudera, HBase, Pig, and Flume all with average salaries above $120K. According to this survey, the median 2014 salary for data engineers was $95K. These opportunities are not just isolated geographically on the West Coast. High tech salaries in Pittsburgh rose almost 17% from 2014 to 2015 and the Baltimore/Washington region was ranked third nationally. We anticipate that successful graduates of our program will readily transition to competitive graduate programs and find high-quality employment in diverse sectors, including, finance, engineering, business, medicine, energy, and government.

Given the affordable tuition at Shepherd University, growth and expansion in the government and industrial sector in the quad-state area and the increasing student interest in the applied sciences and engineering, we anticipate a high demand for this program. As noted, Shepherd University is accessible to potential students both in the Eastern Panhandle of West Virginia and the surrounding region.

Shepherd University’s location is ideal for initiating a graduate program in Data Analytics and Information Sciences. According to a recent study by the West Virginia Bureau of Business and Economic Research (Reference link: http://be.wvu.edu/bber/pdfs/BBER-2014-04.pdf), the counties surrounding Shepherd University (Jefferson and Berkeley) are expected to sustain continued growth in the future, continuing progress that has taken place over the last two decades. This has led to an increasing number of educational and employment opportunities for West Virginia residents. (Source: The U. S. Bureau of Labor Statistics, 2012).

Shepherd University has the third highest economic impact among West Virginia’s four- and two-year colleges according to a study commissioned by the West Virginia Higher Education Policy Commission. The study, titled “The Economic Impact of Public Institutions of Higher Education in West Virginia,” shows that Shepherd’s economic impact on Berkeley and Jefferson counties is $91.1 million. Part of this study, which was conducted by the West Virginia University Bureau of Business and Economic Research, examined the economic impact of direct university expenditures like supplies and utilities, university payroll, and out-of-state student expenditures. The study showed that in fiscal year 2014, Shepherd had a total budget of $60.8 million and spent about $32.6 million on salaries and benefits for its 647 employees. (Reference Link: http://wvutoday.wvu.edu/n/2016/08/04/west-virginia-s-public-higher-education-institutions-have-2-7-billion-impact-on-state)
6.3.f. Program Impact
The MS, DAIA will have a positive impact on the CME department, as well as the University as a whole. Instructional costs for graduate programs are relatively low compared to the larger undergraduate programs, and, in general the graduate offerings at Shepherd University provide a positive revenue stream for the institution.

To start the program, faculty will teach a mixed load of undergraduate and graduate courses as part of their teaching assignments. Once implemented, the successful offering of Shepherd’s proposed graduate program will require one additional full-time faculty member to prevent the assignment of overloads, as well as the hiring of additional and qualified adjunct faculty to cover courses at the undergraduate and/or graduate levels.

Working with President Hendrix, the Provost, Deans Council and Executive Leadership, the institution is currently exploring the implementation of new programs at the undergraduate and graduate levels to meet the needs of the communities it serves. In the process, a ProForma is being developed to address resources needed to implement and sustain new programs as it relates to new income streams and reallocation of current fiscal and human resources. The ProForma process has also been used in the past to address new hires required for these innovative academic programs. Much of this information is also presented in the Forms 1 and 2 required by the WV-HEPC, and found later in this document.

6.3.g. Cooperative Arrangements
As part of the culminating experience in this graduate program, the DATA 591 internship course will provide students with the opportunity to apply the cumulative knowledge and skills in the Data Analytics and Information System program to a real-world work environment. The internship involves the following steps: 1) selecting a work site; 2) developing a contract that ensures both employer and student benefit; 3) fulfilling the contract activity through ongoing work; 4) preparing a paper that summarizes the learning experience and outcomes, and 5) presenting the result to the committee.

Students will utilize a learning agreement form (http://www.shepherd.edu/wordpress-1/wp-content/uploads/2015/02/Co-Op-Learning-Agreement.pdf), to detail learning outcomes for the internship, as well as work within guidelines set by the Office of Cooperative Education. Information on co-operative education may be found here: http://www.shepherd.edu/cooperative-education
6.3.h. Alternatives to Program Development
As noted earlier in this document, the CME department has taken specific and targeted steps to prepare for a graduate degree in the sciences. These include recruitment of faculty with the academic credentials and professional experience to teach in the program, the merging of several departments into a cohesive whole, and ongoing discussions with internal and external stakeholder groups.

The proposed program provides the best opportunity for students in the region to pursue a graduate degree that is interdisciplinary in nature, has excellent career prospects and salary potential, all at a reasonable cost. If Shepherd is unable to offer this program, we are allowed by our regional accreditor (HLC) to offer up to 20 credits annually through courses not associated with a specific degree program.

6.4. Program Implementation and Resource Requirements

6.4.a. Program Administration
The M.S. in Data Analytics and Information Sciences will be housed in Department of Computer Science, Mathematics and Engineering (CME), which in turn is one of four departments within the School of Natural Sciences and Mathematics, overseen by the Dean of Natural Sciences and Mathematics. This program is also jointly housed and administered by the Division of Graduate Studies and Continuing Education, and the Dean of Graduate Studies. Additionally, each graduate program has a coordinator who acts as an advisor for students, assists with admissions, recruitment and other duties. See program coordinator letter of agreement in Appendix C.

The organizational reporting structure is shown below:

M.S., Data Analytics and Information Sciences Reporting Structure

- Provost
  - Dean, Graduate Studies & Continuing Education & Dean, School of Natural Sciences & Mathematics
    - MS-DAIS Graduate Program Coordinator & Chair, Department of Computer Science, Mathematics & Engineering
      - Program Faculty
### 6.4.b. Program Projections

**WV-HEPC FORM 1: FIVE-YEAR PROJECTION OF PROGRAM SIZE**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students served through course offerings of the Program:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headcount</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>FTE</td>
<td>.78</td>
<td>1.1</td>
<td>1.33</td>
<td>1.67</td>
<td>2</td>
</tr>
</tbody>
</table>

*Student credit hours generated by courses in the program (for the full academic year):*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Majors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headcount</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>FTE Majors (headcount)</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

*Number of student credit hours generated by majors in the program for the full academic year:*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of degrees to be Granted (annual total):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

*Note: For graduate programs, credit hours encompass fall, spring and summer enrollments, based on full-time at nine credit hours.
6.4.c. Faculty Instructional Requirements

There will not be additional faculty lines required to implement and initiate the M.S. in Data Analytics and Information Sciences. As the program grows, the faculty, chair and school dean will work through the institutional budget process to request an additional faculty line.

Working with President Hendrix, the Provost, Deans’ Council and Executive Leadership, the institution is currently exploring the implementation of new programs at the undergraduate and graduate levels to meet the needs of the communities it serves. In the process, a specific pro forma is being developed to address resources needed to implement and sustain new programs, as it relates to new income streams and reallocation of current fiscal and human resources. The pro forma process has also been used in the past to address new hires required for these innovative academic programs. This process is fully supported by the information supplied in the WV-HEPC enrollment, revenue and expense projections detailed in forms 1 and 2.

The Faculty vitae in Appendix E clearly demonstrate the qualifications of Shepherd’s faculty for quality instruction at the graduate level, and also regarding academic and professional qualifications, research initiatives and scholarship outcomes.

Adjunct or affiliate graduate faculty are recommended to the Graduate Dean and must be approved through several layers of internal approvals:

- Department Chair
- Academic School Dean
- Graduate Dean
- Provost

Adjunct faculty would be sparingly used at the undergraduate level to teach courses for faculty teaching in the graduate program. Wherever possible, graduate courses for full-time faculty would count as part of their regular teaching assignment. Some courses may be cross-listed at the undergraduate and graduate levels to make more efficient use of resources.

6.4.d. Library Resources and Instructional Materials

Shepherd University has the classrooms and laboratories, library resources, and instructional materials required for the proposed graduate program in data analytics and information sciences.

All classrooms and other teaching spaces on campus are equipped with a standard set of
information technologies: a computer, overhead projector, web access, and white boards. Classroom and lab technology upgrades were a top priority in the previous institutional strategic plan (2009-2013). Some classrooms have additional technology capabilities, such as “smart” boards, or a high-end sound system, and specialized technologies for areas such as graphic design and computer science. Classroom and laboratory computers and software are replenished on an established rotation cycle, ranging from five years for computers to seven years for projectors.

Additionally, Shepherd has approximately 31 computer labs with 620 computers (although some are for specific majors only) on campus for student and faculty use. Specialized labs are used for instruction in many disciplines. The student fees fund most of the labs; IT Services and the Department of Computer Science, Mathematics, and Engineering support others. All computers are on a four-year rotation cycle and have a standardized set of software such as Microsoft Office. Some labs have more specialized software or hardware, as required by the particular needs of the academic program using the lab.

The Shepherd University library currently subscribes to select IEEE (Institute of Electrical and Electronics Engineers) and ACM (Association for Computing Machinery) periodicals along with the MAA (Mathematical Association of America) and AMS (American Mathematical Society) monthlies. There is no charge to the campus community for the use of these journals and also for online article searches. Public access computers in the library can be used to browse the Internet or for literature searches. In addition, the library provides for interlibrary loan on articles that are not available online or through journals in the library holdings.

At the graduate level, quantitative research is crucial for program outcomes, and graduate students have access to the full-feature of the statistical software package SPSS. This software package aids in addressing the entire analytical process, from planning and data collection to analysis, reporting and deployment.

Library staff includes the following, many of whom hold specialized credentials:

- Dean (Faculty Librarian);
- Four additional Faculty Librarians;
- One Staff Librarian (Archives);
- One part-time Staff Reference Librarian;
- One professionally credentialed Librarian in a paraprofessional position;
  One other FT paraprofessional;
- Two part-time PT paraprofessionals;
- One IT Assistant;
- Approximately 3.5 FTE of work-study student employees.
The online digital library is licensed for group membership so students and faculty have easy access to relevant publications while in the library, as well as remotely. Users have access to thousands of full-text journals from over 50 databases, including subscription databases such as LexisNexis and JSTOR. The library assesses no fees for online searches or for its interlibrary loan services.

Professional librarians are available to assist faculty and students for a total of about 56 hours a week. There are regularly scheduled tours, workshops, and orientation sessions for those who need assistance in utilizing the library’s materials. Librarians offer tailored information literacy skills class sessions that focus on using the library’s databases for research assignments. These sessions are held in the library’s instruction lab enabling students to develop their online searching skills with the assistance of a librarian. The library is normally open 86 hours per week during the fall and spring semesters and has a computer-equipped workroom open 24 hours a day. The reference section of the library is typically open 56 hours weekly during the regular academic year. At present there are 33 reference lab computers and 8 public computers on the main floor of the library. The 24-hour room has 8 computers; the instruction lab 24, the third floor 10, and 38 are available for checkout.

Below is a statistical snapshot of the Scarborough Library as of January 2016.

**Collection Holdings:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Audio CDs</td>
<td>2,517</td>
</tr>
<tr>
<td>2. Books &amp; Bound Serials</td>
<td>136,729</td>
</tr>
<tr>
<td>3. E-Books</td>
<td>6,727</td>
</tr>
<tr>
<td>4. Electronic Journals &amp; Databases*</td>
<td>302*</td>
</tr>
<tr>
<td>5. Government Documents (Federal &amp; WV)</td>
<td>14,017</td>
</tr>
<tr>
<td>6. Maps</td>
<td>638</td>
</tr>
<tr>
<td>7. Microforms</td>
<td>16,292</td>
</tr>
<tr>
<td>8. DVDs, Videos</td>
<td>2,162</td>
</tr>
</tbody>
</table>

*Note: 145 online periodical subscriptions and 157 electronic resources/databases. These do not include full-text journals available in the databases.

**6.4.3. Support Service Requirements**

While most of the student support services on the Shepherd Campus are geared toward the undergraduate population, the Center for Teaching and Learning provides important resources for both students and faculty at the undergraduate and graduate levels.

Each semester the Center for Teaching and Learning conducts faculty seminars, one-on-one instruction for faculty members on the use of Sakai, our classroom management system, and
other innovative tools. The center also provides new faculty orientation and frequent programs specifically for new faculty to Shepherd University.

Graduate students work directly with their academic advisors and graduate program coordinators, and the Dean of Graduate Studies to navigate the requirements of advanced study programs, which may include foundational coursework, or academic support for advanced writing requirements. Students work directly with tutors provided by graduate studies. These costs are covered by a graduate program fee paid by every graduate student ($60 for full-time students and $30 for part-time students). Tutoring services are recommended and considered on a case-by-case basis.

For international students who are admitted to the program, there are a number of support services, including Intensive English Language Program courses detailed here:  
http://www.shepherd.edu/ielp

Undergraduate and graduate students have access to crucial services provided by Students Affairs. These include the following resources:

• The Office of Career Development, also on the first floor of the library, provides students guidance in developing resumes, job search strategies and interviewing techniques, CLEP testing, networking strategies, conducts major/minor fairs and provides a database for job/internships and job fairs (http://www.shepherd.edu/jobweb/).

• The Office of Multicultural Student Affairs provides support and guidance to all students, but specifically students of color, gay, lesbian, bisexual, transgendered and questioning students, international students and students with disabilities (http://www.shepherd.edu/multicultural-student-affairs). The Office of Multicultural Student Affairs also oversees the Multicultural Leadership Scholarship Program, in which several nursing majors have been active and received scholarships. The campus offers support to veterans through its Veteran Support Services program (http://www.shepherd.edu/veterans-support).

• The Office of Disability Support Services (DSS) provides accommodations that allow students with diverse needs to achieve their academic and social potential (http://www.shepherd.edu/disability). DSS will provide testing accommodations for the DNP students at the Martinsburg Center.

• Additionally, the university offers a variety of health and wellness services for students in the form of a student health center (http://www.shepherd.edu/healthcenter/), counseling services (http://www.shepherd.edu/counseling), wellness center (http://www.shepherdwellness.com/) and a variety of outdoor recreation facilities.
Graduate students may avail themselves of memberships to the Wellness Center for the regular student rates.

**Advising at the Graduate Level**

All graduate students majors are assigned an advisor in collaboration with the graduate program coordinator. Each semester students are required to meet with their concentration advisor to discuss educational progress and plans for program completion. The advisor has access to their grades and transcripts on RAIL (student records system) as a means by which the student and advisor can collectively work together to assist the student to achieve academic and professional success. Advisees are encouraged to meet with their academic advisor as needed throughout the semester regarding academic or personal challenges. Advisees are referred to the appropriate resources at the university by their advisor ([http://www.shepherd.edu/advisement/advising.html](http://www.shepherd.edu/advisement/advising.html)).

Faculty members are not assigned advising responsibilities during their first year of employment at Shepherd University, and are encouraged to work with their peer mentor to learn the role during their first year. Occasionally a new faculty member coming to Shepherd University with previous advising experience will be granted permission from the Provost to advise a small number of advisees. Prior to assuming the advisor role, the new faculty member receives training from the Center for Teaching and Learning regarding the advising process. The university also provides ongoing faculty development sessions on advising throughout the academic year for all faculty members. Academic advisors are evaluated on a yearly basis through an online survey overseen by the assistant dean for teaching and learning. Results are shared with faculty members.

To enhance student success, Shepherd University introduced use of new software from Campus Labs entitled Beacon ([http://www.shepherd.edu/studentsuccess/beacon-quick-notification-tool](http://www.shepherd.edu/studentsuccess/beacon-quick-notification-tool)) during the Fall 2015 semester. This software is used for both the undergraduate and graduate populations. The Dean of Graduate Studies is readily available to assist students regarding graduate policies and procedures. The Dean participates in the admissions and academic progression process. Graduate students work directly with the program director, their academic advisors and graduate program coordinators, support staff, and the Dean of Graduate Studies to navigate the requirements of advanced study programs.
6.4.f. Facilities Requirements
Courses for the M.S. in Data Analytics and Information Systems program will be taught in venues across campus. Classrooms vary in capacity and all are technologically outfitted with computer projection systems and web access. The program will use the Laboratory for Big Data Analytics located in 310 Stutzman-Slonaker, our Laboratory of Genomic Bioinformatics Located in 312 Stutzman-Slonaker Hall, and the Laboratory for Genomic Diversity in Room306 of Stutzman-Slonaker. Both the Big Data lab the Bioinformatics lab are equipped with multiple Linux servers and work-stations, dedicated Internet access that students and faculty can access remotely via ssh, and a wide range of software including the “R” environment for statistical computing, the Python programming language with the scipy scientific packages, Apache Hadoop (with Hive, Spark, Cassandra, HBase, Mahout, Mahout, Pig and ZooKeeper), PostgreSQL, Octave, Java and C/C++ compilers, and visualization tools such as Bokeh and D3. The Geneious bioinformatics platform is available in the Laboratory of Genomic Bioinformatics. While space is at a premium on the Shepherd campus, the program can be offered without new construction and without any significant increases in class size.

6.4.g. Operating Resource Requirements

WV-HEPC FORM 2: FIVE-YEAR PROJECTION OF TOTAL OPERATING RESOURCES REQUIREMENTS*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. FTE POSITIONS (by semester)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Administrators</td>
<td>.25</td>
<td>.25</td>
<td>.25</td>
<td>.25</td>
<td>.25</td>
</tr>
<tr>
<td>2. Full-time Faculty</td>
<td>.25</td>
<td>.25</td>
<td>.50</td>
<td>.75</td>
<td>1.0</td>
</tr>
<tr>
<td>3. Adjunct Faculty</td>
<td>.33</td>
<td>.50</td>
<td>.66</td>
<td>.66</td>
<td>.75</td>
</tr>
<tr>
<td>4. Graduate Assistants</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. Other Personnel:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Clerical Workers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>b. Professionals</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: Current clerical and instructional staffing is built into the budget; costs represent new hires.
B. **OPERATING COSTS** (annually)

1. Personnel Services:
   a. Administrators  
      0  
   b. Full-time Faculty  
      0  60,000  62,000  63,240  64,505  
   c. Adjunct Faculty  
      6,000  9,000  12,000  12,000  15,000  
   d. Graduate Assistants  
      0  0  0  0  0  
   e. Non-Academic Personnel:
      Clerical Workers  
      0  0  0  0  0  
      Professionals  
      0  0  0  0  0  
   f. Coordinator Stipend  
      10,000  10,000  10,000  10,000  10,000  

2. **Total Salaries**  
   16,000  79,000  84,000  85,240  89,505

---

**WV-HEPC FORM 2, page 2**

**FIVE-YEAR PROJECTION OF TOTAL OPERATING RESOURCES REQUIREMENTS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Current Expenses</td>
<td>16,000</td>
<td>16,000</td>
<td>20,000</td>
<td>20,000</td>
<td>22,360</td>
</tr>
<tr>
<td>(non-salary)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Table 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Repairs and Alterations</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Equipment:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>listed about in non-salaried expenses, see Table 1 for detail</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Nonrecurring Expense</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Costs (non-salaried)</td>
<td>30,200</td>
<td>31,750</td>
<td>33,200</td>
<td>33,850</td>
<td>34,200</td>
</tr>
</tbody>
</table>
C. SOURCES

1. Gen. Fund Appropriations ( Appropriated Funds Only)
   ( Appropriation Funds Only)
   Reallocated __ New funds

2. Federal Government
   (Non-appropriated Funds Only)

3. Private and Other Revenue
   Program Tuition  86,544  126,960  160,992  206,072  254,880
   Program Fees  1,260  1,800  2,160  2,700  3,240

Total All Sources  87,804  128,760  163,152  208,772  258,120

*NOTE: See Table 1 and Table 2 for more detail on revenue and expenses.

6.4.h. Source of Operating Resources
Shepherd University is not seeking new financial support for implementing the proposed MS-DIAS program. Like all graduate programs at Shepherd University, the MS-DAIS program has a positive revenue impact through the generation of tuition revenue and program fees, coupled with relatively modest instructional costs. All funding is subject to approval through the institution’s normal budget review and allocation process. Resource needs are not expected to extend beyond the usual operating costs for any similarly sized educational program. As the program develops, and as noted in 6.4.c., the program will work through the institutional process to develop a request for an additional faculty line.

The following pages contain information from the MS-DAIS proforma document utilized by the University in developing new programs.

Pro Forma - Master of Science, Data Analytics and Information Systems
Assumptions:
1. The program begins accepting students in Fall 2017 with an initial cohort of 7 students.
2. The program has the potential to admit up to 20 students per year in each succeeding Fall semester.
3. Students graduate after approximately 2 years or less, depending upon the number of credits taken in the summer term.
   3.a Program length is 36 credits.
   3.b Students take 24 credits per year (9 each in Fall, Spring and 6 in the Summer)
4. There is 10\% or higher attrition after year 1 for each cohort.
5. 50\% of students are classified as in-state and 50\% of students are classified as out-of-state. This figure is based on the most current enrollment figures for graduate studies that show a trend for higher out-of-state enrollment for graduate vs. undergraduate programs.
7. Benefits, as a percentage of salary, remain constant at 23\%
8. Tuition is modestly increased approximately 2\% per annum.
9. Non-Tuition revenue is in the form of graduate program fees

### TABLE 1: Expenses

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-salary expense</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library additions (Books and Subscriptions)</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$2,000</td>
<td>2,060</td>
</tr>
<tr>
<td>Software (acquisition and maintenance) or other equipment</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>Costs associated with pursuing ABET accreditation</td>
<td>$2,000</td>
<td>$2,000</td>
<td>$4,000</td>
<td>$5,000</td>
<td>7,000</td>
</tr>
<tr>
<td><strong>TOTAL NON-SALARY EXPENSE</strong></td>
<td>$8,000</td>
<td>$8,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>10,300</td>
</tr>
<tr>
<td><strong>Salary Expense</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty Position</td>
<td>$0</td>
<td>$60,000</td>
<td>$62,000</td>
<td>$63,240</td>
<td>64,505</td>
</tr>
<tr>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-Total Salaries</strong></td>
<td>$0</td>
<td>$60,000</td>
<td>$62,000</td>
<td>$63,240</td>
<td>$64,505</td>
</tr>
<tr>
<td>Benefit Cost (23% of salary cost)</td>
<td>$0</td>
<td>$13,800</td>
<td>$14,260</td>
<td>$14,545</td>
<td>$14,836</td>
</tr>
<tr>
<td>Coordinator stipend, coverage of release time.</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Adjunct Faculty or other faculty pay</td>
<td>$6,000</td>
<td>$9,000</td>
<td>$12,000</td>
<td>$12,000</td>
<td>15,000</td>
</tr>
<tr>
<td><strong>TOTAL SALARY WITH BENEFITS</strong></td>
<td>$16,000</td>
<td>$83,800</td>
<td>$86,260</td>
<td>$87,785</td>
<td>$89,341</td>
</tr>
<tr>
<td><strong>Total annual expense</strong></td>
<td>$24,000</td>
<td>$91,800</td>
<td>$96,260</td>
<td>$97,785</td>
<td>$99,641</td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td>$87,804</td>
<td>$128,760</td>
<td>$163,152</td>
<td>$208,772</td>
<td>$258,120</td>
</tr>
<tr>
<td>Deductions from Revenue (25% University Overhead)</td>
<td>$21,951</td>
<td>$32,190</td>
<td>$40,788</td>
<td>$52,193</td>
<td>$64,530</td>
</tr>
<tr>
<td><strong>Total Revenue less deductions</strong></td>
<td>$65,853</td>
<td>$96,570</td>
<td>$122,364</td>
<td>$156,579</td>
<td>$193,590</td>
</tr>
<tr>
<td><strong>Excess Revenue (Expense)</strong></td>
<td>$41,853</td>
<td>$4,770</td>
<td>$26,104</td>
<td>$58,794</td>
<td>$93,949</td>
</tr>
</tbody>
</table>
TABLE 2: Revenue

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total FTE</strong></td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>In-State Students</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Out-of-State Students</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Tuition (in-state)</td>
<td>$435</td>
<td>$49</td>
<td>$457</td>
<td>$466</td>
<td>$475</td>
</tr>
<tr>
<td>Tuition (out-of-state)</td>
<td>$622</td>
<td>$649</td>
<td>$661</td>
<td>$694</td>
<td>$705</td>
</tr>
<tr>
<td>Credits per student</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>In-State Credits</td>
<td>96</td>
<td>144</td>
<td>144</td>
<td>192</td>
<td>216</td>
</tr>
<tr>
<td>Out-of-State Credits</td>
<td>72</td>
<td>96</td>
<td>144</td>
<td>168</td>
<td>216</td>
</tr>
<tr>
<td><strong>In-State Revenue</strong></td>
<td>$41,760</td>
<td>$64,646</td>
<td>$65,808</td>
<td>$89,472</td>
<td>$102,600</td>
</tr>
<tr>
<td><strong>Out-of-State Revenue</strong></td>
<td>$44,784</td>
<td>$62,304</td>
<td>$95,184</td>
<td>$116,600</td>
<td>$152,280</td>
</tr>
<tr>
<td><strong>TOTAL Tuition Revenue</strong></td>
<td>$86,544</td>
<td>$126,960</td>
<td>$160,992</td>
<td>$206,072</td>
<td>$254,880</td>
</tr>
<tr>
<td><strong>Non-Tuition Revenue</strong></td>
<td>$1,260</td>
<td>$1,800</td>
<td>$2,160</td>
<td>$2,700</td>
<td>$3,240</td>
</tr>
<tr>
<td><strong>TOTAL Revenue</strong></td>
<td>$87,804</td>
<td>$128,760</td>
<td>$163,152</td>
<td>$208,772</td>
<td>$258,120</td>
</tr>
</tbody>
</table>

*Non-tuition revenue is the program fee that full- and part-time graduate students pay each term.

*FTE for graduate students is based on 9 credit hours of registration.

6.5. Program Evaluation

Shepherd University has established procedures for program evaluation and has cultivated a culture of assessment over the past decades. Assessment occurs at multiple levels across the institution, in both academic and administrative units, and embraces a full-circle approaches that leads to programmatic improvements. The University, school, and departmental mission statements align and the assessment process is connected to strategic planning at each level.

6.5.a. Evaluation Procedures

All programs at Shepherd University, whether graduate or undergraduate, are required by the Center for Teaching and Learning at Shepherd University to perform assessments in all areas of degree programs. The M.S., DAIS will undergo regularly scheduled evaluation using the established program review process and guidelines. These include maintaining an accurate assessment record and continual monitoring of the program by the Center for Teaching and Learning, as well as by the department. These measures will address the viability, necessity, and quality of the program to ensure that objectives and goals are met. With the aim of continuous quality improvement, the proposed program will also meet all requirements as established by the University’s accrediting body, the Higher Learning Commission (HLC).

Shepherd University has made progress in the development of graduate education and culture over the last decade. We have added new graduate programs, instructional delivery...
models, and support services that ensure success of our adult learners. Faculty are dedicated to quality teaching, with small class sizes, using a variety of education resources that enhance face-to-face instruction and accessible advising. Additionally, as Shepherd pursues accreditation with the Accreditation Board for Engineering and Technology (ABET), both the undergraduate and the proposed graduate program in Data Analytics would be included in the fields considered for initial accreditation. In anticipation of seeking accreditation, the curriculum for the M.S. in Data Analytics and Information Systems has been developed to address ABET standards. It should be noted that many of the items required for initial accreditation are similar to those required for the WV-HEPC Series 11 documents. These include mission, program and student outcomes, facility requirements and faculty qualifications.

Assessment
The M.S. in Data Analytics and Information Systems program will follow and adhere to Shepherd University guidelines for programmatic and course assessment. For more than 15 years, Shepherd has cultivated a culture of assessment, with assessment occurring at multiple levels throughout the institution, not only in academic programs, but also in administrative and other support units.

Like other Shepherd programs, the proposed graduate program in Data Analytics and Information Systems will utilize the WEAVE online assessment and planning management system. Students will evaluate courses regularly through the process outlined in the faculty handbook. Instructors will offer ongoing formal and informal input to the review and planning processes. Knowledge and skills-based outcomes will be assessed by examinations, quizzes, projects, research papers, writing assignments, self-assessment surveys, and oral presentations and discussions. The program will be evaluated on the basis of overarching institutional LEAP goals and outcomes of the Association of American Colleges and Universities (AAC&U), learning outcomes set by program faculty, and ABET accreditation standards. As part of measuring key performance indicators, the program faculty will work with the Office of Alumni Affairs and the Center for Teaching and Learning in tracking graduate success.

Program Review
Shepherd University ensures the quality of its academic programs, its faculty, and curricula through regular assessment in cyclical program reviews. The M.S. in Data Analytics and Information Systems will be subject to five-year programmatic review under the established requirements of the state and the institution. Assessment data is regularly collected and reported to the Center for Teaching and Learning as a part of our internal review process. The five-year review requires both internal self-review and external review by a qualified professional. These documents, in turn, are reviewed by the campus Program Review
The proposed graduate program will also be evaluated at intervals along with other university programs by Shepherd University graduate studies’ regional accreditor. Feedback will be examined and evaluated by the department to generate appropriate plans for program improvement.

**University Process-Assessment**: Each academic program is required to submit an assessment plan and report annually to the Center for Teaching and Learning (CTL). The CTL requests that assessment facilitators from all departments and administrative units identify at least two to three intended student-learning outcomes. Within these outcomes, faculty and assessment facilitators provide two means of assessment (direct and indirect – academic departments are encouraged to provide as many direct measures as possible). Each assessment strategy must include criteria or benchmarks for success. Following the completion of these assessments, the data are analyzed and assessment facilitators (with their respective faculties) decide how the assessment data will be used to improve student learning. In other words, all departments and units establish two to three learning goals, direct and indirect means of measuring these goals, benchmarks for success, and a detailed plan for improvement. After each plan and report are reviewed by the Assessment Task Force, department and unit assessment facilitators receive a letter from the Dean of Teaching, Learning, and Instructional Resources recognizing accomplishments and offering suggestions for areas of improvement. Assessment plans and reports are transparent and posted on the CTL website [http://www.shepherd.edu/ctl/assess_learning.html](http://www.shepherd.edu/ctl/assess_learning.html).

Reports are uploaded into the WEAVE assessment program to generate departmental, programmatic, and/or unit reports. Such reports are generated as evidence for institutional and programmatic accreditation site visits. Additionally, each semester the CTL hosts assessment, advisement, and Focus on Student Learning (FOSL) workshops. Faculty members are encouraged to attend these workshops as professional enhancement, e.g., in innovative pedagogy, and to contribute to campus discussions on these topics. A campus goal is to integrate the Global Learning Inventory, or a comparable instrument, into the summative assessment.

**University Process-Program Review**: Shepherd University ensures the ongoing quality of its academic programs, its faculty, and curricula through regular assessment in cyclical program reviews. These reviews occur at the undergraduate and graduate levels. Information regarding the cycle and guidelines are found in Appendix G of the faculty handbook located here: [http://www.shepherd.edu/employees/senate/documents/handbook.pdf](http://www.shepherd.edu/employees/senate/documents/handbook.pdf)
The Shepherd University Program Review Committee utilizes an evaluation procedure and established criteria for on-campus program reviews consistent with policy. Crucial components of the review are the unit self-study, which must state accomplishments achieved since the last review, and the use of an external reviewer who evaluates the self-study, completes a site visit, and issues a report with commendations and recommendations. The use of external experts in the field helps to ensure continuous quality improvement of a program. Changes made as a result of the program review process are an important component in closing the loop on assessment as it relates to the mission and strategic priorities of the University. The review of academic programs is listed as a power and duty of the Board of Governors by legislative policy. Committee findings and recommendations are reported to the Board during its April meeting.

6.5.b. Accreditation Status
Shepherd University is accredited by the Higher Learning Commission (HLC) — one of the six regional agencies that accredits U.S. colleges and universities at the institutional level (https://www.hlcommission.org). Shepherd has been fully accredited since 1950. Shepherd last hosted a site visit for reaffirmation of accreditation on 5–7 March 2012. The university met all five criteria for accreditation and its accreditation was reaffirmed. For the 2012–2022 cycle, Shepherd University is part of the HLC’s Standard Pathway process for reaffirmation of accreditation. Shepherd’s four-year review visit took place on 7–8 March 2016. HLC and other accreditations and affiliations demonstrate Shepherd’s commitment to excellence. In compliance with the Higher Education Act of 1965, this information is displayed on the following web pages: http://www.shepherd.edu/accreditations/ and http://www.shepherd.edu/consumer-information/.

In addition, Shepherd University is recognized as a member of the Council of Public Liberal Arts Colleges (COPLAC): www.coplac.org. COPLAC advances the aims of its member institutions and drives awareness of the value of high-quality, public liberal arts education in a student-centered, residential environment. Established in 1987 and now consisting of 29 colleges and universities in 27 states and one Canadian province, COPLAC represents a distinguished sector in higher education.

The institution has taken initial steps in pursuing accreditation with the Accreditation Board for Engineering and Technology (ABET). Both the undergraduate and the proposed graduate program in Data Analytics would be included in the fields considered for initial accreditation. In anticipation of seeking accreditation, the curriculum for the M.S. in Data Analytics and Information Systems has been developed to address ABET standards. It should be noted that many of the items required for initial accreditation are similar to those required for the WV-HEPC Series 11 documents. These include mission, program and student outcomes, facility requirements and faculty qualifications.
Shepherd will also simultaneously pursue approval with the HLC through the substantive change process, thus ensuring the M.S., DAIS is also approved and covered by the institution’s regional accreditor.
As this is a new program, the course descriptions will be found in Shepherd University’s online catalog (http://catalog.shepherd.edu) starting with the 2017-2018 publication.
Shepherd University
Curriculum for Master of Data Analytics and Information Systems

The graduate program in Data Analytics and Information Systems covers interdisciplinary subjects ranging from statistical analysis and big data analytics, to information systems, which data analytics is based upon. Students also have opportunities to conduct research projects with their mentoring Professors or internship projects to gain real-world experiences.

Program Requirements ............................................................................................................. 36 Hours
Data Science Requirements ..................................................................................................... 12 Hours*
  • DATA 509 Statistical Analysis (3)
  • DATA 510 Mathematical Modeling (3)
  • DATA 512 Operations Research (3)
  • DATA 518 Big Data Analytics (3)
  • BIOL 507 Genomics and Bioinformatics (3)

*Students choose from the above selection of classes. Students also choose with their advisor special topics classes, which are designated 599 in the subject area.

Information Systems Requirements ........................................................................................... 12 Hours*
  • IS 580 Introduction to Networking (3)
  • IS 581 Web Programming (3)
  • IS 582 Management Information Systems (3)
  • IS 584 Artificial Intelligence (3)

*Students choose from the above selection of classes. Students also choose with their advisor special topics classes, which are designated 599 in the subject area.

Special Topics Course (Choose one with advisor) ................................................................. 3 Hours*
  • IS 599 Special Topics in Information Systems (3)
  • DATA 599 Special Topics in Data Analytics (3)
  • BIOL 599 Special Topics in Biology (3)

Elective Courses ..................................................................................................................... 9 Hours*
  • IS 583 E-Commerce (3)
  • IS 585 Information Security (3)
  • IS 588 Database Management System (3)
  • IS 599 Special Topics in Information Systems (3)
• DATA 590 Applied Research Project and Capstone (3-6)
• DATA 591 Internship (3-6)
• DATA 599 Special Topics in Data Analytics (3)
• BIOL 501 Evolution (3)

*Students choose from the above selection of classes. Students also choose with their advisor special topics classes, which are designated 599 in the subject area.
Appendix B: Catalog Course Descriptions and Course Outlines*

As this is a new program, the course descriptions will be found in Shepherd University’s online catalog (http://catalog.shepherd.edu) starting with the 2017-2018 publication.
M.S., Data Analytics and Information Systems
Course Descriptions

BIOL 501 - Evolution
(3 cr) Evolution processes underpin all biological phenomena and thus represent fundamental and synthetic ideas in all fields. Understanding evolution and how it impacts everything from our health to biotechnology is essential to all scholars. Lecture topics include patterns of macroevolution; mechanisms of microevolution; the nature of adaptation; units and levels of selection; how we measure natural selection; limits to selection; quantitative genetics; the evolution of behavior; and applications of evolution to conservation and medicine. In the laboratory, we will interpret the outcomes of evolution through computation and analysis of phylogenies, genomes, and population genetic structure. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS:
BIOL 501 Evolution: Evolutionary processes underpin all biological phenomena and thus represent fundamental and synthetic ideas in all fields. Understanding evolution and how it impacts our everyday lives to biotechnology is essential to all scholars. We also discuss how we interpret the outcomes of evolution from phylogenies, genomes, and population genetic structure. Topics include:
• Patterns of macroevolution
• Population genetics
• The nature of adaptation
• Units and levels of selection
• How we measure natural selection
• Limits to selection; quantitative genetics
• Methods of phylogenetic analysis
• The evolution of behavior and sociality
• Applications of evolution to conservation and medicine

BIOL 507 - Genomics and Bioinformatics
(3 cr) Lectures will introduce some of the common techniques and algorithms used in genomic analysis, including sequence alignment, BLAST, gene expression profiling, and prediction of protein structure and gene function. Throughout the course, we will explore how these techniques, and genomic data in general, have been used to explore topics such as evolutionary history, genetic causes of disease, cancer biology, and ecology (metagenomics). Since genomics is a new and rapidly changing field, we will emphasize topics chosen from recent literature, discussing both the scientific and cultural implications of the work.
The computational lab is an essential component of this course. There is no assumption of previous experience beyond knowing how to move files around and use the web, word processors and spreadsheets. In the first set of labs, students will become comfortable with online databases, sequence alignment, gene expression analysis, and genome-scale data. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS:

BIOL - 507 Genomics and Bioinformatics:
Throughout the course, we will explore how genomic data and informatics techniques have been used to explore topics such as evolutionary history, genetic causes of disease, cancer biology, and ecology (metagenomics). Since genomics is a new and rapidly changing field, we will emphasize topics chosen from recent literature, discussing both the scientific and cultural implications of the work. Lectures will introduce some of the common techniques and algorithms used in genomic analysis. The computational lab is an essential component of this course. Topics include:

- DNA and RNA sequence alignment
- Mapping a genome: From chromosome pictures to Next Gen sequencing
- Public database informatics
- Gene expression profiling
- Prediction of protein structure and gene function
- Applications of genomics in medicine
- Genetic association testing
- Comparative genomics

Data 509 - Statistical Analysis

(3 cr) This course covers basic statistical skills for advanced work in the functional areas of data science and analytics, including descriptive statistics, probability and its distributions, sampling, and estimation.

COURSE TOPICS

Data 509 - Statistical Analysis:
Advanced course in the theory and application of mathematical statistics. Topics include:
- Use of statistical software such as the R environment for statistical computing
- Descriptive statistics
- Linear models and regression
- Single and multi-variate distributions including Gaussian, t, chi-squared, and their
variants

- The Central Limit Theorem
- Parameter estimation
- Hypothesis testing
- Nonparametric methods
- Bayesian inference
- Joint distributions and copula theory

Data 510 - Mathematical Modeling

(3 cr) This course is a study of how to model the world around us using mathematics, how to solve the resulting equations, and how to apply the results. It provides a thorough study of how to use both quantitative and qualitative solution behavior in the modeling process. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS

Data 510 - Mathematical Modeling: Design, selection, and analysis of mathematical and computational models for physical phenomena. Topics include:

- Statistical learning
- Linear regression models
- Linear models for classification
- Resampling methods
- Linear model selection and regularization
- Nonlinear methods such as polynomial regression, splines and generalized additive models
- Tree-based methods such bagging, random forests and boosting
- Support vector machines
- Unsupervised learning

Data 512 - Operations Research

(3 cr) This course provides an introduction to main topics of operations research: linear programming, network optimization, dynamic programming, and queueing theory. Examples of applications from industry, notably some queueing algorithms, are examined. Additional topics may be chosen from Markov chains, integer programming, nonlinear programming, game theory and decision analysis, and simulation. Students will be expected to complete an independent research project chosen with guidance from the instructor.
COURSE TOPICS

Data 512 - Operations Research:
Advanced course on operations research and optimization. Topics include
- Dynamic programming
- Greedy algorithms
- Elementary graph algorithms
- Minimum spanning trees
- Dijkstra and Floyd-Warshall shortest path algorithms
- Flow networks, maximum flow and the Ford-Fulkerson algorithm
- PERT charts
- Linear programming and the simplex algorithm
- Additional topics may include nonlinear programming, integer programming, and Markov chains, and applications.

DATA 518 - Big Data Analytics
(3cr) This course introduces students to concepts, methods and tools used in the analysis and management of massive data sets. Topics will include the map-reduce programming paradigm, cluster analysis, algorithms and libraries for working with large graphs, disk-based and memory-based distributed computing, stream processing, large-scale machine learning, and analysis of distributed algorithms. The course will explore the historical context, current relevance, and future growth of data analytics. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS

Data 518 - Big Data Analytics: Advanced course on the concepts, methods and tools used in the analysis and management of massive data sets. The course will explore the historical context, current relevance, and future growth of data analytics. Topics include:
- Linux operating environment
- Distributed file systems
- MapReduce
- Hadoop/Spark and related technologies
- Finding similar items via shingling and locality-sensitive hashing
- Mining data streams
- Link analysis and PageRank
- Frequent itemsets
- Clustering
- High-performance computing and the message passing interface (MPI)
IS 580 - Introduction to Networking

(3 cr) This course provides comprehensive coverage in contemporary data communication networking theory as demonstrated by real-world examples with case studies and hands-on projects. The focus is on fundamental principles and concepts of modern local and wide area network such as architecture, design and protocols of TCP/IP networking, the Internet and Web. Also covered are enabling networking technologies for data sciences such as cloud computing and Internet of Things. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS

IS 580 - Networking: Fundamental principles and recent progress in computer networking. Topics may include:
- Adopt a practical hands-on approach when examining computer networking techniques and provide computer networking theory illustrated by real-world examples.
- Examining different computer networking strategies, this course will explore the advancement of computer network development, as well as, time serving problem solving strategies.

IS 581 - Web Programming

(3 cr) This course examines Internet/Web concepts and modern Web programming techniques. Students will develop an understanding of concepts that are essential to developing contemporary Web applications. Web programming languages (HTML, CSS, JavaScript, etc.) and tools are covered with emphasis on client-side Web development. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS

IS 581 - Web Programming:
Essential skills and principles for building modern Web applications. Topics may include:

- HTML5
- Cascading Style Sheets
- JavaScript Programming
- Server Side Web Application Development
- Advanced JavaScript and jQuery
- Others: Search Engine Optimization, Web Services, Social Network Integration, etc.
IS 582 - Management Information Systems
(3 cr) This course provides a comprehensive coverage of modern management information systems in a business setting that involves people, technology and organizations. Topics include structured business information systems, decision support systems, information systems acquisition and management, database management systems, computer and network security, and the role of information processing systems in business decisions. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS
IS 582 - Management Information Systems: An examination of modern management information systems in a business setting. Topics may include:
• Business Processes, Information Systems and Information
• Organization Strategy and Competitive Advantage
• Database Processing and the Cloud
• Organization and Information System
• Social Media Information Systems
• Business Intelligence (BI) Systems
• Information System Security
• Information Systems Development

IS 583 - E-Commerce
(3 cr) This course covers concepts, IT skills and tools, and social and ethical issues encountered performing e-commerce in a contemporary fashion. Topics include EDI, VAN, ExtraNet, E-Commerce Web development, online shopping cart systems, e-payment, cloud computing, database, and security. Students will be expected to complete an independent research project chosen with guidance from the instructor.

COURSE TOPICS
IS 583 - E-Commerce: Principles, IT skills and tools, and social and ethical issues encountered performing e-commerce in a contemporary fashion, with focus on technical issues rather than business practices. Topics may include
• E-Commerce Business Models and Concepts
• E-Commerce Infrastructure: The Internet and World Wide Web
• Building an E-Commerce Web Site
• E-Commerce Payment Systems
• E-Commerce Marketing Techniques
• Search Engine Optimization
• Web 2.0: Evolution & Technologies
• Web Loggers and Social Networking
• Ethical, Social, and Political Issues Associated with E-Commerce

**IS 584 - Introduction to Artificial Intelligence**
(3 cr) This course provides an overview of artificial intelligence, its tools and techniques that are essential to data science and data analytics. Topics included are nonprocedural programming, basic search techniques, automated reasoning, and expert systems, with emphasis on the application of artificial intelligence techniques to real-world problems. Students will be expected to complete an independent research project chosen with guidance from the instructor.

*COURSE TOPICS*

**IS 584 - Artificial Intelligence:** Advanced artificial intelligence concepts, tools, and techniques. Topics may include:

- Philosophy of artificial intelligence.
- State space search. Language tools.
- Formal logic and reasoning systems. Expert systems.
- Evolutionary techniques. Genetic algorithms. Particle swarm optimization.
- Robots – software and sensor systems.

**IS 585 - Information Security**
(3 cr) Students will be introduced to fundamental concepts of information security including the establishment and implementation of an organization-wide security policy which is designed to protect the information assets of an organization. This course provides the student with the skills necessary to enforce an organization security policy and lays the foundation for continued study in the areas of information security. Students will be expected to complete an independent research project chosen with guidance from the instructor.

*COURSE TOPICS*

**IS 585 - Information Security:** Comprehensive coverage of a variety aspects of information and information system security.

- Vulnerability of an information system and the corresponding plan for risk management
- Security policy and procedure
- Authentication and encryption
- Public key infrastructure
• Intrusion detection
• Web security

**IS 588 - Database Management Systems**

*(3 cr)* This course examines the design, implementation and maintenance of a modern database management system. Also covered are database query languages, contemporary database architecture in the Internet and Web based business setting, and security and privacy considerations. Students will be expected to complete an independent research project chosen with guidance from the instructor.

*COURSE TOPICS*

**IS 588 - Database Management System:** Design, develop and maintenance of a modern database management system in a business setting.
- Data modeling and entity relationship diagrams
- Logical database design and relational model
- Physical database design and performance constraints for database operations
- SQL and database application development
- Data and database administration
- Cloud computing and data cloud
- Database security

**IS 599 – Special Topics in Information Systems**

*(3cr)* This is an advanced course on a selected topic in the area of information systems.

*COURSE TOPICS*

- Social Media Information Systems
- Business Intelligence (BI) Systems
- Internet of Things (IoT)
- Cloud Computing and Fog Computing
- Web Services
- Robots and Internet of Intelligent Things

**DATA 590 - Applied Research Project and Capstone**

*(3-6 cr)* The student will identify a problem of interest in the area of data science, data analytics or information system, analyze the problem as completely as possible, offer the best alternative(s) for solution, and describe the problem and the proposed solution(s) in a case-study format.
DATA 591 - Internship

(3-6cr) This internship course provides students with the opportunity to apply the cumulative knowledge and skills in the Data Analytics and Information System program to a real-world work environment. The internship involves the following steps: 1) selecting a work site; 2) developing a contract that ensures both employer and student benefit; 3) fulfilling the contract activity through ongoing work; 4) preparing a paper that summarizes the learning experience and outcomes, and 5) presenting the result to the committee. The regular expectation is for a minimum of 150 hours completed in this internship for 3 credits and 300 hours for 6 credits, upon approval by the committee.
Appendix C:
Sample Graduate Coordinator Letter of Agreement
Position: Coordinator, Health Administration Programs

Reports to: MBA program coordinator (direct report)
            Dean, Graduate Studies and Continuing Education (direct report)

Primary Goals and Specific Duties:

The Graduate Program Coordinator provides support for operations of the Division of Graduate Studies and the respective graduate program track. Reporting to the Graduate Studies Dean and other appropriate units such as the MBA program coordinator and advisory councils, this position will lead academic programming to ensure that goals and objectives specified for the program are accomplished in accordance with established institutional priorities, accreditation guidelines, time and funding limitations or other specifications.

In coordination with the Graduate Dean and appropriate academic units, they will assist in developing annual program goals, work within established procedures for recruiting, hiring and evaluating adjunct and full-time faculty, and conduct curricular and programmatic evaluations. The Coordinator will also teach classes within the program, lead recruitment efforts, and supervise student advising.

In accordance with the faculty handbook, specific duties include, but are not limited to:

Specific duties:

a. Attend Graduate Fairs, Open Houses, or other recruitment events in order to market health administration programs.

b. Assist in development of the program on a continual basis.

c. Assist in course development and rotation on a continual basis in order to refine the Graduate Program.

d. Advise students in the program on a continual basis.

e. Attend Graduate Council Meetings on a monthly basis.

f. Coordinate Accreditation Documents on a continual basis.

g. Coordinate Accreditation Research and produce required documents.

h. Coordinate final graduate student admission on continual basis with the Office of Graduate Studies.

i. Provide advice to the Office of Graduate Studies and Enrollment Management on a continual basis to assist with advertising and marketing the program.

j. Work with the office of graduate studies to maintain official recruitment and advisement records of graduate students.

k. Work in cooperation with the DNP and MBA program and track coordinators.
Position Requirements
   a. Graduate and Full-time Faculty Status.
   b. One year graduate course teaching experience.

Reimbursement and hours worked each week
   a. The Health Administration coordinator will receive a ¼ load release (one course) each semester, unless other arrangements are provided for in a letter of agreement drafted with the GSCE Dean and Provost.
   b. A stipend will be provided each semester (fall, spring and summer) for administrative duties such as meetings, office hours, advisement, and recruitment/retention initiatives. The total annual compensation is $3000 ($750 fall & spring, $1500 summer).
   c. Pay for summer courses to the instructor at the regular rates for full-time faculty.

__________________________________  _________________________
Health Administration Program Coordinator          GSCE Dean

Approved:   Revised 08/29/16 (specific to health administration programs only)
             Revised 07/07/15 (specific to DNP positions-Dean, GSCE)
             Revised 06/03/14 (specific to position-Dean GSCE)
             Revised 1/11/2011 (Dean GSCE)
             VPAA 7/29/2009 (General/original description)
             Dean of Graduate Studies and Continuing Education 7/27/2009
Appendix D:
Graduate Faculty Qualifications
Shepherd University, Division of Graduate Studies
Application for Graduate Faculty Status

Applicant’s Name: ________________________________ Shepherd ID ________________

Highest Degree: __________ Date/Institution: ________________________________

Faculty Rank: _______________ Department: _____________________ School: __________

E-mail address: ___________________________ Status: Tenure-track _____ Clinical _____ Other _____

External applicants: Please list institutional or company affiliation:

Name: ________________________________________________________________

Address:

________________________________________________________________________

Membership categories: __________ Graduate Faculty ____________ Affiliate Graduate Faculty

Explanation of Scholarship Qualifications

To remain current and adept in the discipline, graduate faculty must demonstrate evidence of currency (defined as within the last five years), in the area of scholarship and creative activities. While criteria for promotion and tenure for full-time tenure-track faculty are outlined in the faculty handbook (http://www.shepherd.edu/employees/senate/documents/handbook.pdf), the expanded definition of scholarship as outlined by Boyer in the 1997 text Profile of a Quality Faculty Member covers outcomes in four basic areas: discovery, integration, application, and teaching. This flexible framework allows for all forms of scholarship to be recognized, evaluated and rewarded for graduate and affiliate graduate faculty. This flexibility allows for a more personal approach to each faculty member’s individualized professional development.

In addition to the traditional research in the area of discovery, there is the possibility to make connections across disciplines with integration, societal and professional connections in application, and finally teaching as being at the heart of scholarship.
Table 1: Boyer Model of Scholarship

<table>
<thead>
<tr>
<th>Type of Scholarship</th>
<th>Purpose</th>
<th>Performance outcomes</th>
</tr>
</thead>
</table>
| DISCOVERY           | Build new knowledge through traditional research. | • Publishing in peer-reviewed forums.  
|                     |         | • Producing and/or performing creative work within established field.  
|                     |         | • Creating infrastructure for future studies. |
| INTEGRATION         | Interpret the use of knowledge across disciplines. | • Preparing a comprehensive literature review.  
|                     |         | • Writing a textbook for use in multiple disciplines.  
|                     |         | • Collaborating with colleagues to design and deliver a core course. |
| APPLICATION         | Aid society and professions in addressing problems. | • Serving industry or government as an external consultant.  
|                     |         | • Assuming leadership roles in professional organizations.  
|                     |         | • Advising student leaders, thereby fostering their professional growth. |
| TEACHING            | Study teaching models and practices to achieve optimal learning. | • Advancing learning theory through classroom research.  
|                     |         | • Developing and testing instructional materials  
|                     |         | Mentoring graduate students.  
|                     |         | • Designing and implementing a program level assessment system. |
### Table 2: Graduate Faculty Membership Categories

<table>
<thead>
<tr>
<th>Membership</th>
<th>Qualifications</th>
<th>Duties &amp; Privileges</th>
<th>Review and Renewal</th>
</tr>
</thead>
</table>
| Graduate Faculty            | • Hold a terminal or earned doctoral degree. • Hold a regular tenured or tenure-track continuing faculty appointment at Shepherd University. • Be actively engaged in graduate education and continuing scholarly activity as defined by Boyer’s Model for scholarship. | • Propose, design and teach graduate-level courses, including thesis research, scholarly research projects, and supervision of other graduate projects and internships. • May serve on or chair thesis committees and comprehensive examination committees. • May serve as a graduate student advisor. • May serve on the Graduate Council, and may vote in elections pertaining to Graduate Council and graduate education. | Membership as a graduate faculty member is to be reviewed for renewal every **five** years. The result of this review may be:  
• Continued status as Graduate faculty.  
• Revocation of Graduate Faculty Status. |
| Affiliate Graduate Faculty | • Hold an earned masters, doctoral or terminal degree and/or specialized certifications. • Hold an adjunct appointment at Shepherd University, or is a professional in the field with specialized knowledge or experience. • Be actively engaged in graduate education and continuing scholarly activity as defined by Boyer’s Model for scholarship. | • May teach graduate-level courses, excluding thesis research. • May in consultation with the appropriate Graduate Program Coordinator, Graduate Dean and Graduate Council, participate in curricular proposals. • May serve on, but not chair thesis committees and comprehensive examination committees. • May direct internships. • May not serve on Graduate Council or its committees, but may serve on programmatic faculty groups and advisory councils. | Membership as an affiliate graduate faculty member is to be reviewed for renewal every **two** years. The result of this review may be:  
• Continued status as Affiliate Graduate faculty.  
• Revocation of Affiliate Graduate Faculty Status. |
CANDIDATE QUALIFICATIONS

I. DISCOVERY & INTEGRATION: List scholarship outcomes in the area of research, publications and grants during the last five years, as well as cross disciplinary or collaborative efforts in your course development, assignments or other presentations. You may also attach these as a separate document.

II. APPLICATION & TEACHING: List service to professional and/or community organizations, committee membership, advisement or mentoring of students, and assessment or efforts that have led to innovative teaching practices during the last five years. Please attach these as a separate document.
III. Summary and appraisal of recommendation by Department Chair person:


IV. Summary and appraisal of recommendation by School Dean:


V. Summary and appraisal of recommendation by Graduate Dean:

_____________________________________________________________________________________
Applicant Name (print)                                      Applicant Signature

__________________________________________________________________________________
Vice-President of Academic Affairs                          Date approved
**Graduate Faculty Status and Qualifications**

Graduate faculty play an essential role in graduate education. They are responsible for program content, serve on graduate student committees, and, they assure the quality of preparation of Shepherd University’s graduates. Service as a graduate faculty member, member of the graduate council or other graduate faculty committee should be recognized in the faculty member’s annual report, as well as any applications for pre-tenure, tenure, and promotion. Schools and graduate program coordinators should develop an appropriate timeline for recommending graduate faculty. Faculty applications are reviewed by the department chair for recommendation, and upon approval are submitted to the school dean, dean of graduate studies and finally approval by the Vice President for Academic Affairs.

**Graduate Faculty Qualifications**

a.) Hold a terminal or earned doctoral degree.

b.) Hold a regular tenured or tenure-track continuing faculty appointment at Shepherd University.

c.) Be actively engaged in graduate education and continuing scholarly activity as defined by Boyer’s Model for Scholarship and/or demonstrated competencies and achievements of related work or professional experience. This information is found in the graduate faculty application. These criteria are to be applied for the appointment to, as well as continuation of, graduate faculty status. *These initial criteria and any subsequent amendments or changes are subject to approval of the Graduate Council.*

d.) Duties & privileges: *(Graduate faculty may participate in any or all of these privileges.)*

• Propose, design and teach graduate-level courses, including thesis research, scholarly research projects, as well as supervision of other graduate projects and internships.
• Serve on or chair thesis committees and comprehensive examination committees.
• May serve on the Graduate Council, and may vote in elections pertaining to Graduate Council and graduate education.

e.) Review & Continuance: Membership as a graduate faculty member is to be reviewed for renewal every five years. The result of this review may be: Continued status as graduate faculty or revocation of graduate faculty status.

f.) Appeal Process: In the case of removal from the Graduate Faculty list, or drop in rank, a faculty member may appeal the decision in the following manner:
• Submit their explanation in writing no later than ten business days after receiving the decision from the Dean of Graduate Studies and Continuing Education to both the Graduate Dean and the Vice-President for Academic Affairs.
• A final decision will be made by the Dean of Graduate Studies and Continuing Education and the VPAA. All decisions are final.

Affiliate Graduate Faculty Qualifications
Schools and graduate program coordinators should develop an appropriate timeline for recommending affiliate graduate faculty. Faculty applications are reviewed by the department chair for recommendation, and upon approval are submitted to the school dean, dean of graduate studies and finally approval by the Vice President for Academic Affairs.

a.) Hold a masters, terminal or earned doctoral degree.
    These may include the following individuals who hold the necessary degree qualifications:
    • Faculty or staff holding non tenure-track appointments.
    • Emeritus faculty members may remain as affiliate graduate faculty, subject to review.
    • Off-campus professionals willing to participate in graduate education may be affiliate graduate faculty, but may not chair student committees (exceptions require approval of the graduate program coordinator and graduate dean).

b.) Do not hold a regular tenured or tenure-track continuing faculty appointment at Shepherd University.

c.) Be actively engaged in graduate education and continuing scholarly activity as defined by Boyer’s Model for scholarship and/or demonstrated competencies and achievements of related work or professional experience.
    This information is found in the graduate faculty application. These criteria are to be applied for the appointment to, as well as continuation of, affiliate graduate faculty status. These initial criteria and any subsequent amendments or changes are subject to approval of the Graduate Council.

d.) Duties & privileges: (Affiliate graduate faculty may participate in any or all of these privileges.)
    • May teach graduate-level courses, excluding thesis research.
    • May in consultation with the appropriate Graduate Program Coordinator, Graduate Dean and Graduate Council, participate in curricular proposals.
• May serve on, but not chair thesis committees and comprehensive examination committees.
  • May direct internships.
  • May not serve on Graduate Council or its committees, but may serve on programmatic faculty groups and advisory councils.

e.) Review & Continuance: Membership as an affiliate graduate faculty member is to be reviewed for renewal every two years. The result of this review may be: continued status as Affiliate Graduate faculty or revocation of Affiliate Graduate Faculty Status.

f.) Appeal Process: In the case of removal from the Affiliate Graduate Faculty list, a faculty member may appeal the decision in the following manner:
  • Submit their explanation in writing no later than ten business days after receiving the decision from the Dean of Graduate Studies and Continuing Education to both that Dean and the Vice-President for Academic Affairs.
  • A final decision will be made by the Dean of Graduate Studies and Continuing Education and the VPAA.
  • All decisions are final.

g.) Degree Candidates: Normally, no candidate for a degree at Shepherd University may be a member of the graduate faculty. Individuals seeking exceptions to this policy must submit a graduate faculty application and petition to the graduate dean.

h.) Exceptions: The dean of school will justify qualifications for related field and post-doctorate experience for each teaching assignment through supporting documentation of related field experience specifically related to the course(s) the faculty member will teach, as well as supporting documentation of high-level professional or noncredit academic experience.

**Promotion & Tenure for Graduate Faculty**

A candidate for pre-tenure review, promotion or tenure will submit an application by the established deadline to the department chair, who will forward it to School PT committee. If the candidate holds graduate faculty status, the department will notify the graduate dean of the application, giving him or her an opportunity to provide any information that he or she may have bearing upon tenure.
**DISTRIBUTION OF WORKLOAD: Graduate Faculty Workload**

- Graduate courses wherever possible should be taught in load as part of the full-time faculty member’s teaching load for the fall or spring semesters.

- Exceptions or justifications for graduate courses taught as an overload may be granted under the following circumstances:
  - The overload is an independent study or low-enrolled course. For the graduate program, this is defined as a course with less than 4 students.
  - The course is part of the core curriculum for a graduate program and will ensure students’ progression towards degree completion in a timely manner.
  - The course is an internship, study-abroad or other course where the role of the faculty member is administrative.

- In determining the workload for the semester, the faculty member should work with the department chair to determine reassigned time for curricular development, assessment models, and research initiatives. Upon approval by the graduate dean, a recommendation for reassigned time will be forwarded to the Vice President of Academic Affairs for approval.

- Graduate faculty members may supervise up to six theses projects in a semester. The graduate dean and Vice President for Academic Affairs must approve exceptions to this policy.
Appendix E: Faculty Vitae
CLARISSA R. MATHEWS  
18822 Preston Road, Hagerstown, MD 21742 | 304.707.5310 | Cmathews@redbudfarm.com

EDUCATION

University of Maryland, College Park, MD  
Ph.D. in Entomology  
GPA: 4.0  
2004

University of Maryland, College Park, MD  
M.S. in Entomology  
Thesis: “The effects of composted poultry manure on ground-dwelling arthropods and predation in apple”  
1999

University of Rochester, Rochester, NY  
B.A. in English  
Emphasis in Environmental Studies  
Magna Cum Laude  
1992

EXPERIENCE

Institute of Environmental and Physical Sciences, Shepherd University, Shepherdstown, WV  
Professor of Environmental Studies  
Department Chair  
- Facilitate departmental meetings, coordinate programming, course scheduling and planning  
- Monitor course content and instruction to meet learning outcomes and institutional standards  
- Administer departmental budgets  
- Assess faculty performance and provide written evaluations for use in merit determination and promotion  
- Produce department white papers, program reviews, planning and budget documents  
- Coordinate department Internship Program, place students at research facilities, mentor students in design and implementation of individual field research projects, statistical analysis and interpretation and prepare manuscripts that adhere to peer-reviewed journal format  
- Coordinate Environmental Science program and lead departmental in curricular development  
- Coordinate campus sustainable agriculture garden showcasing organic production techniques  
- Coordinate adjunct instructors, providing course materials and technical support  
- Serve as representative on campus committees, including International Affairs Committee and Global Studies Curriculum Committee  
- Manage departmental outreach via website, externally-funded regional conferences and training workshops  
- Teach 8 undergraduate courses on rotating basis (e.g., courses include Sustainable Agriculture, IPM and Environmental Research Methods); full-time (16 credit hours per academic year) teaching appointment with 8 credit hour release for Chair duties  
- Mentor undergraduate students in externally funded research program in applied agroecology, with emphasis on trap cropping and biological control  
- Write grants to support research program; obtained (as lead or co-PI) more than $3,000,000 in grants to support research on biological control, sustainable agriculture and sustainable energy applications  
2015 – Present

Associate Professor of Environmental Studies and Associate Graduate Faculty  
Department Chair (Term beginning 1 May 2014)  
Assistant Professor of Environmental Studies  
- Independently develop, teach and grade 16 undergraduate courses (e.g., courses include Sustainable Agriculture, IPM and Environmental Research Methods) on a rotating basis; full-time (24 credit hours per academic year) teaching appointment  
- Mentor undergraduate students in externally funded research program in applied agroecology, with emphasis on trap cropping and biological control  
- Write grants to support research program and to procure laboratory and field research equipment  
2010 – 2015

USDA Agricultural Research Service, Appalachian Fruit Research Station, Kearneysville, WV  
Visiting Scientist  
2013 – 2016
- Collaborate with Tracy Leskey’s ecology lab group to develop ecologically-based methods of managing the Brown Marmorated Stink Bug

Redbud Farm, LLC, Inwood, WV
Research Director 2002 – 2015
- Direct externally-funded applied research in ecologically-based pest management strategies on USDA certified organic farm
- Write grants, obtain and manage funding for on-farm research; obtained and administered more than $200,000 in grant funding to support research on ecologically-based pest management techniques
- Collaborate with Cooperative Extension to address specific research needs and to disseminate research results via Fact Sheets and on-farm Field Days serving farmers and the general public
- Produce research reports and coordinate outreach and education efforts and field days
- Oversee compliance with U.S.D.A. National Organic Program standards
- Direct undergraduate internships and training in theoretical and practical applications of IPM, agroecology and field research techniques

USDA Agricultural Research Service, Appalachian Fruit Research Station, Kearneysville, WV
Entomologist, Tree Fruit Entomology Laboratory 2003 – 2004
- Design and direct research on biological control of orchard insect pests for sustainable crop production
- Statistically analyze experiment results, write scientific manuscripts for publication in peer reviewed journals, present research results at professional conferences
- Write grant applications to support research activities

Biological Science Laboratory Technician, Tree Fruit Entomology Laboratory 1998 – 2003
- Conduct applied and basic entomological research aimed at developing sustainable tree fruit production systems via orchard diversification, application of compost and mulches, inter-planting and conservation biological control

USDA Agricultural Research Service, Beltsville Area Research Center, Beltsville, MD
Laboratory Technician, Soil Microbial Systems Laboratory 1996 – 1997
- Assist in research on compost utilization in crop production, soil microbiology, soil-microbe-root interactions, soil quality and productivity

Wilson College Center for Sustainable Living, Chambersburg, PA
Program Coordinator 1995 – 1996
- Independently develop sustainable crop production system and Land Use Management Plan for 100-acre campus farm under conversion from conventional dairy operation to organic vegetable and field crops
- Train and supervise interns in sustainable agriculture crop production techniques
- Coordinate Public Relations and outreach events

GRANTS


$3,000 - Shepherd University Foundation Professional Development Award: PI, “Biological Control of Insect Pests in Peach Orchards,” 2010


$20,000 - West Virginia Division of Energy: PI, Coordinating outreach on solar energy in WV through conference and technical workshops, 2008


$15,000 - West Virginia EPSCOR Instrumentation Program: PI, “Acquisition of an Entovision imaging system for use in Shepherd University research, instruction, and laboratory applications,” 2005

$30,000 - West Virginia EPSCOR Innovations Program: Co-PI, developing a campus renewable energy demonstration site with passive solar greenhouse for organic agricultural production, 2005

$30,000 - West Virginia Development Office, Energy Efficiency Program: Co-PI, Coordinating alternative energy conference and conducting alternative energy outreach, 2004

$225,000 - USDA National Research Initiative, CSREES: Co-PI, “Interplanting peach trees bearing extrafloral nectaries for conservation biological control in apple orchards,” 2003

$2,500 - USDA Southeast Sustainable Agriculture Research and Education (SARE): Collaborating with Virginia Cooperative Extension to conduct field research on organic ethnic crop production, 2003


PUBLICATIONS


CLARISSA R. MATHEWS

PROFESSIONAL SERVICE

Member, Northeastern IPM Center Steering Committee and Advisory Council, Ithaca, NY (June 2013 – present)
Member, IPM Steering Committee, West Virginia University, Morgantown, WV (June 2012 – present)

President Appointee and Vice Chair, Institutional Review Board, Shepherd University (Vice Chair and Presidential Appointee since 2012; member since Fall 2005)

President, Phi Kappa Phi Honor Society, Shepherd University Chapter (President since 2013, Vice President 2011 - 2013, member since April 2010)

Member, Brown Marmorated Stink Bug Working Group (June 2010 – present)


President, Children’s Tree House Child Development Center Board of Directors, US Fish and Wildlife National Conservation Training Center, Shepherdstown, WV (President January 2009 - April 2011; member since November 2008)

TRAINING & CERTIFICATIONS

USDA-ARS Beneficial Insects Introduction Research Workshop: 2013
Taxonomy and Identification of Hymenopteran Parasitoids of the Brown Marmorated Stink Bug
Bridgeton, NJ

National Institutes of Health (NIH) Office of Extramural Research

Diploma in Renewable Energy Technologies 2007
North Carolina State University, Raleigh, NC

Parasitic Hymenoptera Training Session XI 2001
University of Maryland, College Park, MD

Certificate in Ecology and Environmental Science, emphasis in Sustainable Agriculture 1991
Jæren Folkehøgskule, Kleppe, NORWAY

AWARDS

Inducted into Phi Kappa Phi Honor Society 2008
Shepherd University Chapter

President’s Award, Entomological Society of America 2003
First Place in 10-minute oral presentation competition, National Meeting, Cincinnati, OH.

Allen Steinhauer Award for Excellence in Teaching 1998
University of Maryland, College Park, MD

COURSES TAUGHT

ENVS101: First Year Experience in Environmental Science (1 credit)
ENVS201: Environmental Science I and Laboratory (4 credits)
ENVS202: Environmental Science II and Laboratory (4 credits)
ENVS299A: Sustainable Raised Bed Food Production (3 credits)
ENVS300: Integrated Pest Management and Laboratory (4 credits)
ENVS302: Forestry and Laboratory (4 credits)
ENVS308: Physical Resource Management
ENVS340: Sustainable Agriculture and Laboratory (3 credits)
ENVS341: Sustainable Energy and Laboratory (4 credits)
ENVS345: Sustainable Development and Laboratory (4 credits)
ENVS362: Soil Science and Laboratory (4 credits)
PROFESSIONAL PRESENTATIONS, POSTERS AND FACTSHEETS

William R. Morrison, III, Brett R. Blaauw, Anne Nielsen, Clarissa Mathews and Tracy C. Leskey. 2016. Combining attractive flowers and odors to concentrate both brown marmorated stink bug and natural enemies for improved biocontrol. Poster presented at Mid-Atlantic Fruit and Vegetable Convention (2-4 February 2016), Hershey, PA


C. Mathews, W.R. Morrison and T. Leskey. 2015. CSI egg mass damage: Tracking down unexplained predation of brown marmorated stink bug egg masses by native natural enemies. Poster presented at Ecology Society of America Meetings, Baltimore, MD (9-14 August)

W.R. Morrison, C. Mathews and T. Leskey. 2015. Pushing the frontiers of applied ecological science with the use of harmonic radar and micro-tagged insects to address questions related to the management of invasive species. Talk presented at Ecology Society of America Meetings, Baltimore, MD (9-14 August)


C. Mathews, W.R. Morrison and T. Leskey. 2015. Update on brown marmorated stink bug egg mass damage by generalist predators in the laboratory and in organic vegetable plots. Talk presented at the OREI Planning Meeting, Rutgers Agricultural Research and Extension Center, Bridgeton, NJ (January 15-16)


C. Mathews, W.R. Morrison III and T. Leskey. 2014. Fate of brown marmorated stink bug egg masses exposed to common generalist predators in the laboratory and in organic vegetable plots. Talk presented at the Entomological Society of America National Meeting, Portland, OR (November 16-19)
S. Barry and C.R. Mathews. 2014. Effects of botanical capsaicin spray on eggs and 3rd instar nymphs of the squash bug (Hemiptera: Coreidae). Poster presented at the West Virginia Academy of Science, Shepherdstown, WV (April 12)


C.R. Mathews and M.H. Hallack. 2014. Research update on trap cropping for organic management of BMSB, Talk presented at the OREI Planning Meeting, Rutgers Agricultural Research and Extension Center, Bridgeton, NJ (January 6-7)


C.R. Mathews and E.M. Snyder. 2010. Enhancing Shepherd’s Curriculum through Real-world Applications of Green Technologies. Invited Speaker: Shepherd University Faculty Research Forum


C.R. Mathews. 2009. Enhancing Sustainable Energy Adoption in West Virginia. Invited Speaker: USDA Women’s History Month, USDA Appalachian Fruit Research Station, Kearneysville, WV

M. W. Brown and C. R. Mathews. 2007. Manipulating Biological Control of Spirea Aphid on Apple by Providing Natural Alternative Food Resources. Talk presented at International Aphidophaga Meeting, Athens, GRECE


D. Smith and C. R. Mathews. 2007. Determining the suitability of Shepherd University waste vegetable oil for conversion to Biodiesel. Talk presented at the West Virginia Academy of Sciences, Huntington, WV


E. Messenger and C.R. Mathews. 2007. The Application of EntoVision Microscopy Technology to Entomological Assays in the Laboratory and Field. Talk presented at the West Virginia Academy of Sciences, Huntington, WV


K. Carswell, C. Mathews, and E. Snyder. 2006. Wind speed analysis for power generation via small wind applications at Shepherd University (Shepherdstown, WV). Talk presented at the West Virginia Academy of Sciences, Shepherdstown, WV


E. Messenger, C. Mathews, and M. Brown. 2006. Harmonia axyridis choice between extraloral nectar assessed through three experimental designs. Talk presented at the West Virginia Academy of Sciences, Shepherdstown, WV

D. Shisshler, C. Mathews, E. Volker, and D. Dilella. 2006. Development of a method for the use of flame emission atomic absorption spectroscopy for detecting rubidium used as a marker in environmental samples. Talk presented at the West Virginia Academy of Sciences, Shepherdstown, WV


A. Byers and C. Mathews. 2006. Effect of Dormitory Window Retrofit on Electricity Consumption in Relation to Heating Degree Days. Talk presented at the West Virginia Academy of Sciences, Shepherdstown, WV


RECENT PRESS RECEIVED
- Featured in article “Shepherd upgrades EV charging stations” in The Journal (June 2, 2016)
- Featured in article “Shepherd installs new electric-vehicle charging stations” in The Morning Herald (May 31, 2016)
- Provided interview on stink bugs to WEPM “Panhandle Today” radio show (July 28, 2015 8:30 AM-9:00 AM)
- Featured in article “Stink bugs studied at Shepherd University” in The Herald Mail (July 19, 2015)
- Featured in article “Shepherd teacher, students research stink bugs” in The Journal (July 16, 2015)
- Featured in article “Shepherd professor and students help with stink bug research” in *The Neuron* – West Virginia’s quarterly journal of science and research, Summer 2015 Issue
- Featured in two videos in the “Tracking the Brown Marmorated Stink Bug” series produced by StopBMSB.org: http://www.stopbmsb.org/video (June 2013)
- Featured in article “Stink Bugs Permeate Daily Life, And They’re Here to Stay” featured in The Picket (November 20, 2013)

PROFESSIONAL MEMBERSHIPS
- Phi Kappa Phi Honor Society (Inducted to S.U. Chapter in 2008; President 2013 - 2016)
- Entomological Society of America
- West Virginia Academy of Science
- Florida Entomological Society

PROFESSIONAL REVIEWS PROVIDED
- Honey bees avoiding ant harassment at flowers using scent cues. Review provided for *Environmental Entomology* (August 2015)
- Orchard Ecological Research Approaches. Review provided for Dr. Mark Brown, USDA Appalachian Fruit Research Station, Kearneysville, WV (2009)
- The parasitoid of a fruit moth caterpillar utilizes fruit components as nutrient source to increase its longevity and fertility. Review provided for *Biological Control* (2008)
- Interpretation of conservation biological control experiments at the ecosystem level. Review provided for Dr. Mark Brown, USDA Appalachian Fruit Research Station, Kearneysville, WV (2008)
Mohammadreza Ghahremani
mghahrem@shepherd.edu

CME Department
Shepherd University
Shepherdstown, WV
(443) 798-8130

3701 Twin Lakes Court
Apartment 509
Windsor Mill, MD 21244

CURRENT POSITION

Shepherd University
Assistant Professor
2015 – Present

EDUCATION

The George Washington University
Ph.D. Computer Engineering
Dissertation: Magnetic Refrigeration Systems
GPA: 3.9/4
Washington, DC
2014

Sharif University of Technology
M.Sc. Computer Engineering
Thesis: Watchdog processor for cache-based processors
GPA: 3.8/4
Tehran, Iran
2000

Azad University
B.Sc. Electrical Engineering
GPA: 3.8/4
Tehran, Iran
1998

SELECTED AWARDS AND HONORS

- 1st Prize Award, Research Days 2015, George Washington University
  2015
- 2nd Prize Award, Annual Graduate Research and Development Showcase, George Washington University
  (2 out of 200 presentations)
  2013
- NSF grant awarded fellowship on Magnetic Tunable Nanostructure
  2013
- Best Poster Award, INTERMAG - IEEE International Magnetics Conference
  2012
- DOE-GE grant awarded fellowship on Magnetic Refrigeration
  2011-2013
- Research Assistant at the George Washington University
  2011-2013
- Teaching Assistant at the George Washington University
  2010-2011
- Instructor Assistant at the George Washington University
  2010

RESEARCH AND TEACHING INTERESTS

- Computer architecture and electronic devices
- VLSI, FPGA
- Hardware security
- Embedded systems
- Electromagnetics
- MEMS, NEMS, and nanotechnology

TEACHING EXPERIENCE

The George Washington University
Graduate teaching assistant
- Circuit theory
- Circuit design
  2010-2011

Sharif University of Technology
Lecturer
  Tehran, Iran
  2000-2008
• Computer Architecture
• VLSI design
• Introduction to computer networks
• Applied electromagnetics
• Circuit theory

RESEARCH EXPERIENCE

The George Washington University Washington, DC

• Postdoctoral Fellow 2013 - Present
  - CPU and semiconductor chip cooling device: Design, produce and market a novel miniaturized off-chip semiconductor chip-cooling device based on magnetic refrigeration technology.
  
  Accomplishments: Design of a CPU cooling device with a significantly higher efficiency than other cooling technologies, e.g. the cooling efficiency in magnetic refrigerator working with gadolinium can reach 60%.

  - Miniature micro-pump for microfluidic and drug delivery application: Designed and built a magnetocalaric-based micro pump for interesting applications in micro power systems including the much anticipated drug delivery under the skin.
  
  Accomplishments: Innovating a novel micro-pump that offers many advantages. It is not directly connected to any external power supply to pump the fluid and when placed in a biocompatible casing, gets extremely suitable for biomedical applications like drug delivery under the skin. The power consumption is dropped significantly as no internal battery is required for pumping the fluid.

• Research Assistant, Institute for Magnetics Research 2011 – 2013
  - Magnetocaloric Materials for use as Magnetic Refrigerants (DOE funded project): Designed and built an advanced magnetocaloric direct temperature measurement System.
  
  Accomplishments: Characterized mixed-state clusters using self-similarity phenomenon for first-order magnetocaloric metamagnets.

  - Magnetic refrigeration and magnetic devices: Design and instrumentation of an advanced magnetocaloric temperature change test system with fully controlled time, ambient temperature and external field capabilities.

  - Magnetic Tunable Nanostructures: Property Characterization and Modeling (NSF funded project) Designed and built the experimental system for the measurement of charge-induced control magnetic properties in magnetic nanostructures. The system includes a MOKE apparatus, an electrochemical workstation, a three-electrode electrochemical cell and a Visual Basic / LabVIEW program for measurement, automation, and data acquisition. Characterized the structural, electrochemical and magnetic properties of number ferromagnetic systems in various electrolytes.
  
  Accomplishments: Realized the reversible and dynamic tuning of electronic and magnetic properties in metallic nanostructure which were restricted materials with low carrier density, such as semiconductor, piezoelectrics and conducting polymers.

• Research Assistant, MEMS and VLSI Laboratory 2009 – 2011
  
  Accomplishments: Design a miniaturized SAW drug delivery device placing on the eye surface under the eyelid to allow non-invasive long-term drug application based on the programmed timeline and electronic control of a drug regimen.
Watchdog processor for concurrent error detection in a CPU: Investigating the applicant ability of some behavior checking mechanisms in cache-based microprocessors

Accomplishments: Design and implementation of behavior-based mechanisms for CPU, as a watchdog processor using FPGA chip from ALTERA Company. The watchdog is evaluated by using physical fault injection.

PATENTS

- Design and Instrumentation of an Advanced Magnetocaloric Direct Temperature Measurement System (US Provisional Application No. 61/635,431a).
- MCE based magnetic field sensor (US Provisional Application No. 61/635,431b).
- Magnetocaloric based micro-pump (Application submitted).

INVITED TALK

- National Institute of Standard and Technology (NIST)

SELECTED PROFESSIONAL ACTIVITIES

Peer Review

- AIP advances Journal
- Journal of Applied Physics

Professional Affiliations

- Institute of Electrical and Electronics Engineers (IEEE)
- American Physical Society (APS)
- Materials Research Society (MRS)

SELECTED JOURNAL PUBLICATIONS


9) H. M. Seyoum, M. Ghahremani, H. ElBidweihy, L. H. Bennett, E. Della Torre, F. Jonson, and M. Zou, “Metastability in the Magnetic Structure of Ni$_{51}$Mn$_{33.4}$In$_{15.6}$ Heusler Alloy”, *IEEE Magnetics Letters*, 4, 6000204 (Jul, 2013).


**SELECTED CONFERENCE PROCEEDINGS**


Weidong Liao, Ph.D.
Associate Professor of Computer and Information Sciences
School of Natural Sciences and Mathematics
Shepherd University
Shepherdstown, WV 25443
Email: wliao@shepherd.edu
Web page: http://webpages.shepherd.edu/wliao

Professional Preparation

Northeastern University, China
Computer Science and Engineering  B.Eng., 1991
Northeastern University, China
Computer Engineering  M.Eng, 1994
Kent State University
Computer Science  M.A., 1999
Kent State University
Computer Science  Ph.D., 2003

Appointments

2010–Present:  Associate Professor of Computer and Information Sciences,
Shepherd University, Shepherdstown, West Virginia
2004–2010:  Assistant Professor of Computer and Information Sciences,
Shepherd University, Shepherdstown, West Virginia
2002–2003:  Instructor for Computer Literacy, Department of Computer Science,
Kent State University, Kent, Ohio 44240
1997-2002:  Research Assistant, Department of Computer Science,
Kent State University, Kent, Ohio
1995–1996:  System Specialist, Microsoft Professional Training Center, Beijing, China
1994–1996:  Software Engineer, Software Institute, Chinese Academy of Sciences,
Beijing, China
1991-1993:  Research Assistant, Department of Computer Science, Northeastern
University, Shenyang, China

Selected Publications

Jason Bertman, Osman Guzide, Weidong Liao, Analysis and Comparative Study of Elliptic
Curve Cryptography in Secure Web Applications, ACM Communications in Computer Algebra,
Vol. 47, No. 2, Issue 184, June 2013. (Abstract)

Weidong Liao, Osman Guzide, Reza Mirdamadi, Developing and Teaching a Biometrics Course
as Part of Computer Science and Engineering Curriculum, Proceedings of the 2012 International


Peter Groen, Weidong Liao, etc. West Virginia Health IT Architecture and Standards, September 2008.


Ph.D. Thesis and Advisor

IAMC Framework: Design and Implementation. Kent State University, Kent, Ohio, December 2003. (Ph.D. Advisor: Dr. Paul S. Wang, Professor of Computer Science, Dept. of Computer Science, Kent State University, Kent, Ohio.)
Jeffrey R. Groff

177 Azure Drive (304) 240-7109
Martinsburg, WV 25404 jeffreyryangro@gmail.com

CURRENT POSITION

Associate Professor of Physics
Shepherd University Shepherdstown, WV
As a member of the Institute of Environmental and Physical Sciences, I teach lecture and laboratory components of introductory and advanced physics and environmental studies courses for both science and non-science majors in the context of the university’s liberal arts curriculum. I have been tenured and at the associate professor rank since the fall of 2015.

EDUCATION

Ph.D. in Applied Science with specialization in Theoretical Biophysics
The College of William & Mary Williamsburg, VA 2008
Dissertation: “Markov Chain Models of Calcium Puffs and Sparks”

M.S. in Applied Science
The College of William & Mary Williamsburg, VA 2005

B.A. in Physics, Minor in Chemistry
McDaniel College Westminster, MD 2001

COURSES TAUGHT

Foundations in Environmental Science II Shepherd University Shepherdstown, WV Fall 2016
This course introduces fundamental concepts in environmental studies, with specific focus on energy, earth systems and human resource utilization. Students explore interactions between humans and earth’s abiotic resources, examining topics such as natural resource extraction, renewable and non-renewable energy production, hydrologic resource use and associated global environmental impacts.

Physical Computing Shepherd University Shepherdstown, WV Spring 2013, 2015
This course is an introduction to electronics and microprocessors for students who do not wish to be electrical or computer engineers. Science, mathematics, and art majors represent the majority of the students enrolled in this course. A major component of the course is learning the Arduino open-source prototyping platform based on Atmel microcontrollers.

This course is an introduction to the physics of energy and the application of physics principles to the production and use of energy. Topics covered include mechanical energy, thermal energy, heat transfer, work, conservation of energy, laws of thermodynamics, the kinetic theory of gases, applications of electromagnetism for power generation and distribution, applications of nuclear and quantum physics for power generation, and energy flow through biological systems.

Electricity and Magnetism Shepherd University Shepherdstown, WV Fall 2011
This course is an intermediate-level vector calculus based survey of classical electromagnetism covering topics including Coulomb’s Law, Gauss’s Law, Ampere’s Law, the Lorentz Force Law, and Maxwell’s Equations.

Advanced Laboratory Shepherd University Shepherdstown, WV Summer 2011
This laboratory-based course focuses on advanced experiments in physics, physics laboratory instrumentation, and experimental error analysis.

General Physics I Shepherd University Shepherdstown, WV Fall 2015, 2016
A lecture with laboratory calculus-based introductory physics course covering topics including kinematics, dynamics, energy, and momentum.

**General Physics II**  
Shepherd University  
Shepherdstown, WV  
A lecture with laboratory calculus-based introductory physics course covering topics including oscillation and waves, ray optics, wave optics, electricity, and magnetism.

**General Physical Science**  
Shepherd University  
Shepherdstown, WV  
A lecture with laboratory conceptual physics course for non-science majors. Topics include Newtonian mechanics, work and energy, momentum, conservation laws, gravitation, rotational motion, fluid mechanics, electricity, magnetism, and special relativity.

**College Physics II**  
Shepherd University  
Shepherdstown, WV  
A lecture with laboratory algebra-based introductory physics course covering topics including oscillation and waves, ray optics, wave optics, electricity, magnetism, and early quantum mechanics.

**College Physics I**  
Shepherd University  
Shepherdstown, WV  
A lecture with laboratory algebra-based introductory physics course covering topics including Newtonian mechanics, work and energy, gravitation, rotational motion, static equilibrium, heat and temperature, and fluid mechanics.

**Electronics**  
Spring 2009  
Gettysburg College  
Gettysburg, PA  
A lecture and laboratory course in analog and digital electric circuits. Topics included networks of resistors, RC and RLC filters, digital logic circuits, oscillators, operational amplifiers, semiconductor devices, and microcontrollers.

**Elementary Physics I**  
Fall 2008  
Gettysburg College  
Gettysburg, PA  
A lecture with laboratory algebra-based introductory physics course covering topics including Newtonian mechanics, work and energy, gravitation, rotational motion, static equilibrium, and the concepts of heat and temperature.

**Calculus I**  
Fall 2006, 2007  
The College of William & Mary  
Williamsburg, VA  
This course was primarily concerned with teaching single variable differentiation and its applications.

**Visiting Assistant Professor of Physics**  
August 2008 – August 2009  
Gettysburg College  
Gettysburg, PA  
I taught lecture and laboratory components of Elementary Physics to biological science students and non-science majors in the context of a liberal arts curriculum and taught Electronics to physics majors.

**Research Associate**  
December 2007 – July 2008  
The College of William & Mary and Ohio University  
Williamsburg, VA and Athens, OH  
In collaboration with Dr. Gregory D. Smith and Dr. Peter Jung, I used computational models to study the dynamics of intracellular calcium mobilization. This work aimed to clarify the biophysics of calcium signal transduction in eukaryotic cells.

**Mathematics Teaching Fellow**  
Fall 2006, Fall 2007  
The College of William & Mary  
Williamsburg, VA  
While still working to complete my Ph.D., I taught first semester calculus to both science and non-
science majors and students who intended to major in mathematics. I was the instructor of record for these courses.

**Science and Mathematics Tutor**  
*University Instructors*  
2004 – 2007  
*University Instructors*  
Williamsburg, VA  
I provided one-on-one tutoring to high school students in physics, biology, mathematics, and chemistry.

**Non-Academic Employment History**

**Lab Technician**  
*Wyeth Pharmaceuticals*  
2001 – 2002  
*Marietta, PA*  
Performed industrial scale refinement of influenza virus vaccine fluids including column chromatographic separations and resin filtration.

**Research Experience**

**Graduate Research Assistant**  
*The College of William & Mary*  
2003 – 2007  
*Williamsburg, VA*  
Studied the dynamics of the stochastic gating of clusters of intracellular calcium channels using continuous-time Markov chains. During the first two years of graduate school, I studied the throughput properties of thalamic visual pathways using ordinary differential equation-based models of the relevant neural networks and spectral analysis and information theoretical techniques.

**Summer Program in Neural Rhythms**  
*Ohio State University, MBI*  
2003  
*Columbus, OH*  
Developed computational models of olfactory glomeruli networks to illustrate how neural networks learn to smell. Director: Dr. Avner Friedman.

**Undergraduate Research Experience**  
*The College of William & Mary*  
2000  
*Williamsburg, VA*  
Studied vacuum deposition and characterization of metallic thin films. Mentor: Dr. Brian Holloway.

**Publications**

**Dissertation**


**Book Chapters**


**Peer-Reviewed Published**


*Feedback Inhibition and Throughput Properties of an Integrate-and-Fire-or-Burst Network Model of*

Proceedings


Grants Awarded

(PI) The Acquisition of Biophysics Instrumentation for Curricular Enhancement, Research, and Outreach, EPSCoR Innovation Grant from WV Higher Education Policy Commission Division of Science and Research, Grant Number: HEPC.dsr.10.10, Fall 2009, Amount: $72,386 ($50,420 cash, $21,966 in-kind).

(PI) The Acquisition of an Electronic Polling System to Facilitate Peer Instruction and Enhance Conceptual Understanding in Introductory Physics, Shepherd University Technology Oversight Committee Grant, Spring 2010, Amount: $1056.


(PI) Shepherd Professional Development Committee Mini-Grant, Purpose: To fund travel to the winter 2012 AAPT conference and to give a presentation at the conference titled Estimating the size of onion epidermal cells from diffraction patterns., Spring 2011, Amount $500.

(PI) The Development of a Biophysics Laboratory for Introductory Physics Courses that Teaches the Principles of Movement and Flow at Low Reynolds Number, Shepherd University WV Space Grant Consortium Research Enhancement Award, February 2012, Amount: $2,500.

(PI) Physical Computing: an introductory course in electronics and microcontroller programming, NASA WV Space Grant Consortium - College Course Development Grant Program, Spring 2013, Amount: $8152 ($6,643 cash, $1,509 in-kind).

(PI) Shepherd Professional Development Committee Mini-Grant, Purpose: To fund travel to the winter 2013 AAPT conference in order to present "Estimating the Boltzmann constant from simulations of settling Brownian particles", January, 2013, Amount: $500.

(co-PI with Dr. Edward Snyder as PI) Alternative Energy: Real World Applications, WV Division of Energy, State Energy Program Grant to fund a two day conference on renewable energy at Shepherd University and to fund solar panels for the Institute of Environmental and Physical Science’s Renewable Energy Demonstration Site, Spring 2013, Amount: $15,000.

(PI) Shepherd Professional Development Committee Mini-Grant, Purpose: To fund travel to the winter 2015 AAPT conference in order to present "Physical Computing: An Arduino-Based Course for Artists and Scientists", January, 2015, Amount: $500.

(PI) Shepherd Technology Oversight Committee Grant, Purpose: To fund iMacs for the physics laboratory for teaching and research purposes, 2015, Amount: $12,959.

(PI) Shepherd Professional Development Committee Mini-Grant, Purpose: To fund travel to the summer 2016 AAPT conference in order to present "Climate Change Films for the Physics Classroom", January, 2016, Amount: $500.
(co-PI with Dr. Clarissa Mathews as PI) **Sustainability Site EV Charger Refurbish and Replacement**, WV Division of Energy, State Energy Program Grant to help fund replacement of the sustainability site’s electric vehicle charger with models that allow pay-to-charge capability, spring 2016, Amount: $5,000.

(PI) **American Association of Physics Teachers Philanthropy & Special Projects Committee Travel Grant**, Purpose: To fund travel to the summer 2016 AAPT conference, April 2016, Amount: $250.

**Presentations**

- **Climate Change Films for the Physics Classroom**, Groff, J., American Association of Physics Teachers, Sacramento, CA, July 19, 2016. ([speaker](#))

- **Small-Scale Distributed Solar Photovoltaics (PV)**, Groff, J., Inauguration Symposium: The University’s Role in Translating Energy Challenges into Business and Employment Opportunities, Shepherdstown, WV, April 8, 2016. ([invited speaker](#))

- **Generating Audio-Frequency Analog Signals with Arduino**, Groff, J., American Association of Physics Teachers, New Orleans, LA, January 11, 2016. ([speaker](#))

- **Ortmann and the Physical Forms of Sound**, Groff, J., Gonzol, D., American Association of Physics Teachers, New Orleans, LA, January 11, 2016. ([poster](#))

- **Physical Computing: An Arduino-Based Course for Artists and Scientists**, Groff, J., American Association of Physics Teachers, College Park, MD, July 27, 2015. ([speaker](#))

- **Assessment of a model population’s sensitivity to collapse and extinction due to generational variance in adult survivorship**, Hayes, Shelby and Groff, J., West Virginia Academy of Science 90th Annual Meeting, West Liberty University, April 11, 2015. ([talk co-author](#))

- **Using Arduino to Study Resonance**, Groff, J. and Murphy S., American Association of Physics Teachers, San Diego, CA, January 5, 2015. ([poster](#))

- **The Search for the Higgs Boson: Science for the Sake of Discovery**, Groff, J., West Virginia Academy of Science 89th Annual Meeting, Shepherd University, April 12, 2014. ([plenary speaker](#))

- **The Development of a Low-Cost Arduino and Raspberry Pi-Based System for Environmental Monitoring**, Tomlin, Jared and Groff, J., West Virginia Academy of Science 89th Annual Meeting, April 12, 2014. ([talk co-author](#))


- **The Stochastic Physics of Cells**, Groff, J., Dickinson College Physics Colloquium Series, March 27, 2014. ([invited speaker](#))

- **From Gravity to Gradients: The Nanoscale Physics of our Cells**, Groff, J., Faculty Research Forum, Shepherd University, February 12, 2014. ([speaker](#))

- **Using Arduino and a Microphone to Listen for Time**, Groff, J. and Murphy, S., American Association of Physics Teachers Winter Meeting, Orlando, FL, January 6, 2014. ([poster](#))

- **Online Assessment with WebAssign**, Groff, J., Focus on Student Learning, Shepherd University, January 28, 2014. ([speaker](#))

- **Leading Change**, Groff, J., Aldrich, Dawn, and Maloney, Kate, McDaniel College, Westminster, MD, November 18, 2013. ([invited panelist](#))

Estimating the Boltzmann constant using simulations to fit experiments of settling Brownian particles, Khurana, Merika and Groff, J., West Virginia Academy of Science Annual Meeting, Canaan Valley Institute, April 6, 2013 (talk co-author)

Observations of the Thermal Properties of a Solar-Thermal Greenhouse Using an Arduino-Based Temperature Monitor, King, Lauren and Groff, J., West Virginia Academy of Science Annual Meeting, Canaan Valley Institute, April 6, 2013 (poster)

Pale Blue Dot, Remarks made as part of my acceptance of the McDaniel College Scholar Alumni Award, McDaniel College, March 28, 2013. (invited speaker)


Constructing an Ultrasonic Anemometer Based on the ATmega328 Microcontroller and Arduino, Hoeck, K., Groff, J., West Virginia Academy of Science and STaR Symposium Joint Meeting, Institute, WV, April 21, 2012. (poster)

Spherical Cows and Other Ways that a Physicist can be Useful for Studying Biological Systems, Groff, J., McDaniel College, Westminster, MD, April 5, 2012. (invited speaker)

Estimating the Size of Onion Epidermal Cells from Diffraction Patterns, Groff, J., American Association of Physics Teachers Winter Conference, Ontario, California, February 6, 2012. (speaker)

Swift and Slow, Vast and Small: Science and Human Perceptions of Space and Time, Groff, J., Harper’s Ferry Middle School, December 8, 2011. (invited speaker)

A Computational Investigation of Calcium Puffs and Sparks at Heterogenous Release Sites, Shepard, W., Groff, J., West Virginia Academy of Science Annual Meeting, WVU Tech, Montgomery, WV, April 1, 2011. (poster)

Deconstructing Rainbows, Groff, J., Shepherd University Byrd Center For Legislative Studies, March 9, 2011. (invited speaker)


Physical Biology and Mathematical Biology in Undergraduate Physics Laboratory, Groff, J.R., The College of William and Mary, Williamsburg, VA, March 18, 2011. (invited speaker)


A Computational Investigation of the Effects of Allosteric Coupling Between Ryanodine Receptors on Ca^{2+} Spark Statistics, Groff, J.R., Graduate Research Symposium, The College of William and
Mary, Williamsburg, VA, March 24, 2006. (speaker)


**Select Graduate Level Coursework**
- Engineering Mathematics
- Mathematical Modeling
- Cellular Biology
- Bioinformatics
- Systems Neuroscience
- Neurophysiology
- Cellular Biophysics and Modeling
- Mathematical Physiology
- Parallel Computing
- Time Series Analysis
- Knowledge Discovery
- Molecular Evolution

**Select Technical Skills**
- **Expertise in:** MATLAB, C++, Arduino Development, AVR Programming, Eagle PCB, Linux and OS X System Administration, LaTeX, Adobe Photoshop and Illustrator, Microsoft Office, Shell Scripting (BASH CSH), Perl, Wordpress, HTML, BrightScript
- **Experience in:** Java, Objective-C, PHP, MPI, Flash, mySQL, CSS, JavaScript

**Awards**
- McDaniel College Scholar Alumni Award - in recognition of leadership for change
- Graduate Research Symposium Presentation Award - The College of William & Mary – 2006
- College Scholar - McDaniel College – 2001
- Summa Cum Laude - McDaniel College – 2001
- Departmental Honors in Physics - McDaniel College – 2001

**Professional Affiliations**
- **American Association of Physics Teachers**
  - Member and Chair of the Committee on Educational Technology
- **West Virginia Academy of Science**

**Community Engagement**
- **American Conservation Film Festival**
  - Board member, VP
  - 2013-Present
OSMAN GUZIDE

Department of Computer Sciences, Mathematics, and Engineering
Shepherd University
P.O. Box 5000
Shepherdstown, West Virginia 25443
Phone: (304) 876 5017
E-mail: oguzide@shepherd.edu

PRIMARY TEACHING/RESEARCH INTEREST

- Distributed Systems, Networking, Security, Software Engineering and Parallel Processing

SPECIFIC TEACHING/RESEARCH INTEREST

- Networking and Security
- Software Engineering
- Information Systems Application in Industry
- Parallel Processing
- Knowledge Management
- Systems Analysis and Design
- Artificial Intelligence

EDUCATION

- **Doctor of Philosophy** (Computer Science and Engineering), 2000, Lehigh University
  *Dissertation Title: “Derivatives of Butterfly Interconnection Networks for Parallel Processing”*

- **Master of Science**: (Mathematics), 1989, Hacettepe University, Turkey
  *Thesis: “The conditional sequence entropy function”*

- **Bachelor of Science**: (Mathematics), 1989, Hacettepe University, Turkey
  *Rank: First in the major in the University*
EXPERIENCE:

a) Industry Experience

- Researched and Developed on major systems in Medical software, Medical system design, Implementing Medical Information Technology, Networking and Security for planning future aspects.
- Set up and administrated systems and networks
- Developed programs for distributed systems and databases
- Designed, analyzed, and developed medical software and distributed data base systems.
- Researched on information technology software and systems
- Researching the most appropriate solutions on parallel and embedded systems.
- Analyzing, designing, and developing suitable solutions for system automation
- Programmed Control Problems on Servers
- Customized the software for medical platform
- Managed the Mainframes for 250 doctors cites

July 2000- 2005 **System Engineer and Researcher:**
The Information Systems Manager, Bethlehem, PA

Dec.1996-June 2000 **Senior Software Engineer and Researcher:**
The Information Systems Manager, Bethlehem, PA

Knightsbridge Group, Bethlehem, PA

Jan.1995-Nov.1995 **Consultant: Medical System and Software Developer:**
The Landau Group, Wyomissing, PA
b) Teaching/Research Experience

- Teaching computer networking, security and sciences courses
- Designing and preparing course materials
- Researching information systems, distributed systems and their security and parallel processing
- Taught introduction to embedded systems
- Conducting recitations and took over teaching occasionally.
- Working on new mathematical techniques to map algorithms to parallel architectures
- Solving some interesting and important problems on Interconnection Networks for Parallel Computers.
- Discovering new mathematical modeling techniques for distributed databases
- Researching on butterfly interconnection networks to extend and generalize
- Mathematical modeling of networks, communication architectures.
- Researched on Knowledge based systems and expert system shells
- Network management, setup, and development for Client/Server
- Designed of parallel systems by using parallel architecture and algorithms in system integration
- Object-oriented programming such Visual C++
- Quality assessment.
- Data acquisition and processing with LabVIEW.
- Conducted recitations and took over teaching occasionally.
- Investigated information systems theory especially information entropy function
- Set up and conducted experiments and analyzed of research observations.
- Implemented programs for research.

Aug. 2004- present  **Associte Professor:**  
**Department of Computer and Information Sciences**  
Shepherd University

Jan. 2002-May 2002  **Adjunct Lecturer:**  
**Department of Computational Science**  
SUNY Brockport

June 1997-May 1999  **Teaching and Research Assistant:**  
**Department of Electrical Engineering and Computer Science, Lehigh University, Bethlehem, PA**
June 1996-Nov. 1996 **Research Engineer:**
Enterprise Systems Center, Lehigh University, Bethlehem, PA

Aug 1992- Aug 1993 **Laboratory Assistant**
Energy Research Center, Lehigh University, Bethlehem, PA

Sep. 1988-Dec. 1996 **Teaching and Research Assistant:**
Department of Mathematics,
Hacettepe University, Ankara, TURKEY

**JOURNAL PUBLICATIONS:**


**CONFERENCES:**

5. Weidong Liao, Osman Guzide, Reza Mirdamadi, ”Developing and Teaching a Biometrics Course as Part of Computer Science and Engineering Curriculum”, (FECS’ 12), July 16-19, 2012, Las vegas, Nevada


7. O. Guzide, Meghanad D. Wagh: Enhanced butterfly: A cayley graph with node degree 5. ISCA PDCS 2007: 224-229


RESEARCH ARTICLES WITH UNDERGRADUATE STUDENTS:


16. P. O’Keefe, Weidong Liao and Osman Guzide presented their research on "Providing GCD Computation Services over the Internet and Distributed Environment" in the 82nd West Virginia Academy of Science annual meeting on March 31, 2007.


27. THOMAS WILLOUGHBY, OSMAN GUZIDE, AND WEIDONG LIAO, “Is Cloud Computing the Future?”, West Virginia Academy of Science, April 2011


34. **Quantum Cryptography: Security on The Edge**, Christopher C. Wallace (Shepherd University), Osman Guzide (faculty advisor, Shepherd University), The 2011 CCSC Eastern Conference, October 14-15, 2011, Marymount University, Arlington, Virginia

35. **Enhanced Butterfly Topology in On Chip Network for a Multicore System**, Etleva Jackson (Shepherd University), Osman Guzide (faculty advisor, Shepherd University), Weidong Liao (faculty advisor, Shepherd University), The 2011 CCSC Eastern Conference, October 14-15, 2011, Marymount University, Arlington, Virginia
36. Developing and Enhancing a Biometrics and Information Security Curriculum, Weidong Liao (Shepherd University) and Osman Guzide (Shepherd University), The 2011 CCSC Eastern Conference, October 14-15, 2011, Marymount University, Arlington, Virginia


43. Christopher C. Wallace and Osman Guzide, ” Quantum Cryptography: Ultraviolet Hash Function of Quantum Cryptography”, STaRSYMPOSIUM2012 and the West Virginia Academy of Science Annual Meeting (the 87th)


46. Chad Vanorsdale, Weidong Liao and Osman Guzide, Department of Computer Science, Mathematics and Engineering, Shepherd University,
Shepherdstown, WV 25443. “Firefox OS: A Comparative Analysis of Web Apps.”, the West Virginia Academy of Science Annual Meeting (the 88th)

47. JASON BERTMAN* and OSMAN GUZIDE, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “Using Elliptic Curve Cryptography to Secure Web Applications” the West Virginia Academy of Science Annual Meeting (the 88th)

48. JORDAN CANNIN*, JESSICA NOVAK*, WEIDONG LIAO and OSMAN GUZIDE, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “Analyzing and Securing the Mobile World.” the West Virginia Academy of Science Annual Meeting (the 88th)

49. MATTHEW MOCNIAK* and OSMAN GUZIDE, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “The User Interface: Importance & Good Practice.” the West Virginia Academy of Science Annual Meeting (the 88th)

50. TYLER WALDRON*, WEIDONG LIAO and OSMAN GUZIDE, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443.” 'Breaking' AES.” the West Virginia Academy of Science Annual Meeting (the 88th)

51. Chad Vanorsdale, Osman Guzide, Weidong Liao Shepherd University, “Implementing Virtual Folders in Firefox OS” CCSC Eastern Regional 29th Annual Conference in association with ACM SIGCSE, November 1-2, 2013

52. Jason Bertman, Brett Salmieri, Osman Guzide, Shepherd University, “Bypassing Address Space Layout Randomization and Data Execution Prevention on intel x86 Platform” CCSC Eastern Regional 29th Annual Conference in association with ACM SIGCSE, November 1-2, 2013


54. Daniel Bird and Osman Guzide, Shepherd University “Analysis of Superconducting Spintronics”, the West Virginia Academy of Science Annual Meeting (the 89th)

55. Skyler Bartles, William Slifer and Osman Guzide, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “Acoustic Cryptanalysis.,” the West Virginia Academy of Science Annual Meeting (the 89th)

56. Vasyl Shtanko and Osman Guzid, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “Real-time Operating System for Robotics and Embedded Systems” the West Virginia Academy of Science Annual Meeting (the 89th)

57. REBECCA HERBERT and OSMAN GUZIDE, Department of Computer Science, Mathematics and Engineering, Shepherd University, Shepherdstown, WV 25443. “ACCESSING A CAR’S COMPUTER FOR PERSONALIZATION.” the West Virginia Academy of Science Annual Meeting (the 89th)
HONORS

TUBITAK (The Scientific and Technical Research Council of Turkey) -NATO 3-year-Fellowship Award for studying Ph.D. in computer science in USA 1995-1998

AND

Hacettepe University 4-year-Scholarship Award 1983-1987

AWARDS:

President Fellowship Award—graduated with high honors in Science Faculty 1987
Hacettepe University Good Scholar Award. 1987
First in Major Award. 1987
Karen S. Adams
119 South Broad Street
Waynesboro, PA 17268
(h) 717-749-7976; (c) 240-367-2759
(h) tadams@fred.net; (w) kadams@shepherd.edu

I. Education

   Ed.D. Shenandoah University, Winchester, VA.
   M.A. Mathematics Morgan State University, Baltimore, MD.
   M.S. Education McDaniel College, Westminster, MD.
   B.S. Mathematics Shepherd College, Shepherdstown, WV.
   A.E. EE Technology Vermont Technical College, Randolph, VT.

II. Summary of Qualifications

Assistant Professor of Mathematics, Shepherd University, Shepherdstown, WV. (2013- Present).
Primary responsibility is to teach a variety of undergraduate mathematics courses, 24 credit hours per year. Non-teaching responsibilities include advising students, seeking grant opportunities, conducting research, assisting with licensure and accreditation reviews, supervising student teachers, serving on committees and advising undergraduate research.

Associate Professor of Mathematics, Chair Department of Math/CS, Wilson College, Chambersburg PA. (2000 – 2013).
Primary responsibility was to teach a variety of undergraduate mathematics courses, 7 courses per year. Non-teaching responsibilities include seeking grant opportunities, conducting research, serving on college committees, assisting with licensure and accreditation reviews, supervising math tutors, recruiting faculty, assisting with course rotations and teaching schedules, developing new courses, directing math placement activities, advising undergraduate students, and advising undergraduate research.

Department Chair, Mathematics, Boonsboro HS, Boonsboro, MD. (1994-2000)

Responsible for developing software and hardware necessary to test chip, board and box components predominantly used in the aircraft industry. Corporations included IBM, General Technology Division, Essex Junction, VT and Fairchild Avionics, Germantown MD.
III. Professional development.

Courses taught and curriculum development.
Wilson College: (096) Basic College Math; (098) Elementary Algebra; (*101) Math for Liberal Studies; (103) College Algebra; (110) Pre-calculus; (115) Elementary Statistics; (130), (140), (242) Calculus I, II, III; (205) Discrete Math; (207) Linear algebra; (*306) Geometry; (308) Abstract Algebra; (320) Differential Equations; (321) Analysis; (325), (326) Mathematical Statistics I and II; (*330) Advanced and Multivariate Statistics; (*410) Capstone. (*) indicates new a course that I developed for the college.

Shepherd University: (154) Finite Math; (105) College Algebra; (108) Precalculus; (254) Discrete Mathematics; (205) Applied Calculus; (207) Calculus; (307) Linear Algebra; (314) Statistics; (321) Probability & Statistics.

Publications and grant reports.
Adams, K. (2007, 06, 05). Results of the 2006/07 (06/05, 05/04) Life Skills Video Pilot Program. VA State Department of Education.

Presentations.

What part of $e^{ix} + 1 = 0$ don’t you understand? Presented at the 3rd annual Literacy Leaders Conference at Shepherd University, 2015.
Can you dig it? Presented (2) forty five minute presentations to support “Seeding your Future”. Seeding Your Future was a math and science conference aimed to inspire young girls to pursue careers in science, technology, engineering, and mathematics. 2014, 2015.
The Pythagorean Propositions Project. Two SU students presented their research under my advisement at the West Virginia Academy of Science. (2014).

On the convergence of the integral representation of Zeta (2). Shippensburg University, 2009.

Poor Freshmen Know Every Derivative. Presented at the annual conference on “First Year Success”, Southern Maryland College, October, 2009.

Mathematical Induction. Presented at the weekly faculty colloquium, UHI, 2006.


Proving Minkowski’s Inequality as a Tool for Student Research. AMS, Fall Eastern Section Meeting, Storrs, CT, October 28-29, Meeting #1021, 2006.

Reproving Minkowski’s Inequality. MAA, Regional MD/DC/VA Conference, Howard Community College, 2005.

Reproving Minkowski’s Inequality. Wilson College Math/CS Faculty Colloquium, 2005.


Grants.

Technology Grant Proposal, Shepherd University 2015 In process. Description. “Incorporating Technology into the Mathematics and Mathematics Education Program at SU.” If awarded this grant that will provide faculty and students with access two important technologies used in Math and math education programs: iclickers and the Geometers Sketchpad. Grant request is approximately $1,200.00.

NASA Undergraduate Research Fellowship, 2015-2016. Description. This fellowship will provide support for two undergraduate students to become involved in a research project under my supervision. Students must be enrolled in STEM disciplines to participate in a WV Space Grant affiliate institution. Project is entitled, “Pythagorean Propositions Project”.

Principal Investigator of NSF 15-530 Robert Noyce Teacher Scholarships. 2015 Pending. Description. The Robert Noyce Teacher Scholarship Program seeks to encourage talented science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers. The Noyce Scholarship Track provides funds to institutions of higher education to support scholarships, stipends, and academic programs for undergraduate STEM majors who persist and complete a combined 5 year BS + MAT program earning teaching certification in a STEM 5-12 or 5-9 field. If awarded, the $819,266 grant will support scholarships to 12 students over the next 5 years.

NASA Undergraduate Research Fellowship, 2013-2014. Description. This fellowship provided support for two undergraduate students to become involved in a research project under my supervision. Students must be enrolled in STEM disciplines enrolled in a WV Space Grant affiliate institution. Project was entitled, “Pythagorean Propositions Project”.

Principal Investigator of TENSOR Foundation grant, MAA, 2012. Description. This grant supported the teacher professional development component of a joint Wilson College/Shippensburg University event, “Cumberland Valley ESTEEM” (Exploring Science, Technology, Engineering, Earth Science, and Mathematics). ESTEEM is an annual day-long program for seventh grade girls and their teachers.
Principal Evaluator of Project Forward Leap, 2006-2013.
Description. The Whitaker Foundation provided significant financial support to improve the math and science competency of disadvantaged children within south central PA. Through the combined efforts of the Foundation for Enhancing Communities, the Whitaker Foundation Math & Science, and Project Forward Leap summer residential and school year enrichment programs for middle school students were created. I was the principal evaluator of the program. This grant supported student summer internship opportunities.

Description. This grant was funded by the National Science Foundation and supported scholarships for students studying Mathematics at Wilson College. The Scholarships to Enhance Mathematical Learning and Research (SEMLAR) was established in the fall of 2004 and provided 16 mathematics scholarships during the years 2004-2009 for a total award of $55,000. As the principal investigator, I oversaw all grant activities including annual reporting responsibilities.

Director of Research and Statistical Analysis, Department of Juvenile Justice, 2005- 2007.
Description. The program was entitled, Using Movies in the Schools to Decrease the Incidence of Bullying in the Elementary and Middle Schools. This program investigated procedures implemented to best address the use of violence among children at the middle school level. I designed and completed the evaluative component of this educational grant. I provided a yearly evaluative statistical report of the Life Skills Mentor Program, which is cosponsored by the Shenandoah County Social Services Department and the Tobacco Free Youth Foundation. This grant supported student research internships.

Principal investigator Education Technology Grant supported by “No Child Left Behind” Title II, Part D, Subpart I. 2003-2005. Description. This program represented a county wide effort in Washington County MD to determine whether specific types of artificial intelligence (Cognitive Tutors©) would significantly improve mathematical achievement in high school algebra. I designed, supervised and completed the evaluative component of this educational technology grant. This grant supported student research internships.

IV. Service to the college and community.

Awards and special licenses.
Wilson College Alumni Outstanding Faculty Award (2015).
Wilson College Summer Faculty Research Stipend Award (2006, 2012).
Donald K. Blutz Outstanding Senior Faculty Teaching Award, Wilson College (2006).
Advanced Professional MD State teaching license, 6-12 Mathematics (1992 - 2007).

Curriculum development. (SU = Shepherd University; WC = Wilson College)
WC: Middle Years (4-8) Math & Science Certification degree proposal (2011).

Committee work.
SU: Professional Education Unit Council (2014-Present).
SU: On-line Curriculum Review Committee (2015 – Present)
WC: Strategic Planning Committee (2003 - 2006).
WC: Appointments, Promotion and Tenure Committee (2007 - 2010).
WC: Library Committee (2003 - 2006).

Advising of undergraduate research projects.

Pythagorean Propositions Project (2013/14).
Reproving the irrationality of pi. (2009).
Is Euclid’s proof of the Pythagorean Theorem the most natural? (2007).
An analysis of the rates of convergence of certain zeta functions. (2006).

Conferences attended with students.
Shenandoah Undergraduate Mathematics and Statistics at JMU (2010, 11, 12).
Mathematics Association of America, Regional DC/MD/VA conference (2005).
Mathfest 2004, Undergraduate Research Colloquium at MSU.
Women and Technology (2002), Shepherd College.
Math Fest (2002), Sponsored by the MAA.
Shippensburg University Math Conference (2001, 10, 11, 12).

Service to the community.
Praxis workshops for high & middle school teachers, Hagerstown, MD. (2003, 2004).
NAME: Nicholas Martin
Associate professor
Dept. of Mathematics and Engineering
Shepherd University
304-876-5336

EDUCATION:
1989: Ph.D., Mathematics, Indiana University, Bloomington, Indiana
1983: M.A., Mathematics, Indiana University, Bloomington, Indiana
1981: B.Sc. University of Toronto

EMPLOYMENT:
1989-present Shepherd University. Present rank: Associate Professor
1992-93 Visiting Professor at the EKTF College, Eger, Hungary

PUBLICATIONS:
Internal altitudes, proposed problem, Consortium, number 61, 1/97
The Interior Angles Sum Theorem for Polygons, Mathematics and Informatics Quarterly, 1996, Number 4
Reconciling the geometric concept of tangents with Calculus, Mathematics and Informatics Quarterly, March/June 2009, Vol. 19, no 1/2
Equality of Proportions: The Eudoxian definition versus the modern one, Mathematics and Informatics Quarterly, Sept./Dec. 2010, Vol. 20, no. 3/4
Constructing the number e from Calculus, Mathematics and Informatics Quarterly, March/June 2012, Vol. 22, no 1/2
Using algebraic identities to solve equations, Octogon, March 2016
In the stage of typing up the final version: A generalization of a transportation problem

**HONORS, AWARDS:**

CURRICULUM VITAE

Donald D. Mills
CME Department, Shepherd University
Shepherdstown, WV 25443-5000

Phone (Mobile): (847) 890-9540
Email: dmills@shepherd.edu

EDUCATION

Clemson University
M.S., Mathematical Sciences (May 1995); Ph.D., Mathematical Sciences (August 1999) Dissertation Title: ‘Root-Based Polynomial Compositions Over Finite Fields’
Advisors: Joel V. Brawley, Shuhong Gao

Bob Jones University
B.S., Mathematics (May 1993)

PROFESSIONAL EXPERIENCE

Shepherd University (Shepherdstown, WV)
Position: Mathematics Lecturer
Period of Service: August 2014 to Present

Elgin Community College (Elgin, IL)
Position: Mathematics Tutor
Period of Service: October 2012 to October 2013

Sri Bestari School (Kuala Lumpur, Malaysia)
Positions: Pedagogical Consultant and Teacher Mentor
Period of Service: March 2012 to July 2012

CEDEI Language School (Cuenca, Ecuador)
Position: TESL Instructor
Period of Service: September 2011 to February 2012

Penn State University (State College, PA)
Position: Mathematics Instructor
Period of Service: August 2009 to December 2010

Wittenberg University (Springfield, OH)
Position: Visiting Assistant Professor of Mathematics
Period of Service: August 2008 to May 2009

Illinois State University (Normal, IL)
Position: Visiting Assistant Professor of Mathematics
Period of Service: January 2008 to May 2008
Rose-Hulman Institute of Technology (Terre Haute, IN)

Position: Assistant Professor of Mathematics
Period of Service: August 2006 to June 2007

Southern Illinois University (Carbondale, IL)

Position: Assistant Professor of Mathematics
Period of Service: August 2002 to August 2006

United States Military Academy (West Point, NY)

Position: National Research Council Davies Fellow
Period of Service: January 2000 to July 2002

Southeastern Louisiana University (Hammond, LA)

Position: Assistant Professor of Mathematics
Period of Service: August 1999 to December 1999

COURSES TAUGHT

Shepherd University: Fundamentals of Mathematics; College Algebra; Calculus II and III; Differential Equations; Finite Mathematics; Discrete Mathematics; Probability and Statistics; Mathematics Capstone

Penn State University: Calculus (with a review of Algebra and Trigonometry)

Wittenberg University: Essentials of Calculus, Calculus I, and Calculus II

Illinois State University: Calculus II

Rose-Hulman Institute of Technology: Calculus I, II, and III; Discrete and Combinatorial Mathematics I and II; Coding Theory

Southern Illinois University: Finite Mathematics; Business Calculus; Calculus for the Biological Sciences; Calculus I, II, and III; Linear Algebra; Abstract Algebra; Introduction to Galois Theory; Algebraic Number Theory; Reading Courses in Cryptography and Number Theory, Algebraic Structures, and the Theories of Groups and Rings

United States Military Academy: Discrete Dynamical Systems; Multivariable Calculus; Abstract Algebra

Southeastern Louisiana University: College Algebra; Precalculus; Computer-Based Calculus

RESEARCH INTERESTS

1. Theory and applications of finite fields
2. Combinatorial number theory

REFEREED PUBLICATIONS

12. “On the crosscorrelation of sequences with decimation factor \((p^n+1)/(p+1)-(p^n-1)/2\)” Appl. Alg. Engrg. Comm. Comput. 12 (2001), no. 3, 255–263. (with Z. Hu, X. Li, E. Mueller, W. Sun, W. Willems, Y. Yang, and Z. Zhang) This paper arose out of two different notes, both having the same content. One was written by the authors Hu, Li, Sun, Yang, and Zhang, the other by the authors Mills, Mueller, and Willems.

OTHER PUBLICATIONS

INVITED TALKS
3. Indiana State University, November 2006.
5. Southern Algebra Conference, Southeastern Louisiana University, November 2004.
11. Wesleyan University, April 2000.

CONFERENCE AND SEMINAR PARTICIPATIONS

1. AMS/MAA Joint Meetings, San Antonio, January 2015 (mini-course participant).
2. CVE Conference on Designs, Graphs, and Number Theory, April 2008 (session chair).
3. Finite Fields Workshop, Banff International Research Station, November 2006 (invited participant).
4. AMS/MAA Joint Meetings, Phoenix, January 2004 (special session coordinator).
8. AMS/MAA Joint Meetings, New Orleans, January 2001 (focus group participant).
9. NATO Workshop on Difference Sets and Sequences, Bad Windsheim, Germany, August 1998 (participant).

INSTRUCTIONAL TRAINING

1. Participated in an MAA-sponsored workshop focused on modeling-based approaches to teaching differential equations, held at Carroll College in July 2015.
2. Assisted in a faculty development workshop conducted by senior members of the USMA Mathematical Sciences Department in July 2001.
5. Successfully completed a graduate-level course dealing with the effective teaching of mathematics at the college level in December 1997.
6. Assisted in the training of incoming teaching assistants to Clemson University’s Mathematical Sciences Department in August 1995.

STUDENT RESEARCH AND INDIVIDUAL INSTRUCTION

1. Currently guiding the efforts of five seniors as they work on capstone projects dealing with issues in data mining and cryptography.
2. Supervised Kyle Paup on his senior capstone project, in which he conducted a statistical analysis of population growth in the American Southwest during the period from 1980 to 2010, during the 2015–16 academic year.
3. Conducted a reading course in number theory and cryptography for Ph.D. candidate Alison Marr during the Spring 2006 term. Served on her Ph.D. committee during the 2005–06 academic year.
4. Conducted a reading course in advanced topics on groups and rings for M.S. student Daniel Spector during the Fall 2005 term.
5. Conducted a reading course in the theory of groups and rings for B.A. student Paul Vanstone during the Summer 2003 term.
6. Advised Cadet Thomas Scaife on his senior project, entitled “Primitive roots and their cryptographic value”, during the Spring 2001 term.

ADDITIONAL DUTIES

1. Assisted with Shepherd University’s Department of Computer Science, Mathematics, and Engineering open house presentation to potential students and their families in November 2015.
3. Active in the Rose-Hulman Skeptics Club during the 2006-07 academic year.
6. Reviewed a finite math textbook, and a chapter of a calculus text, for Addison-Wesley in 2004.
8. Co-wrote and co-proctored three Ph.D. qualifying exams while at SIU.
10. Refereed papers for journals whose focus is either finite fields or combinatorial number theory.

GRANTS RECEIVED

1. Awarded an MAA PREP Travel Grant in June 2015.
2. Awarded the Professional Enrichment Grant by Wittenberg University in October 2008.
3. Awarded the Davies Fellowship, a three-year grant issued by the National Research Council, in January 2000.

AWARDS AND POSITIONS HELD

1. Member of the editorial board of Cryptologia between 2005 and 2007.
2. Served as a judge for the Illinois Junior Academy of Science Region 8 Science Fair in March 2005.
3. Served as the faculty advisor for SIU’s Math Club during the 2004–05 and 2005–06 academic years.
5. Received the Commander’s Award for Public Service from the U.S. Department of the Army in June 2002.
6. Received a Project NExT Fellowship Award for the 2001–02 academic year.
8. Received an Outstanding Master’s Student Award from Clemson University in April 1995.
9. Received an R.C. Edwards Fellowship Award from the Clemson University Mathematical Sciences Department. The fellowship was for the 1993–94 academic year.
CURRICULUM VITAE

EDUCATION

- **Ph.D.** in Applied Mathematics, University of Waterloo, Waterloo, Ontario, Canada, January 2003 - April 2007;
- **M.S.** in Mathematics, Hunan Normal University, Changsha, Hunan, China, September 1999 - June 2002;

RESEARCH INTERESTS

My research interests have focused on three areas: the stability and boundedness of dynamical systems, especially impulsive systems; the impulsive control and stabilization of delay differential equations and applications to neural networks, secure communication, and population growth models; mathematical modeling and analysis of disease spread models and tumor cell growth models.

ACADEMIC EXPERIENCE

1. **Assistant Professor (tenure-track)**, Department of Computer Sciences, Mathematics, and Engineering, Shepherd University (Shepherdstown, WV, USA), August 2008 – May 2013;

   Courses taught:
• MATH 108 – Pre-calculus, January 2011 – May 2011; August 2011 – December 2011;
• MATH101 – Fundamentals of Mathematics, Summer I and Summer II, 2011

2. Visiting Assistant Professor, Department of Computer Sciences, Mathematics, and Engineering, Shepherd University (Shepherdstown, WV, USA), August 2007 – May 2008;

Courses taught:
• MATH 208 – Calculus II, January 2008 – May 2008;
• MATH 207 – Calculus I, January 2008 – May 2008;
• MATH 154 – Finite Mathematics, January 2008 – May 2008;
• MATH 434 – Senior Capstone Practicum, January 2008 – May 2008;
• MATH 318 - Numerical Analysis, August 2007 – December 2007;
• MATH 307 - Linear Algebra, August 2007 – December 2007;
• MATH 108 – Pre-calculus, August 2007 – December 2007;

3. Postdoctoral Fellow and/or Lecturer, Department of Applied Mathematics, University of Waterloo (Waterloo, Ontario, Canada), May 2007-August 2007; January 2005-April 2005;

Courses taught:
• MATH 137 - Calculus I for Honors Math, May 2007 – August 2007;
• MATH 138 - Calculus II for Honors Math, May 2007 – August 2007;
• MATH 228 - Differential Equations for Physics and Chemistry, January 2005 - April 2005;

4. Research Assistant, Department of Applied Mathematics, University of Waterloo (Waterloo, Ontario, Canada), January 2003 – April 2007;

5. Teaching Assistant, Department of Applied Mathematics, University of Waterloo (Waterloo, Ontario, Canada), January 2003 – April 2007;

• Math Tutor: MATH 115 - Linear Algebra for Engineering, MATH 127 - Calculus 1 for the Sciences, AMATH 231 - Calculus 4, MATH 211 -
Advanced Calculus for Electrical and Computer Engineering, AMATH 250 - Introduction to Differential Equations, running tutorial sessions or quizzes.


GRANTS


3. West Virginia IDeA Network of Biomedical Research Excellence (WV-INBRE) predominantly undergraduate institutions (PUI) Research Award, Modeling and Stability Analysis of Mixed Immuno-chemotherapy of Tumors by Impulsive Control, $223,928, May 1, 2012- July 31, 2014, Role: Principal Investigator (PI).


5. Summer Professional Development Grant (Shepherd University Internal Grant), Stability Analysis of a Class of Linear Differential Equations with Delayed Impulses, $3,500, Summer 2009, Role: PI.


PUBLICATIONS

Refereed Journal Articles


8. X. Liu and Q. Wang, Impulsive Stabilization of High-Order Hopfield-Type Neural Networks with Time-varying Delays, IEEE Transactions on Neural Networks, 19(2008), no. 1, 71-79.


**Refereed Conference Articles**


Other Publications


Published Abstracts


3. Qing Wang, Zhijun Wang, David J. Klinke, oral presentation on “A Calibrated Model for an Immuno-Chemotherapy to Treat Colon Cancer”, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.

4. Qing Wang, invited talk on “Effects of a Mixed Immuno-chemotherapy on Tumor

5. Qing Wang, Zhijun Wang, David J. Klinke, oral presentation on “Modeling the efficacy of an immunochemotherapy against colorectal cancer”, Loyola University Chicago, Chicago, IL (Central Fall Sectional Meeting), October 2-4, 2015.

6. Zulfiya Muradova, Jessica Poffenberger, Zhijun Wang, Qing Wang, David J. Klinke, A Calibrated Model and Analysis for Ebola Outbreaks, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.

7. Jessica Poffenberger, Zulfiya Muradova, Qing Wang, Zhijun Wang, David J. Klinke, A Mathematical Model of West Nile Virus, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.

8. Qing Wang, Zhijun Wang, David J. Klinke, oral presentation on "Effects of a Mixed Immuno-chemotherapy of Tumor by Impulsive Control", the 2015 AMMCS-CAIMS Congress, Waterloo, ON, Canada, June 7-12, 2015.


17. Dustin Revell, Adam Parks, and Qing Wang, Mathematically modeling the growth of Escherichia coli K12 throughout GASP phase, the 87th Annual Meeting of the WVAS, West Virginia State University, WV, April 21, 2012.


19. Darryl Johnson, Matthew Alt, Emad khan, and Qing Wang, Fundamental modes of elliptic drumheads in relation to eccentricity, the 87th Annual Meeting of the WVAS, West Virginia State University, WV, April 21, 2012.

20. Matthew Mocniak, Qing Wang, and Zhijun Wang, Genetic algorithm based analysis and numerical study of an SIR model for contagious disease patterns, the 87th Annual Meeting of the WVAS, West Virginia State University, WV, April 21, 2012.


29. Jeremiah Alexander, Osman Guzide and Q. Wang, Fibonacci Numbers, the 83rd Annual Meeting of the West Virginia Academy of Science, Fairmont State University, Fairmont, West Virginia, April 5, 2008.


**Presentations**


3. Qing Wang (presenter), Zhijun Wang, David J. Klinke, oral presentation on “A Calibrated Model for an Immuno-Chemotherapy to Treat Colon Cancer”, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.


5. Qing Wang (presenter), Zhijun Wang, David J. Klinke, oral presentation on “Modeling the efficacy of an immunochemotherapy against colorectal cancer”, Loyola University Chicago, Chicago, IL (Central Fall Sectional Meeting), October 2-4, 2015.

6. Qing Wang (presenter), Zhijun Wang, David J. Klinke, oral presentation on "Effects of a Mixed Immuno-chemotherapy of Tumor by Impulsive Control", the 2015 AMMCS-CAIMS Congress, Waterloo, ON, Canada, June 7-12, 2015.


21. Qing Wang, “Global Exponential Stability of Impulsive BAM Neural Networks with Time-varying Delays”, the 6th International Conference on
Differential Equations and Dynamical Systems, Morgan State University, Baltimore, Maryland, May 24, 2008.


23. Qing Wang, “Exponential Stability of Impulsive Differential Equations with Time Delay and Applications to Neural Networks”, University of Waterloo, Ontario, November 15, 2005;


25. “The Reproductive Ratio of Pandemic H1N1/09 Influenza Virus in Active Duty Military Personnel” (presented by Chase Dowling), the 85th Annual Meeting of the WVAS, West Virginia University, WV, April 10, 2010.

26. “Analysis on SARS Models” (presented by Kristel Chase), the 84th Annual Meeting of the West Virginia Academy of Science, Glenville State College, Glenville, West Virginia, March 28, 2009;

27. “Fibonacci Numbers” (presented by Jeremiah Alexander), the 83rd Annual Meeting of the West Virginia Academy of Science, Fairmont State University, Fairmont, West Virginia, April 5, 2008.

SPONSORED UNDERGRADUATE STUDENT / SUMMER HIGH SCHOOL TEACHER INTERNSHIP RESEARCH PROJECTS


4. Dustin Revell (undergraduate student), research project funded by SOARS Scholarship on “Bacteria Growth Model”, summer 2011.
5. Matthew Mocniak (undergraduate student), research project funded by NASA Space Grant Fellowship on “Genetic Algorithm Based Analysis and Numerical Study of an SIR Model for Contagious Disease Patterns”, November 2011 - May 2012.


11. Logan Lyda, Denise M. Gipson, Megan Behrmann, Brittany Poling, Timothy Hoover, David J. Klinke, Burton Lidgerding, Qing Wang, Two Dimensional Versus Three Dimensional Cell Culture of B16 Melanoma Cells, WV-INBRE Summer Symposium, Huntington, WV, July 29, 2013; and West Virginia Undergraduate Research Day at the Capitol, Charleston, WV, Jan. 30, 2014.


13. Megan Behrmann, Logan Lyda, Brittany Polling, Burton Lidgerding, Denise M. Gipson, Qing Wang, David J. Klinke, Cell Culture of S91 Melanoma Cells in
Three-dimensional Space, the WVAS 2014 Annual Meeting, Shepherdstown, WV, April 12, 2014.


20. Mauro Doza, Hans Vomend, Zhijun Wang, Qing Wang, and David J. Klinke, Immunotherapy strategies of cancer via impulsive control, the WVAS 2015 annual meeting, WLU, West Liberty, WV, April 11, 2015.


22. Zulfiya Muradova, Darryl Johnson, Qing Wang, Zhijun Wang, and David J. Klinke, Analysis of Ebola SIR variant model, the WVAS 2015 annual meeting, WLU, West Liberty, WV, April 11, 2015.


24. Tina Nguyen, Shannon Fenton, Megan Bradfield, Robert Warburton, Qing Wang,
Antibody Epitope Mapping of Murine H-2Kb MHC Molecules as a Means Study the Effects of Mutation on B-Cell Recognition, the WV-INBRE Summer Symposium, Marshall University, WV, July 27, 2015.

25. Jeremiah Miller, Eric Goff, Qing Wang, Zhijun Wang, David J. Klinke, A Mouse Model of Metastatic Liver Cancer Treated by a Combination Therapy, the WV-INBRE Summer Symposium, Marshall University, WV, July 27, 2015.

26. Peter Hopkins, Christian Shimer, Qing Wang, Zhijun Wang, David J. Klinke, Quantifying the Mifepristone Induced Liver-Specific Interleukin 12 Expression, the WV-INBRE Summer Symposium, Marshall University, WV, July 27, 2015.


30. Zulfiya Muradova, Jessica Poffenberger, Zhijun Wang, Qing Wang, David J. Klinke, A Calibrated Model and Analysis for Ebola Outbreaks, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.

31. Jessica Poffenberger, Zulfiya Muradova, Qing Wang, Zhijun Wang, David J. Klinke, A Mathematical Model of West Nile Virus, Fall 2015 MAA MD-DC-VA Sectional meeting, St. Mary's College of Maryland, St. Mary's City, MD, November 6-7, 2015.

SCHOLARSHIPS AND AWARDS

1. Ontario Graduate Scholarship (OGS), University of Waterloo, May 2006 - April 2007;
2. 2006 Chinese Government Award for Outstanding Self-financed Students Abroad, University of Waterloo, April 2007;
3. President’s Graduate Scholarship, University of Waterloo, May 2006 - April 2007;

PROFESSIONAL ACTIVITIES
Textbook Chapters Review:

1. Intro Stats, 3e, by De Veaux/Velleman/Bock, Summer 2009.

Recently reviewed and/or received invitations to review research articles for the following journals:

1. IEEE Transactions on Neural Networks (and Learning Systems)
2. The IMA Journal of Applied Mathematics
3. Journal of the Franklin Institute
4. Computers and Mathematics with Applications
5. Mathematical and Computer Modeling
6. Boundary Value Problems
7. Theory in Biosciences
8. PLOS ONE

Conference Services:

1. Judge for graduate poster session at the 88th Annual Meeting of the WVAS, Canaan Valley Institute, WV, April 6, 2013;
2. Convener and Moderator at the 87th Annual Meeting of the West Virginia Academy of Science, West Virginia State University, Institute, West Virginia, April 21, 2012;
3. Judge and session chair at the 84th Annual Meeting of the West Virginia Academy of Science, Glenville State College, Glenville, West Virginia, March 28, 2009;
4. Judge at the 85th Annual Meeting of the West Virginia Academy of Science, West Virginia University, Morgantown, West Virginia, April 10, 2010;
5. Member in the organizing committee and local arrangement committee at the ECCAD 2008 Conference, Shepherd University, Shepherdstown, West Virginia, May 10, 2008;

PROFESSIONAL SOCIETY MEMBERSHIPS

- West Virginia IDEa Network of Biomedical Research Excellence (WV-INBRE) Steering Committee, 2012-present.
- Mathematical Association of America (MAA), 2008 -2014.
• West Virginia Academy of Science (WVAS), 2008 – present.
• Society for Industrial and Applied Mathematics (SIAM), 2014-present.
Reza Mirdamadi  
Computer Science Mathematics and Engineering (CME) Department  
Shepherd University  
304.876.5368 – Rmirdama@shepherd.edu  

Professional Preparation:  
Pennsylvania State University, University Park, PA Mechanical Engineering - MS 1983  
Pennsylvania State University, University Park, PA Applied Mathematics -MS 1985  
Youngstown State University, Youngstown, OH Mechanical Engineering-BS 1981  

Appointments:  
1988 – Present Shepherd University, Shepherdstown, WV  
• Associate Professor.  
• Department Chair (since 2004) CME department offers 4 B.S. degree programs in Computer Science, Computer Engineering, Computer Information Technology, and Mathematics.  
• Responsible for curriculum development,  
• Evaluation of full time faculty and adjuncts  
• Assessments reports including teaching outcomes for various programs, Office of Teaching and Learning  
• External Program Reviews  
• Undergraduate Research Director (CME Department)  
• Higher Learning Commission – North Central  
• NCATE  
• Retention plans.  
• Working directly with the dean and VPAA’s office on strategic plans, budgets and faculty lines.  
• CME department currently has 11 faculty (tenured and tenured tracks) and 9 adjuncts.  
• Over 200 students in 10 different concentrations within 4 majors.  
• Teaching: Fluid Mechanics, Engineering Thermodynamics, Strength of Materials, Dynamics, Statics, Calculus, Introduction to Engineering and Engineering Computations (C++)  
• Successful articulations with community colleges in MD, VA and WVU  

Publications: Most resent.  
• Zhijun Wang, Reza Mirdamadi, and Qing Wang; Prototyping and Simulation of Robot Group Intelligence using Kohonen Networks  


**Synergistic Activities**

- **PI - Innovative Technology Experiences for Students and Teachers (NSF - ITEST) $929,432.00** – Not funded

- **PI - Improving Undergraduate STEM Education (NSF-IUSE) $246,000** – NOT funded

- **Co-Pi - Research and Teaching Robotics and Artificial Intelligence using NAO Robots – WV EPSCoR - Pending**

- Received a grant in the amount of $199,892 from the West Virginia EPSCoR Research Trust Fund STEM Grants for Colleges and Universities for the funding of the proposal “Undergraduate Research and Experiments in Robotics-based Accomplishments for STEM at Shepherd University.” Co-PI– May 2010

- **Engineering Innovation – John Hopkins University- Whiting School of Engineering**

- Attended CCLI- NSF Workshop on High Altitude Balloon Project; Taylor University, IN – May 2009

- Grant for three solar panels ($4500.00) from BP for solar car project – March 2009.

- Received a grant for $7000.00 from West Virginia Space Grant Consortium WVSGC to conduct research and work on High Altitude Balloon Project. May 2009

- Received a grant for $6000.00 from Shepherd University Foundation to promote STEM through High Altitude Balloon Project. July 2009

- Editor for first Shepherd University Undergraduate Journal. Summer 2009

- NASA Space Consortium (Board Member) – grants for Fellowship that awarded students with the total of $22,000.00 in Scholarships and Fellowship. 2011

- **Research Enhancement Award (REA): Grant $12,000.00 to promote research at School of Natural Science and Mathematics (SNSM). Half of this fund is matched with a budget from the Shepherd University, providing opportunity to develop research support for several of faculty - 2011**

- Higher Education Policy Commission, WV-Initiated Computer Engineering degree program at Shepherd University – Successful implementation in 2008
Higher Education Policy Commission, WV – Initiated Computer Information Technology Degree program at Shepherd University – Successful implementation in 2009

Collaborators & Other Affiliations

Dr. Osman Guzide  Assoc. Prof., Dept. of Computer Sciences, Mathematics, and Engineering - Shepherd University

Dr. Weidong Liao  Assoc. Prof., Dept. of Computer Sciences, Mathematics, and Engineering - Shepherd University

Dr. Nicholas Martin  Assoc. Prof., Dept. of Computer Science, Mathematics and Engineering – Shepherd University

Dr. Qing Wang  Assistant Prof. Dept. of Computer Science, Mathematics and Engineering – Shepherd University

Dr. James O’ Brien  Graduate Advisor, Penn State, Mechanical Engineering

Dr. Allen Krall  Graduate Advisor, Penn State, Mathematics
Sytil Kathleen Murphy

Curriculum Vitae

Contact Information:
55 Tammy Lane
Martinsburg, WV 25405

Shepherd University
P.O. Box 5000
Shepherdstown, WV 25443-5000

Voice: 304-876-5782
Cell: 406-599-5742
Fax: 304-876-5028

smurphy@shepherd.edu

Education:
Bachelor of Arts, Monmouth College, Monmouth IL, 1999
Major: Mathematics
Minors: Physics, Spanish
Summa Cum Laude

Masters of Science in Physics, Montana State University, Bozeman MT, 2001

Doctorate in Physics, Montana State University, Bozeman MT, 2008
Topic: Anti-Stokes Generation in a CW Raman Laser
Advisor: Dr. John Carlsten

Employment History:
2011 –
Assistant Professor of Physics
Shepherd University

2008 – 2011
Post-Doctoral Research Associate
Kansas State University
Physics Education Group
Advisor: Dr. Dean Zollman

1999 – 2008
Physics Graduate Assistant
Montana State University
Advisor: Dr. John Carlsten

Professional Organizations:
2008 – 2015 American Association of Physics Teachers
2014 – 2015 West Virginia Academy of Sciences
2015 – 2016 National Science Teachers Association

Grants:
2016 – funded
West Virginia Space Grant Consortium: Extension and Public Outreach
“Seeding Your Future Initiative”
Role – PI (with Dr. Jordan Mader, Co-PI)
(Total: $23,506 From grant: $2970 Matching: $20,536)
2015 – funded
West Virginia Space Grant Consortium: Extension and Public Outreach
“Seeding Your Future Conference”
Role – PI (with Dr. Jordan Mader, Co-PI)
(Total: $12,875  From grant: $3750  Matching: $9125)

2015 – funded
Women Investing in Shepherd (WISH)
“Seeding Your Future Initiative”
Role – Co-PI (with Dr. Jordan Mader, PI)
(Total: $55,415  From grant: $26,250  Matching: $29,165)

2015 – funded
FRADA FINE
“Seeding Your Future Initiative”
Role – PI (with Dr. Jordan Mader, Co-PI)
(Total: $1000)

2015 – unfunded
West Virginia Space Grant Consortium: Research Enhancement Award
“Physics of Tractor Pulls”
Role – PI
(Total: $3000)

2014 – funded
West Virginia Space Grant Consortium: Extension and Public Outreach
“Seeding Your Future Conference”
Role – PI
(Total: $10,595  From grant: $4,145  Matching: $6450)

2013 – funded
West Virginia Space Grant Consortium: Research Enhancement Award
“Development and Refinement of a Blended Course”
Role – PI
(Total: $2000)

2013 – funded
Shepherd University Faculty Mini-Grant
For: travel to Winter 2014 AAPT meeting
(Total: $500)

2012 – funded
Shepherd University Faculty Mini-Grant
For: travel to Summer 2012 AAPT meeting
(Total: $500)

2012 – unfunded
West Virginia Math and Science Partnership
“Shepherd University Math and Science Project”
Role – PI
(Total: $188,345)

2012 – unfunded
WV EPSCoR Innovation Grant
“Mobile Applied Physics and Environmental Laboratory”
Role – Co-PI
(Total: $75,281 From grant: $40,000 Matching: $35,281)

Teaching Experience:
Fall 2016
PHYS 201: 1st semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs

ENVS 299B: Capstone course for Environmental Science majors
Course instructor
Guided students through the process of writing their capstone paper, poster and talk

Summer 2016
GSCI 320: One semester online course covering topics relating to energy and the environment
Course instructor
Wrote/gave lectures and exams

PHYS 201: 1st semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs

PHYS 202: 2nd semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 202L: 2nd semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs

Spring 2016
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

PHYS 201: 1st semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs

PHYS 222: 2nd semester calculus-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 222L: 2nd semester calculus-based laboratory
Course instructor
Wrote/conducted/graded labs

Fall 2015
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

GSCI 320: One semester online course covering topics relating to
energy and the environment
Course instructor
Wrote/gave lectures and exams

Spring 2015
ENVS 202: 2nd semester environmental science intro. Sequence
Course instructor
Co-wrote/gave lectures and labs, graded labs and exams

PHYS 201: 1st semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs

PHYS 222: 2nd semester calculus-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams
PHYS 222L: 2nd semester calculus-based laboratory
Course instructor
Wrote/conducted/graded labs

Fall 2014
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

ENVS 101: Environmental Studies first year experience
Course instructor
Wrote/gave lectures and assignments

Summer 2014
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

Spring 2014
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

PHYS 222: 2nd semester calculus-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 222L: 2nd semester calculus-based laboratory
Course instructor
Wrote/conducted/graded labs

Fall 2013
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

Summer 2013
GSCI 103: One semester physical science survey course
Course instructor
Wrote/gave lectures, assigned/graded homework and exams,
wrote/conducted/graded labs

Spring 2013
PHYS 202: 2nd semester algebra-based intro. sequence
Course instructor
Wrote/gave lectures, assigned/graded homework and exams

PHYS 202L: 2nd semester algebra-based laboratory
Course instructor
Wrote/conducted/graded labs
Fall 2012  PHYS 201: 1st semester algebra-based intro. sequence  
Course instructor  
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory  
Course instructor  
Wrote/conducted/graded labs

Summer 2012  GSCI 103: One semester physical science survey course  
Course instructor  
Wrote/gave lectures, assigned/graded homework and exams,  
wrote/conducted/graded labs

Spring 2012  PHYS 202: 2nd semester algebra-based intro. sequence  
Course instructor  
Wrote/gave lectures, assigned/graded homework and exams

PHYS 202L: 2nd semester algebra-based laboratory  
Course instructor  
Wrote/conducted/graded labs

Fall 2011  GSCI 103: One semester physical science survey course  
Course instructor  
Wrote/gave lectures, assigned/graded homework and exams,  
wrote/conducted/graded labs

PHYS 201: 1st semester algebra-based intro. sequence  
Course instructor  
Wrote/gave lectures, assigned/graded homework and exams

PHYS 201L: 1st semester algebra-based laboratory  
Course instructor  
Wrote/conducted/graded labs

Prior to Fall 2011, I taught some lecture courses and labs at both Kansas State University and Montana State University.

Student Mentoring:

Summer 2016 – Shepherd Undergraduate Research Student  
Fall 2016 Project investigating the effect of companion planting on  
crop yield and soil

Summer 2016 Shepherd Undergraduate Research Student  
Faculty mentor for a student participating in an external  
internship at Harper’s Ferry National Park investigating  
the health of Ash Trees

Fall 2014 – Shepherd Undergraduate Research Student  
Spring 2015 Project investigating both theoretically and
experimentally the variation in the force of friction due to
the change in the sled’s mass distribution during a tractor
pull

Spring 2013  
Shepherd Undergraduate Research Student  
Project investigating properties of non-Newtonian fluids

Spring 2013  
Shepherd Undergraduate Research Student  
Project investigating the resistivity of sports drinks

Fall 2012 – Spring 2013  
Shepherd Undergraduate Research Student  
Project investigating student opinion of a traditional vs. a free online textbook

Summer 2011  
REU Mentor  
Project was developing a modern version of the apparatus Alexander Graham Bell used in his attempt to find the bullet in President Garfield

Summer 2010  
REU Mentor  
Project was developing a modern version of the apparatus Alexander Graham Bell used in his attempt to find the bullet in President Garfield

2009 - 2011  
Undergraduate Mentor  
Qualitative data analysis, quantitative data acquisition and analysis, video editing

Summer 2003  
MAP/AERO Mentor  
Project was to conduct ringdown analysis of a laser cavity to determine mirror reflectivity

Outreach Activities:

2015 – 2016  
Seeding Your Future Workshop Series  
Series Organizer and Workshop Presenter  
Target audience – high school students

2015  
FIRST Lego League – Project Judge  
One-week teacher in-service instructor for MD elementary school teachers – topic energy

2014 – 2016  
Seeding Your Future Conference  
Conference Organizer and Workshop Presenter  
Target audience – middle school girls

2014  
Presentation at Shepherdstown Middle School

2007 – 2008  
FIRST Tech League
Pit Manager

2006 – 2008 FIRST Lego League
   2006: Teamwork Judge
   2007 – 2008: Pit Manager

2002 – 2006 Peaks and Potentials
   Camp Instructor
   Topics: 2002 – 2003: Optics
           2004: Acoustics
           2005: Airplanes
           2006: Electric Circuits

2002 – 2007 Expanding Your Horizons
   Workshop Instructor
   Topics: 2002 – 2003: Optics
           2004: Acoustics
           2005: Spectral Emission
           2006: Electric Circuits
           2007: Pinhole cameras
           2008: Mission to Mars

1999 – 2007 Montana Science Olympiad
   1999: Event Assistant
   2000 – 2007: Event Captain

Service Activities:

2015 – Shepherd University Core Curriculum Meeting

2014 – Shepherd University Scholarship and Awards Committee

2014 – 2016 Shepherd University Institutional Review Board (Vice-Chair since 2015)

2012 – 2013 Shepherd University Faculty Senate (Secretary)

2012 – Institute of Environmental and Physical Sciences Internship Committee

2013 AAPT Graduate Education Committee Chair

2012 AAPT Graduate Education Committee Vice-Chair

2010 – 2013 AAPT Graduate Education Committee member (3 year term)
       AAPT Philanthropy Committee member (3 year term)

2009 – 2010 Arkansas/Oklahoma/Kansas AAPT division President
Other Activities:

- **2009**
  - NSTA Consulting --
    - Nutrition Sci-Pack
    - Electric and Magnetic Forces Sci-Pack

- **2006 – present**
  - NSTA Wizard/Mentor –
    - Physical Sciences Sci-Packs

- **2006**
  - NSTA Content Editor –
    - Energy Sci-Pack

  Assembled the index for *Physics: A World View*

- **2003**
  - 5th edition – Kirkpatrick and Wheeler
- **2006**
  - 6th edition – Kirkpatrick and Francis
- **2008**
  - 7th edition – Francis and Kirkpatrick

- **2006**
  - Astronomy tutorial improvements with Prof. Shannon Willoughby based on student performance

Awards:

- **2010** AAPT Summer Meeting Apparatus Competition
  - 1st Place and Low Cost Winner
  - “A Lens to Demonstrate Accommodation in the Focusing of the Human Eye”
  - Dyan McBride, Sytil Murphy and Dean Zollman.

- **2009** AAPT Summer Meeting Apparatus Competition
  - Low Cost Winner
  - “Investigating the Effect of the Magnetic Field from a Wire on a Compass.” Sytil Murphy.

- **2008** FIRST Tech Challenge Volunteer Award

- **2007** MSU College of Letters and Science Outstanding Graduate Teaching Assistant

- **2005** MSU Mortar Board Professor of the Month (March)

- **2003** Outstanding Physics Graduate Teaching Assistant

- **1998** Mortar Board Inductee

Publications:

- “Automated analysis of short responses in an interactive synthetic tutoring system for introductory physics”, Christopher M. Nakamura, Sytil K. Murphy, Michael G. Christel, Scott M. Stevens, and Dean A. Zollman, accepted to *Physical Review Special Topics: Physics Education Research*. 


“Pilot Testing of the Pathway Active Learning Environment”, Chris Nakamura, Sytil Murphy, Mike Christel, Scott Stevens, and Dean Zollman, in Physics Education Research Conference (2010).


“Student Understanding of the Correlation between Hands-on Activities and Computer Visualizations of NMR/MRI”, Dyan McBride, Sytil Murphy, and Dean Zollman, in Physics Education Research Conference (2010).

“A Lens for Use in the Ingersoll Eye Model to Demonstrate Accomodation in the Focusing of the Human Eye”, Dyan McBride, Sytil Murphy, and Dean Zollman, in AAPT Summer Meeting Apparatus Competition (2010).


Invited Talks:
“The Seeding Your Future Initiative: STEM Outreach for Grades 5-12.” Sytil Murphy and Jordan Mader, Women and Technology Conference (To be presented: October 2016).
“Seeding Your Future.” Sytil Murphy and Jordan Mader, RESA 8 (November 19, 2015).
“Seeding Your Future.” Sytil Murphy and Jordan Mader, American Association of University Women, Shepherd University Chapter (November 2015).
“Seeding Your Future.” Sytil Murphy and Jordan Mader, Women Investing in Shepherd Site Visit (June 2015).
“Seeding Your Future.” Sytil Murphy and Jordan Mader, American Association of University Women, Shepherd University Chapter (November 2014).
“Development of an MRI activity.” Sytil Murphy, Dyan Jones and Dean Zollman, WP/CP joint section meeting of AAPT (2012).
“Ground-Up Development of Biomedical Labs: Wavefront Aberrometry and PET.” Dyan McBride, Dean Zollman and Sytil Murphy, AAPT Summer Meeting (2010).
“Development and Refinement of Biomedical Labs: MRI and CT.” Sytil Murphy, Dean Zollman and Dyan McBride. AAPT Summer Meeting (2010).
“Pathway – 24/7 Online Pedagogical Assistance for Teachers of Physics.” Dean Zollman, Brian Adrian, **Sytil Murphy**, Scott Stevens and Mick Christel, *AAPT Winter Meeting* (2009). *(given for Dean Zollman)*


“Mode-Locked Stokes and Continuous-Wave Anti-Stokes from a Raman Laser.” **Sytil Murphy** and Yihan Xiong, Montana State University Physics Colloquium (2008).


**Contributed Talks/Posters:**


“Re-envisioning the panel discussion.” **Sytil Murphy** and Jordan Mader, submitted to *AAPT Winter Meeting* (2015).

“Development of a blended physical science course.” **Sytil Murphy**, submitted to *AAPT Winter Meeting* (2014).

“Using Arduino and a microphone to listen for time.” Jeff Groff and **Sytil Murphy**, submitted to *AAPT Winter Meeting* (2014).

“Measuring the impulse of a popper.” **Sytil Murphy** and Jeff Groff, submitted to *AAPT Winter Meeting* (2013).

“Novel (extra credit) project for the physics classroom.” **Sytil Murphy**, submitted to *AAPT Winter Meeting* (2013).

“Investigating the effect of lab section on lecture performance.” **Sytil Murphy**, submitted to *AAPT Summer Meeting* (2012).

“Adapting the AAPT photo contest to the classroom.” **Sytil Murphy**, submitted to *AAPT Summer Meeting* (2012).


“Research Designs to Test and Refine the Pathway Active Learning Environment.” Christopher Nakamura, **Sytil Murphy**, Michael Christel, Scott Stevens, and Dean Zollman, submitted to *AAPT Winter Meeting* (2011).

“Student Perceptions and Use of the Pathway Active Learning Environment.” Christopher Nakamura, **Sytil Murphy**, Michael Christel, Scott Stevens, and Dean Zollman, submitted to *AAPT Winter Meeting* (2011).

“REU Students’ Perceptions of Scientific Ethics.” **Sytil Murphy** and Dean Zollman, submitted to *AAPT Winter Meeting* (2011).

“Physics REU Students’ Understanding of Ethics.” **Sytil Murphy** and Dean Zollman, submitted to *AAPT Winter Meeting* (2011).


“Utility of an Online Synthetic Interview Tutor for Teachers and Students.” Christopher Nakamura, Michael Christel, Scott Stevens, Sytil Murphy and Dean Zollman, *AAPT Summer Meeting* (2010).


“Exploring Students’ Patterns of Reasoning.” Mojgan Matloob Haghanikar, Sytil Murphy, and Dean Zollman, *AAPT Winter Meeting* (2010).

“Assessing the Efficacy of an Online Interactive Tutoring System.” Christopher Nakamura, Sytil Murphy, Nasser Juma, Dean Zollman, and Mike Christel, *AAPT Winter Meeting* (2010).

“Using a Synthetic Tutor to Build and Assess Knowledge.” Christopher Nakamura, Sytil Murphy, Nasser Juma, Dean Zollman and Mike Christel, *AAPT Winter Meeting* (2010).


“Probing Students’ Understanding of Resonance.” Sytil Murphy, Dyan McBride and Joshua Gross, *AOK Section Meeting of AAPT* (2009).

“Exploring Students’ Patterns of Reasoning.” Mojgan Matloob Haghanikar, Sytil Murphy, and Dean Zollman, *AOK Section Meeting of AAPT* (2009).
“Study on How College Science Courses Influence Elementary School Teachers.”
Sytil Murphy, Mojgan Matloob Haghaniakar, and Dean Zollman, *AOK Section Meeting of AAPT* (2009).


“Study on How College Science Courses Influence Elementary School Teachers.”
Sytil Murphy, Mojgan Matloob Haghaniakar and Dean Zollman, *AAPT Summer Meeting* (2009).


“Exploring Students’ Patterns of Reasoning.” Mojgan Matloob Haghaniakar, Sytil Murphy, Dean Zollman, Cynthia Sunal, Dennis Sunal, and Cheryl Mason, *AAPT Summer Meeting* (2009).


“Exploring Students’ Patterns of Reasoning.” Sytil Murphy, Mojgan Matloob-Haghaniakar, and Dean Zollman, *AOK Section Meeting of AAPT* (2008).


Workshops:

“Laboratories with Biomedical Applications.” Nancy Beverly, Dean Zollman, and Sytil Murphy, *AAPT Summer Meeting* (2012).


“Laboratories with Biomedical Applications.” Nancy Beverly, Dean Zollman, and Sytil Murphy, *AAPT Winter Meeting* (2010).
Curriculum Vitae
David Bernard Wing

Education
1984 Ph. D., Columbia University, Department of Human Genetics and Development, New York, NY
Doctoral work completed at The Roche Institute of Molecular Biology, Nutley, NJ
1979 M. Phil., Columbia University, Department of Human Genetics and Development, New York, NY
1977 M. Sci., Columbia University, Department of Human Genetics and Development, New York, NY
1976 B. A., Columbia University, Columbia College, New York, NY

Appointments
2013 – Present: Chair, Department of Biology, Shepherd University, Shepherdstown, WV
2006 Associate Professor, Department of Biology, Shepherd University, Shepherdstown, WV
2002 Assistant Professor, tenured, Department of Biology, Shepherd College, Shepherdstown, WV
1999 Assistant Professor, Department of Biology, Shepherd College, Shepherdstown, WV
1992 Assistant Professor, Department of Biology, New Mexico Tech; Socorro, NM
1989 Visiting Scientist, Department of Molecular Biology, National Institute of Agrobiological Resources; Tsukuba, Japan
1988 Staff Scientist, Department of Genetics, Max-Planck-Institut for Plant Breeding; Cologne, Germany
1983 Postdoctoral Fellow, Advisor: Professor Jeff Schell, Max-Planck-Institut for Plant Breeding; Cologne, Germany

Fellowships and Grants
2012 WV-INBRE Instrumentation Grant
Raising the Quality of Digital Image Acquisition
2011 Instrumentation Grants Program for the Improvement of Undergraduate Science, Technology, Engineering and Mathematics (STEM) Education in West Virginia:
(co-author) Microtitre Plate Reader
2010 West Virginia Experimental Program to Stimulate Competitive Research:
(co-author) Real-TimePCR System
2010 NASA/WV Space Grant Consortium Research Enhancement
Genetic Characterization of a novel Drosophila Melanogaster wing-shape mutation (Student support)
2009 NASA/WV Space Grant Consortium Research Enhancement:
Arabis serotina Karyotyping, Seed Germination, and Genomic DNA Banking (Student support)

2006  NASA/WV Space Grant Consortium Research Enhancement: Detecting Horizontal Gene Transfer from Transgenic Plants to Soil Microbes

2004  NASA/WV Space Grant Consortium Research Enhancement: DNA Polymorphism Analysis of Endangered Arabis serotina

2003  West Virginia Nongame Wildlife and Natural Heritage Research Award: Preservation and DNA Polymorphism Analysis of Endangered Arabis serotina

2002  Conard Fund Summer Research Stipend

2001  West Virginia Experimental Program to Stimulate Competitive Research: Applications of Efficient Methodologies for Laboratory Programs in Genomics, Bioinformatics, and Combinatorial Chemistry at Shepherd College

2001  Shepherd College Professional Development Summer Fellowship

2000  NASA/WV Space Grant Consortium Research Enhancement: Establishment of a True-Breeding Arabidopsis thaliana Mutant Hypersensitive to Copper

1999  West Virginia Experimental Program to Stimulate Competitive Research: Planned and Potential Use of a Plant Growth Chamber

1997  Alliance for Minority Participation: Broadening the Application of Phytoremediation through Plant Genetic Engineering

1997  Tri-Beta Undergraduate Research Scholarship: Heavy-metal Uptake Using Saltcedar

1994 + 1995  Coalition to Increase Minority Degrees: Screening for Arabidopsis thaliana mutants sensitive to or tolerant of high copper concentrations

1993  New Mexico Mining and Mineral Resources Research Institute: Genetic Identification of Heavy-metal Tolerance in Arabidopsis thaliana

1989 - 1991  NSF (USA) - Science and Technology Agency (Japan): Long-term Fellowship for United States Researchers

1983 - 1986  Max-Planck Society Postdoctoral Fellowship

1978 - 1983  Roche Institute of Molecular Biology Predoctoral Fellowship

1977 - 1978  NIH Predoctoral Training Fellowship

Publications


**Published Abstracts**


Courses Taught

General Biology (majors and non-majors), Botany, Cell Biology, Genetics, Molecular Techniques, Virology, Advanced Genetics, Molecular Biology, and Evolution
Ralph L. Wojtowicz, Ph.D.
Shepherd University
P.O. Box 5000
Shepherdstown, WV 25443
Phone: (304) 876-5783 Fax: (304) 867-5028
rwojtowi@shepherd.edu
www.adjoint-functors.net/su/web

Education:

• Doctor of Philosophy in Mathematics. University of Illinois at Urbana-Champaign. 2002
• Master of Science in Aeronautical Engineering. University of Illinois. 1992
• Bachelor of Science in Aeronautical Engineering. Rensselaer Polytechnic Institute. 1988
• Bachelor of Science in Mathematics. Rensselaer Polytechnic Institute. 1988

Employment:

• Associate Professor. Shepherd University. Department of Computer Sciences, Mathematics and Engineering. 2015–present
• Assistant Professor. Shepherd University. Department of Computer Sciences, Mathematics and Engineering. 2011–2015
• President, Senior Scientist. Baker Mountain Research Corporation. Yellow Spring, West Virginia. 2011–present
• Assistant Professor. University of Dallas. Department of Mathematics and Computer Science. 2001–2004
• Visiting Assistant Professor. Rose-Hulman Institute of Technology. Department of Mathematics. 1999–2001

Select Project Experience:

• Consultant: Financial analysis for Flexible Plan Investments, Ltd. 2014–present
  – Developed statistical learning and analysis software in R, Python and C
  – Researched and developed statistical algorithms for modeling financial markets
  – Tested and compared active trading strategies
• Consultant: Senior Hadoop Analyst. PNC Bank. May – October 2015
  – Developed and demonstrated financial models in Python and Spark
  – Involved in strategic planning of corporate-level big data infrastructure
• Principal Investigator: Undergraduate Course in Big Data Analytics. West Virginia NASA Space Grant Consortium ($5000 grant). 2015
– Conducted basic research in big data technologies
– Prepared and delivered technical talk at annual NASA IV&V workshop
– Implemented prototype software in Java using Apache Hadoop and Mahout

• Principal Investigator: Hadoop Cluster for Integrating Big Data Concepts and Methods into the Curriculum and Research at Shepherd University ($19K grant). 2012–2013
  – Developed hardware specifications for Hadoop cluster and purchased equipment
  – Installed all computer and networking hardware, all operating systems and software
  – Designed and implemented local area network
  – Developed and implemented demonstrations, course and research material involving Apache Hadoop, Mahout, Accumulo and Lucene/Solr
  – Served as system administrator for 20+ machine linux/unix Shepherd University Laboratory for Big Data Analytics

  – Implemented quantum algorithms in Haskell and Java
  – Managed all technical and financial aspects of project
  – Conducted basic and applied research involving algorithms for quantum computers
  – Created presentation material and delivered presentations to a government client
  – Reviewed government contract and wrote subcontract for an academic co-investigator

• Principal Investigator: Logic-Based Methods for Assurance of Complex System Performance. West Virginia NASA Space Grant Consortium ($2500 grant). 2012
  – Conducted basic research in the independent verification and validation domain (IV&V)
  – Prepared and delivered technical talk at annual NASA IV&V workshop
  – Implemented software in Java

• Consultant (with faculty from Rensselaer Polytechnic Institute and the University of Illinois at Urbana-Champaign): Great Computational Intelligence. Air Force Office of Scientific Research ($600K grant). 2011–2014
  – Conducted basic and applied research in artificial intelligence
  – Developed novel semantic technologies to support visualization and analysis of multi-sorted, linked data
  – Developed demonstrations in Java involving Jenna, Protégé, and Apache Accumulo
  – Gave research presentations at conferences including Turing Centenary Conference in Cambridge, UK
  – Wrote research articles and developed presentation material for a government client

  – Managed all technical and financial aspects of project
  – Conducted basic and applied research involving algorithms for quantum computers
  – Developed software applications Java and Haskell
  – Created presentation material and delivered presentations to a government client
  – Reviewed government contract and wrote subcontract for an academic co-investigator
  – Developed analysis and simulation software in Matlab and Java
  – Analyzed sensor data from defense systems

  – Researched statistical anomaly detection techniques for applications to client systems

  – Responsible for data collection data and integration
  – Designed, developed and implemented network analysis application in Java
  – Utilized semantic web tools developed by the government and other contractors
  – Wrote monthly technical and financial reports to a government client
  – Demonstrated software system in a live Marine Corps exercise

• Analyst. Trade-Net Integration into Global Trader. Office of Naval Intelligence ($1.9M contract). 2009–2010
  – Responsible for development of methods, algorithms and Java tools to support analysis and visualization of decades of cargo shipping transaction data from large Oracle database
  – Wrote user guides, research articles, technical reports and requirements documents

  – Responsible for all technical and financial aspects of the project
  – Conducted basic research in automated uncertainty management
  – Developed and implemented mathematical algorithms in Java
  – Prepared and delivered presentations to government program officers

  – Developed and implemented algorithms in Java for integration into defense systems
  – Managed all technical and financial aspects of the project
  – Wrote monthly technical and financial reports and annual reports
  – Prepared and delivered presentations to government program managers

  – Collected system performance metrics from multiple government and industry sources
  – Developed simulation software in Matlab and Java
  – Conducted numerical experiments over ranges of parameter values
  – Made recommendations for government investment in future technologies

  – Researched and implemented computational geometry methods in Java and Matlab for applications to group localization in which some nodes lack GPS capabilities
Select Publications:


Select Awards:

- Outstanding Faculty Award. Shepherd University. Nominated 2014
- Entrepreneur Award. CreateWV “Pitch Your Idea” contest. Charleston, WV. 2012
- Merit Award in recognition of exceptional professional development achievement. Shepherd University. 2012–2014
- University of Illinois College of Liberal Arts and Sciences Luckman Award for Excellence in Undergraduate Education. Nominated 1996
• University of Illinois Department of Mathematics Graduate Teaching Award. 1996
• National Science Foundation Graduate Fellowship. 1988–1992
• Outstanding Senior Award. Presented annually to the six outstanding students in the United States for exceptional academic achievement and participation in extracurricular activities by Sigma Gamma Tau, the national honor society for aerospace engineering. 1988
• Ricketts Prize. Presented by Rensselaer Polytechnic Institute in recognition of outstanding achievement. 1988

Software Development Experience:
• Primary programming languages: Java, Python, R and Haskell
• Experience with: C/C++, Android, Hadoop/MapReduce/Spark, Processing, OpenGL, Lisp, MatLab, ML, Maple, PostScript, SQL (Oracle and PostgreSQL), Mathematica and Maxima
• Data analysis tools: Hadoop cluster implementation and management, MapReduce algorithm development and implementation, database management (Oracle, PostgreSQL) and design
• Knowledge of XML, RDF, OWL, Jenna, Protégé and semantic web technologies
• Operating environments: Linux, Unix, MacOSX, and Windows
• Other tools include: Version control (Subversion and CVS), emacs, vi and Eclipse

Select Presentations:
• Big Data and Cybersecurity Workshop. Morgantown, WV. December 2015
• NSF/NAVSEA Big Data and Cybersecurity Summit. Rocket City, WV. September 2015
• Computational Category Theory Workshop. National Institute of Standards and Technology. Gaithersburg, MD. September 2015
• Innovation and Entrepreneurship Day at the State Capitol. February 2015
• West Virginia Higher Education Technology Conference. October 2014
• CreateWV Big Data panel session organizer and speaker. October 2014
• NASA IV&V Workshop. Fairmont, WV. September 2014
• Office of Naval Research Focus Area Forum: Data Science for Decision-Making. June 2014
• Rensselaer Polytechnic Institute Cognitive Sciences Colloquium. May 2014
• 8th International Conference on Semantic Technologies for Intelligence, Defense and Security. George Mason University. November 2013
• NASA IV&V Workshop. Morgantown, WV. September 2012
• IARPA Quantum Computer Science PI Meeting. Princeton, NJ. July 2012
• Turing Centenary Conference. Cambridge University. Cambridge, UK. June 2012
• IEEE 12th International Conference on Information Fusion. Seattle, WA. July 2009
• Air Force Institute of Technology Mathematics Colloquium. Dayton, OH December 2009
• Rose-Hulman Institute of Technology Mathematics Colloquium. October 2009
• Sixth International Conference on Computing Anticipatory Systems. Liège, Belgium. 2003
• Central Texas Algebra Conference. Baylor University. 2003
• AMS Special Session on Discrete Dynamics and Difference Equations. Joint Mathematics Meetings. Baltimore, MD. 2003
Business Conferences and Workshops Attended:

- Applications of R in Finance. University of Illinois at Chicago. May 2014
- Telework West Virginia Conference. Charleston, WV. May 2013
- Biometrics Identification Intelligence Strategic Planning Workshop. Bridgeport, WV. May 2013
- I-79 Technology Corridor Biometrics Workshop. Fairmont, WV. January 2013
- Create WV Conference. Charleston, WV. October 2012
- RESA 8 STEM Workshop. Martinsburg, WV. October 2012
- Appalachian Regional Commission Workshop. Charleston, WV. October 2011
- West Virginia Teaming to Win. 2011–2012, 2014
- Shepherd University Grant Workshop. January 2011
- NDIA Business Development Workshop. 2007
- Small Business Administration: Beyond Phase II Business Development Workshop. 2006

Other Experience:

- Contract and grant management
- Non-profit 501(c)3 management
- Shepherd University micro-satellite student project manager. 2013–present
- Shepherd University Department of Computer Sciences, Mathematics and Engineering hiring committee. 2012–2014
- Shepherd University Department of Psychology hiring committee. 2012–2013
- Extensive proposal writing and marketing experience with diverse clients
- Technical report writing in L\TeX

Select Courses Taught:

- Mathematical Modeling (Fall 2015). Course text: *Introduction to Statistical Learning* by James, Witten, Hastie and Tibshirani
- Mathematical Modeling (Fall 2013, 2014). Course text: *Conceptual Mathematics* by Lawvere and Schanuel
- Probability and Statistics (Fall 2011). Course text: *Probability and Statistics* by DeGroot and supplemental material that I prepared covering the Kalman filter
• Introduction to Statistics. (Fall 2011, Spring 2012, Fall 2014, Spring 2015, Fall 2015, Spring 2016). Course text: *Statistics* by Freedman, Pisani and Purves
• Linear Algebra. (Fall 2014, 2015). Course text: *Linear Algebra Done Right* by Axler
• Mathematical Analysis I–II
• Introduction to Applied Mathematics I–II
• Introduction to Differential Equations
• Calculus I–III
• Pre-calculus

**Online Coursework:**

• Electronic Interfaces. edX. 2016
• Mining Massive Datasets. Completion. Coursera. 2014
• Introduction to Data Science. Completion with Distinction. Coursera. 2013

**Citizenship:** USA
CURRICULUM VITAE – ZHIJUN WANG

Education and Training

- Microsoft Certified Professional Developer, Microsoft Corporation, 2010
- Microsoft Certified Technology Specialist, Microsoft Corporation, 2009
- PhD in Computer Science, Outstanding Graduate Award, University of Alabama, Tuscaloosa, AL, 2005
- Oracle Certified Professional, Oracle Corporation, 2000
- MS in Physics, Yale University, New Haven, CT, 1998
- MS in Material Science, Peking University, Beijing, China, 1997
- BS in Applied Physics, Tianjin University, Tianjin, China, 1993

Employment and Research Experience

- 2012 – Present  Associate Professor of Computer Science, Shepherd University, WV
- 2006 – 2012  Visiting/Assistant Professor of Computer Science, Shepherd University, WV
- May-August 2008  Microsoft .Net Developer, 123Print.com, Frederick, MD
- 2005 – 2006  Visiting Assistant Professor of Computer Science and Physics, Millikin University, Decatur, IL
- 2001 – 2005  Research & Teaching Assistant in Computer Science, University of Alabama, Tuscaloosa, AL
- 1997 – 1999  Research and Teaching Assistant in Physics, Yale University, New Haven, CT
- 1993 – 1997  Material Science Lab Engineer, Peking University, Beijing, PR China

Grants and Research Support


Selected Publications and Presentations