Board of Governors, State University System of Florida

Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

University of West Florida	Fall 2019
University Submitting Proposal	**Proposed Implementation Term**

Hal Marcus College of Science and Engineering	Computer Science
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**

Cybersecurity	Master of Science in Cybersecurity
Academic Specialty or Field	**Complete Name of Degree**

11.1003
Proposed CIP Code

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees	**President**	**Date**

Signature of Chair, Board of Trustees	**Date**	**Vice President for Academic Affairs**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	30	16.5	$9,307	$153,571	0	0	$153,571
Year 2	60	33.0					
Year 3	90	49.5					
Year 4	110	60.5					
Year 5	120	66.0	$3,078	$203,155	0	0	$203,155

Note: This outline and the questions pertaining to each section underline must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

INTRODUCTION

    I.   **Program Description and Relationship to System-Level Goals**

        A. **Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.**

(a)   Masters

(b)   Cybersecurity

(c)   30 Semester Credit Hours

(d)   The University of West Florida (UWF) seeks to offer a Master of Science (M.S.) in Cybersecurity degree program consisting of 30 semester credit hours (SCH) beyond the bachelor's degree. The program will be housed in the Department of Computer Science in the UWF Hal Marcus College of Science and Engineering and will be delivered in a fully online format. The M.S. in Cybersecurity degree program will result by separating the current Cybersecurity specialization from the Masters of Science in Information Technology (M.S. in IT) in CIP Code 11.0103 and turning it into a stand-alone degree program in CIP Code 11.1003. The proposed stand-alone M.S. in Cybersecurity degree program has no formal tracks or options, but students will be able to tailor their work toward software development or systems administration with elective courses.

Students graduating from the M.S. in Cybersecurity degree program will have employment opportunities in securing computer systems and networks and building secure applications. There is a high demand by the public and private sector for people with cybersecurity skills. Nationwide, universities are not producing enough graduates to meet the current needs.

The Florida Board of Governors has recognized the need to expand cybersecurity education and research within the state. In 2013, the Board of Governors established the Florida Center for Cybersecurity for State University System (SUS) institutions to collaborate on cybersecurity related initiatives. UWF is an active member of Florida's Cybersecurity Center and has engaged with other SUS institutions on research collaborations and educational programs. In 2016, UWF was designated as a National Center of Academic Excellence in Cyber Defense Education by the National Security Agency and the Department of Homeland Security.

The proposed M.S. in Cybersecurity degree program fits within the Board of Governor's vision for Florida to become a leader in cybersecurity education and research. Opportunities for employment and demand for graduates are discussed in the need and demand sections (II.A and II.B) of this request.

        B. **Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide**

a brief narrative explaining how each of these concerns has been or is being addressed.

During the September 28, 2018, CAVP conference call, no concerns were raised by the review group.

C. **If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.**

Not applicable; this is a not a doctoral degree program.

D. **Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).**

Increase the Number of Degrees Awarded in STEM and Other Areas of Strategic Emphasis

UWF's proposed M.S. in Cybersecurity degree program will contain a heavy emphasis on foundational knowledge in computing and software development as well as skills and abilities for cybersecurity, all STEM topics. It draws distinctions to existing programs at other SUS institutions by 1) offering courses that strengthen computing and software development skills in the program and 2) offering foundational coursework for students entering the program with a degree other than computer science or computer engineering. This approach will attract a wider range of students and provide professionals an opportunity to shift their career into a cybersecurity-related field.

Increase Community and Business Workforce

The Florida Board of Governors has recognized the need to expand cybersecurity education and research within the state. Strengthening cybersecurity capability benefits the community as well as business and governmental organizations. UWF is an active member of Florida's Cybersecurity Center and has engaged with other SUS institutions on research and educational collaborations. The proposed M.S. in Cybersecurity degree program will increase the number of individuals who are prepared to enhance the state's community and business workforce in this vitally important area.

E. **If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.**

The Programs of Strategic Emphasis Categories:
1. Critical Workforce:
    - Education
    - Health
    - Gap Analysis
2. Economic Development:
    - Global Competitiveness
3. Science, Technology, Engineering, and Math (STEM)

3

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal.

The proposed program fits in the current Programs of Strategic Emphasis category Science, Technology, Engineering, and Math (STEM). Within that category, CIP code 11 [Board of Governors 2012 – 2025 Strategic Plan] as follows:

11 Computer and Information Sciences and Support Services (all)

The proposed M.S. in Cybersecurity degree program's CIP code is 11.1003, Computer and Information Systems Security/Information Assurance. According to the President's Council of Advisors on Science and Technology, if the country is to retain its historical preeminence in science and technology, economic projections point to a need for approximately one million more STEM professionals than the U.S. will produce at the current rate over the next decade. (Bureau of Labor Statistics, Monthly Labor Review, May 2015. Online, available at: http://www.bls.gov/opub/mlr/2015/article/stem-crisis-or-stem-surplus-yes-and-yes.htm). Section II. A. of this proposal demonstrates need and demand for cybersecurity education.

This program clearly fits in the STEM category, as it will have strong computer science, engineering, and information technology components. With the critical importance attached to the protection of our nation's information technology assets, graduates will be well positioned to contribute to the security and global competitiveness of U.S. companies. While projected demand varies somewhat among various subfields of STEM, growth in demand for cybersecurity specialists is projected to be significant.

> **F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.**

The M.S. in Cybersecurity degree program will be housed in the Department of Computer Science in the Hal Marcus College of Science and Engineering on the UWF Pensacola campus and will be delivered in a 100% online format. It will utilize the University of West Florida's technical capabilities including Canvas Learning Management System, WebEX, and Panopto.

<u>INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY</u>

  II.   **Need and Demand**

> A. **Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.**

National

According to the U.S. Bureau of Labor Statistics, career opportunities for graduates with a master's degree in cybersecurity are projected to grow over the next ten years. The growth is projected to come from government and industries that require cybersecurity specialists due to the barrage of cybersecurity attacks on corporate and public systems and networks. The two most

closely aligned Standard Occupational Classification (SOC) Codes for cybersecurity are Computer and Information Research Scientists 15-1111 and Information Security Analyst, 15-1122.

Table 1, below, demonstrates that over the next ten years, the U.S. Bureau of Labor Statistics projects job growth for Computer and Information Research Scientists and Information Security Analysts to grow at a rate higher than the rate for other computer occupations of 13% and significantly more than the anticipated growth rate for all occupations (7%). Nationally, Computer and Information Research Scientists garner a median annual salary of $114,520 and Information Security Analysts earn a median annual salary of $95,510. These wages exceed the median annual salary for all computer occupations of $84,580 and significantly outpace the median wage for all occupations of $37,690.

Table 1. *U.S. Job Projections for Computer and Information Research Scientists and Information Security Analysts.*

National Job Projections for M.S. Cybersecurity Graduates						
Job Title	SOC Code	Employment		Change 2016-2026		Median Salary
		2016	2026	Percent	Numeric	2017
Computer and Information Research Scientists	15-1111	27,900	33,200	19%	5,400	$114,520
Information Security Analysts Scientists	15-1122	100,000	128,500	28.0%	28,500	$95,510

Source: Occupational Outlook Handbook, Bureau of Labor Statistics https://www.bls.gov/ooh/

Table 2 shows the top industries in which graduates of UWF's M.S. in Cybersecurity can find employment.

Table 2. *Top U.S. Job Types and Salaries for Computer and Information Research Scientists and Information Security Analysts.*

Job Titles	Top Employment Industries	2017 Median Wages
Computer and Information Research Scientists	Research and development in the physical, engineering, and life sciences	$125,420
	Computer systems design and related services	$114,790
	Federal government, excluding postal service	$108,270
	Colleges, universities, and professional schools; state, local, and private	$77,240
Information Security Analysts	Computer systems design and related services	$98,100
	Finance and insurance	$97,680
	Administrative and support services	$91,510
	Management of companies and enterprises	$90,940

Source: Occupational Outlook Handbook, Bureau of Labor Statistics https://www.bls.gov/ooh/

State

The State of Florida is projecting a growth rate of 20% over the same time period in career opportunities that require an advanced degree in a computer and information science including cybersecurity. The high growth rate of job opportunities has created shortages in skilled candidates and higher education has been unable to produce enough graduates to meet the workforce demand. The shortage of qualified cybersecurity practitioners threatens to put Florida's cyber infrastructure at risk.

The U.S. Bureau of Labor Statistics names Florida as one of the five states with the highest employment level for Information Security Analysts (SOC Code 15-1122) with 5,240 people employed in 2017 at an annual mean wage of $86,630. (https://www.bls.gov/oes/current/oes151122.htm#st)

The Florida Department of Economic Opportunity lists the field as number 27 out of the 100 fastest growing occupations in the state. (http://www.floridajobs.org/labor-market-information/data-center/statistical-programs/employment-projections)

Table 3 below demonstrates Florida's strong demand for Computer and Information Research Scientists and Information Security Analysts will continue for the next ten years. Graduates of UWF's M.S. in Cybersecurity degree program will find employment in a high paying, high-growth occupation, benefiting the state and its industries.

Table 3. *Florida Job projections for Computer and Information Research Scientists and Information Security Analysts.*

Florida Job Projections for M.S. Cybersecurity Graduates						
Job Title	SOC Code	Employment		Change 2017-2025		2017 Median Hourly Wage
		2017	2025	Percent	Numeric	
Computer and Information Research Scientists	15-1111	539	576	6.9%	37	$45.61
Information Security Analysts	15-1122	4,910	5,987	20%	998	$39.73

Source: www.floridajobs.org

Local

Northwest Florida is home to numerous military bases and contractors as well as a variety of companies and government agencies with high-tech needs. Hospitals and financial institutions face increasing demand for cybersecurity professionals to protect their data. Students who graduate from UWF with an M.S. in Cybersecurity will be able to contribute to the needs of those employers and provide a positive impact on the local economy.

The Department of Homeland Security and large defense contractors including Northrop Grumman, Raytheon, and Lockheed Martin have recently expanded their cybersecurity operations in the region. Northwest Florida's military installations house Department of Defense cybersecurity commands such as:
- Center for Information Dominance (NAS Pensacola)
- Navy Information Operations Command (NAS Pensacola)
- 96th Cyberspace Test Group (Eglin AFB)
- 47th Cyberspace Test Squadron (Eglin AFB)

Impetus for the creation of this degree comes from the following:
- rapid enrollment growth of the undergraduate degree program in cybersecurity;
- student demand for graduate degrees in the field;
- input from the Computer Science Industrial Advisory Board; and
- top-level UWF administration who perceive the opportunity to fill a critical local; regional and statewide need.

> **B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.**

The Department Chair anticipates a Year 1 student headcount of 30 students with an FTE of 16.5. The proposed M.S. in Cybersecurity degree program is currently a specialization in UWF's M.S. in IT degree program with a current enrollment of 30 students. Enrollment projections are based on current enrollment in the master's level specialization, enrollment growth in the undergraduate program, as well as demonstrated external need and demand for graduates in this high-paying, high-demand field.

Figure 1 below demonstrates the growth in UWF's undergraduate Cybersecurity specialization to the inception of the stand-alone B.S. in Cybersecurity degree program in 2018.
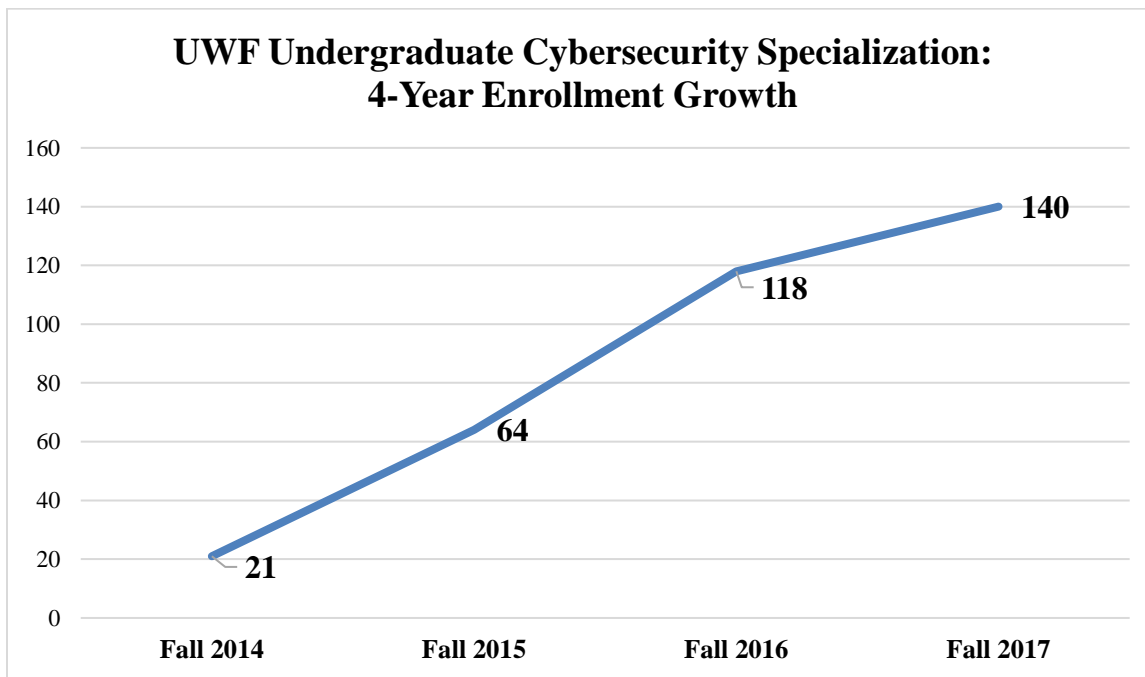

Figure 1. *Four-year enrollment Growth in UWF's undergraduate program in Cybersecurity.*

Overall cybersecurity graduate degree programs in the SUS have experienced enrollment growth as reflected in Table 4 below. The addition of the stand-alone M.S. degree program in Cybersecurity at UWF will support growth in the field.

Table 4. *Other Cybersecurity Degree Programs in Florida.*

Institution	CIP Code	Public/ Private	Enrollment fall 2017	Degree Name
University of South Florida	43.0303	public – SUS	245	M.S. Cybersecurity
Florida State University	43.0116	public – SUS	4	M.S. Cyber/Computer Forensics and Counterterrorism
Florida International University	11.1003	public – SUS	61	M.S. Cybersecurity

> **C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.**

The SUS currently offers three other master's degree programs using the term "cybersecurity" in their program name.

USF and FSU have cybersecurity programs in CIP Code 43 which is defined by IPEDS as "Instructional programs that focus on the principles and procedures for providing homeland security, police, fire, and other safety services and managing penal institutions." (https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88540) The University of Florida's Florida Institute for Cybersecurity Research offers a 12 SCH master's level certificate program in Information Security. (https://fics.institute.ufl.edu/cybersecurity-certificates-programs/) None of these programs are substantially similar to UWF's proposed M.S. in Cybersecurity degree program.

FIU offers a master's degree program in CIP Code 11.1003, which is more closely related to the proposed UWF M.S. in Cybersecurity. The FIU program has a very broad focus including security for physical systems. UWF's M.S. in Cybersecurity degree program in CIP Code 11.1003 contains a heavy emphasis on foundational knowledge in computing and software development as well as skills and abilities for cybersecurity. It draws distinctions to the existing programs in the SUS by 1) offering courses that strengthen computing and software development skills in the program and 2) offering foundational coursework for students entering the program with a degree other than computer science or computer engineering to offer a wider range of students and professionals an opportunity to engage in a cyber-related education.

As was demonstrated in Section II. A. there is increasing demand for graduates with degrees in Cybersecurity, nationally, statewide, and locally, necessitating the development of more programs in the field. Dr. Sudeep Sarkar, Professor and Chair of Computer Science and Engineering at USF, wrote a letter of support stating that the proposed program, "Will offer a

diversity of options to Florida students in the field of Cybersecurity, which is in high demand among employers. There are plenty of open Cybersecurity jobs in the state and there is severe shortage of high-tech workers in the field."

Please see Appendix F for the full text of Dr. Sarkar's endorsement.

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

Enrollment numbers for the M.S. in Cybersecurity degree program were derived using data from the existing enrollment in the M.S. in IT Cybersecurity specialization as well as enrollment data for the new B.S. in Cybersecurity degree program that began fall 2018. As is shown in Appendix A Table 1, the Hal Marcus College of Science and Engineering expects the new stand-alone degree program to begin with 30 students (16.5 FTE) in fall 2019. Student enrollment for Year 5 is anticipated to reach 120 (66 FTE) and remain consistent at that number.

E&G cost per FTE for Year 1 is $9,307. The Year 1 FTE cost is below the SUS average of $10,793 for CIP Code 11. Year 5 E&G cost per FTE will decrease to $3,078 as enrollment increases over time.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

Regarding UWF's proposed M.S. in Cybersecurity degree program, no comments were expressed concerning impact on programs at FAMU or FIU during the September 28, 2018, Council of Academic Vice Presidents (CAVP) Program Coordination Work Group conference call.

Consistent with its mission, UWF has admissions policies that balance attention to access, inclusiveness, and quality. In addition, UWF encourages applications from qualified persons and does not discriminate on the basis of age, color, disability, gender (including gender identity and sex), marital status, national origin, race, religion, sexual orientation, or veteran status. Also, UWF's New Academic Program Approval Policy requires that programs appropriately address diversity. Therefore, the university and its degree programs take proactive measures to achieve a diverse student body.

To ensure the desired outcome for student diversity, recruiting efforts initially focus on the university's eight-county service area: Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Washington, Bay, and Gulf. Recruitment efforts also extend to other geographic regions having larger underrepresented populations of prospective students.

Program faculty and staff will use multiple outreach methods to seek diversity in the program. The Hal Marcus College of Science and Engineering will promote the proposed M.S. in Cybersecurity degree program to the aforementioned student segments.

The university currently attracts a diverse student body; all efforts will be made to ensure that the M.S. in Cybersecurity degree program will reflect institutional diversity (Figure 2).
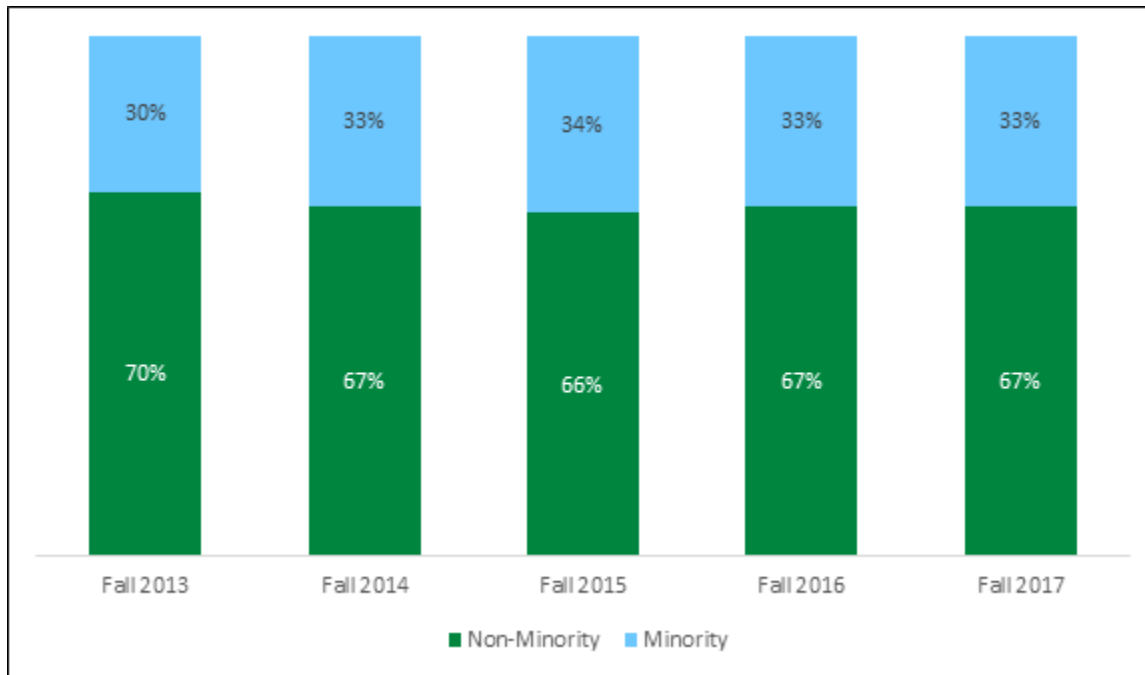

Figure 2. *Five-year comparison of Hal Marcus College of Science and Engineering's diversity.*

III.   Budget

A. **Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)**

The proposed M.S. in Cybersecurity degree program is currently being offered as a specialization in the Department of Computer Science M.S. in IT degree program. As such, faculty and resources are in place and will be reallocated to the new stand-alone degree program. The Provost has approved one additional non-tenure earning full-time faculty line to begin in Year 1 (fall 2019). The new lecturer will teach three classes per year in the master's degree program or 37.5% of a .75 FTE. The Year 1 program E&G Cost per FTE is $9,307, which is less than the SUS E&G Cost per FTE of $10,793 for CIP Code 11.

Total Year 1 costs are $153,571. $111,011 is reallocated funds from the existing specialization and $42,560 is new E&G funding for salary and fringe for the new faculty hire. The following is a breakdown of the projected Year 1 costs as shown in Appendix A Table 2, all from E&G funds:

- Current full-time faculty salaries and fringe apportioned to the stand-alone degree program at $88,293
- $42,560 for new faculty hire (lecturer)
- 5% of the Department Administrator salary and fringe at $2,800
- Adjunct expense of $6,000
- Graduate assistantships and grants $13,120
- There will be no additional library expenses for the program as the department will use the materials already in place for the B.S in Cybersecurity and M.S. in Computer Science degree programs as well as other technical programs at the university
- 5% of the department office supply and sundry expenses at $798

Total Year 5 costs equal $203,155. The following is a breakdown of the projected Year 5 costs as shown in Appendix A Table 2 all continuing base E&G funds:

- Full-time faculty salaries and fringe increased at five per cent per annum at a total of $159,052
- 5% of the Department Administrator salary and fringe increased at five percent per annum at $3,403
- Adjunct expense of $7,000
- Graduate assistantships and grants should increase to $32,800
- 5% of the department office supply and sundry expenses at $900

    B. **Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.**

UWF does not intend to operate the program through continuing education on a cost-recovery basis, seek approval for market tuition rate, or establish differentiated graduate-level tuition. The M.S. in Cybersecurity program will be offered as a regular program through UWF's Department of Computer Science.

    C. **If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).**

The Cybersecurity specialization within the M.S. in IT program has been growing at a rate of 10% per year since its inception in the fall of 2016. As the proposed program represents a reorganization of an existing specialization, significant resources are already in place. Due to projections for continued rapid growth of the program, additional resources including a new hire faculty member, have been approved.

Enrollment in the stand-alone M.S. in Cybersecurity degree program will continue to increase as demands for graduates from cybersecurity programs are growing regionally and nationally. The increase in enrollment will positively contribute to enrollment growth in other departments at UWF including the Department of Electrical and Computer Engineering and the Department of Management and Management Information Systems.

The new M.S. in Cybersecurity degree program will offer courses in systems and network security that may become electives in closely related graduate programs in Computer Science and Engineering (proposed to start in the fall of 2019) and a future revised M.S. in IT degree program. Giving students from related programs the option to choose electives in cybersecurity, a highly sought after discipline, adds a new marketable edge to these programs and allows UWF to attract and retain students.

  D. **Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).**

Since it is a graduate level program, implementation of the M.S. in Cybersecurity degree program will have no impacts on general education or common prerequisite courses. It will have no impacts on departments outside Computer Science with the exception of the shift of M.S. in IT program students from the IT department to the Computer Science Department.

  E. **Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.**

The Department of Computer Science in which the M.S. in Cybersecurity will be housed has well-established relationships with local industries and employers who hire UWF graduates. These employers include the Institute for Human and Machine Cognition, Navy Federal Credit Union, Raytheon, and Northrop Grumman.

Additionally, the Department of Computer Science has an Industrial Advisory Board comprised of local and national cybersecurity experts who will be able to provide insight about potential resources to support the proposed program. For more information about the board, refer to Section VIII. F. Table 5, below provides the names of individuals outside of the institution on the Industrial Advisory Board.

Table 5. *Members of the UWF Department of Computer Science Industrial Advisory Board*

Name	Organization
Mr. Brian Clarke	Silver Bullet Pensacola, Florida
Ms. Terry Enos	Navy Federal Credit Union Pensacola, Florida

Dr. Alessandro Morelli	Institute for Human and Machine Cognition Pensacola, Florida
Mr. John Corliss	Department of Homeland Security Washington, D.C.
Mr. Heath Gardner	Jetpay Pensacola, Florida
Mr. Jesse Sweetland	AppRiver Gulf Breeze, Florida
Mr. Patrick Rooney	Coastal Services Pensacola, Florida

IV.   Projected Benefit of the Program to the University, Local Community, and State

> **Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.**

The field of cybersecurity encompasses everything from knowledge of human factors to hard-core technical skills. While bachelor's level graduates are ready to fill entry-level roles, many consumers of cybersecurity talent locally, regionally, and nationally seek new hires with more advanced education including the types of research skills cultivated in a master's degree program.

Additionally, the creation of the proposed M.S. in Cybersecurity degree program will have clear benefits to the university. Specifically, it will achieve the following:

1. Provide a path to a graduate degree for graduates of the B.S. in Cybersecurity degree program.
2. Make the university more responsive to the local, regional, and statewide workforce needs.
3. Provide more research and collaboration opportunities within the university and outside the university. For example, faculty in the Computer Science Department working on Cybersecurity might collaborate with researchers in the UWF Center for Cybersecurity.

The proposed M.S. in Cybersecurity degree program will also have significant benefits for the state. Only one other master's degree program for cybersecurity (in CIP Code 11.1003 at FIU) presently exists. Consequently, the state currently lags in its capacity to provide post-baccalaureate degrees in cybersecurity. USF Professor Sudeep Sarkar's letter of support for the program (please see Appendix F) accentuates Florida's need to develop statewide capacity for education in this high-demand field.

V.   Access and Articulation – Bachelor's Degrees Only

> **A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)**

Not applicable; this is a Master's degree program.

> **B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the**

Common Prerequisite Manual on <u>the resource page for new program proposal</u>). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

Not applicable; this is a Master's degree program.

    C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

Not applicable; this is a Master's degree program.

    D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on <u>the resource page for new program proposal</u>). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

Not applicable; this is a Master's degree program.

INSTITUTIONAL READINESS

VI.   **Related Institutional Mission and Strength**

    A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on <u>the resource page for new program proposal</u>).

The institutional mission at UWF is to:

- Provide high-quality undergraduate and graduate education,
- Conduct teaching and research that services the body of knowledge, and
- Contribute to the needs of professions and society

UWF's proposed, stand-alone, fully online M.S. in Cybersecurity degree program will support the university's mission by providing high-quality and accessible graduate education locally, statewide, and nationally. The proposed program is in an area of critical importance to the local community, the region, the state, and nation and it will contribute to the needs of society by producing skilled cybersecurity practitioners who can help to protect critical information technology resources.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

UWF has attained the Center for Academic Excellence in Cybersecurity designation on the basis of a strong undergraduate curriculum that aligns with guidelines from Homeland Security and the National Security Agency. UWF has created a Center for Cybersecurity which participates in a variety of local, statewide, national, and international initiatives to promote cybersecurity education and training. The Center for Cybersecurity attracts external funding and excellent professional cybersecurity talent.

Additionally, the UWF Department of Computer Science has hired several specialists in cybersecurity in the last number of years. Specifically, professors Ezhil Kalaimannan and Amitab Mishra completed Ph.D. work in the field of cybersecurity. These and other researchers in the department have opportunities to collaborate with researchers in the Center for Cybersecurity and researchers at the Institute for Human and Machine Cognition, a not-for-profit research institute established by the Florida legislature with an increasing cohort of researchers with cybersecurity research interests.

The Computer Science Department also offers Bachelor of Science degree programs in traditional Computer Science, Software Design and Development, and a Master of Science degree program in Computer Science. Most faculty in the Computer Science Department teach courses that are taken by students in all degrees and specializations and are available as mentors for graduate research experiences in all degrees/specializations. Due to the broad background required in science, students in the proposed M.S. in Cybersecurity degree program will also interact with faculty in the Departments of Information Technology, Management and Management Information Systems, and Criminology and Criminal Justice.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

Informal planning for the M.S. in Cybersecurity degree program started in early 2018. The Computer Science Curriculum Committee laid the groundwork for the degree in the spring and summer. In mid-summer, the Interim Dean of the Hal Marcus College of Science and Engineering and the UWF Provost provided feedback on the proposal. The Computer Science Department Chair presented the curriculum draft to the faculty at the Fall Computer Science Departmental Retreat.

In Fall 2018, the College Curriculum Committee reviewed and refined the courses and student learning outcomes. The curriculum and student learning outcomes were then presented to the

Graduate Council for review. Feedback from those bodies was incorporated into the program proposal. Over the course of the fall semester, the draft of the formal Request to Offer a New Degree Program Proposal was developed and refined. The program obtained approvals from the UWF Faculty Senate and senior university administration.

Table 6. *Planning Process for the M.S. in Cybersecurity degree program.*

Date	Participants	Planning Activity
8/20/2018	CS Fall Faculty Retreat	Curriculum planning
9/18/2018	CS Faculty	Curriculum planning
9/25/2018	CS Faculty	Review and approval of new M.S. in Cybersecurity
Fall 2018	College Council	Review and approval of M.S. in Cybersecurity curriculum
Fall 2018	Graduate Council	Review and approval of M.S. in Cybersecurity curriculum & student learning outcomes
Spring 2019	Academic Council of the Faculty Senate	Review and approval of M.S. in Cybersecurity curriculum
Spring 2019	Faculty Senate	Review and approval of M.S. in Cybersecurity curriculum

Table 7. *Events Leading to Implementation of the M.S. in Cybersecurity degree program*

Date	Implementation Activity
Summer and Fall 2018	Preparation of course and program CCRs
9/28/2018	CAVP approval of the proposal
July 2018	Dean's Office and Provost's Office review
August 2018	UWF New Degree Program Internal Pre-Proposal approved by Provost
Anticipated approvals	
Spring 2019	University of West Florida, BOT Academic Subcommittee approval (prospective)
Spring 2019	University of West Florida, BOT approval (prospective)
Spring 2019	Florida Board of Governor's Staff approval (prospective)
August 2019	Start of Fall 2019 semester with new program (prospective)

VII.   **Program Quality Indicators - Reviews and Accreditation**

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

Pursuant to BOG Regulation 8.015, all academic departments at UWF conduct program reviews every seven years. The M.S. in IT program conducted a program review in 2016-2017 and several recommendations were made including discontinuing a small enrollment specialization, hiring faculty for the program, and improving the assessment plan. Since the review, the M.S. in IT program has been assigned to a new department in Information Technology, the low enrollment specialization has been discontinued, a department chair has been appointed, and the M.S. in IT Cybersecurity specialization is being reorganized into a stand-alone M.S. in Cybersecurity degree program in the Computer Science Department.

Center for Academic Excellence in Cybersecurity Education Review

Due to efforts by faculty in Computer Science, UWF has been awarded the Center for Academic Excellence (CAE) in Cybersecurity Education designation by the Department of Homeland Security and the National Security Agency. Faculty developed the stand-alone M.S. in Cybersecurity degree program with consideration of the guidelines for Cyber Defense Education (CDE) as defined by the National Security Agency and the Department of Homeland Security. Employers value students that graduate from a university with a CAE-CDE designation. The department is planning on having the approved M.S. in Cybersecurity degree program evaluated for CAE-CDE designation.

ABET Accreditation Review

ABET's Computer Accreditation Commission (CAC) accredits computing programs at the bachelor level and has only recently added cybersecurity as a new area of accreditation. At this time, ABET's CAC does not accredit master's level programs in computer science or cybersecurity. Therefore, the department will continue to focus efforts on the CAE-CDE designation offered by the Department of Homeland Security and the National Security Agency.

VIII. **Curriculum**

        A. **Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.**

See Appendix C for the full M.S. in Cybersecurity degree program's Academic Learning Compact and Curriculum Map.

Master of Science in Cybersecurity

Student Learning Outcomes
UWF M.S. in Cybersecurity graduates should be able to do the following:
Content
Analyze concepts, principles, and theories in computing technology for use in the cybersecurity field.

Critical Thinking
Analyze cybersecurity problems and formulate and evaluate solutions.

Communication
Deliver effective oral and written artifacts to document professional communications.

Integrity/Values
Articulate professional, legal, and ethical issues in the discipline.

B. Describe the admission standards and graduation requirements for the program.

Admission Standards

In addition to the university graduate admission requirements described in the [Admissions section](#) of the catalog, the department bases decisions for regular admission on a holistic review of credentials in which the following criteria are used to assess the potential success of each applicant:

- Submission of one of the following graduate admission tests:
  - Graduate Record Examination (GRE): successful applicants typically have verbal scores of 140 or higher and quantitative scores of 145 or higher
  - Miller Analogies Test (MAT): successful applicants typically have a score of 370 or higher
- Minimum undergraduate cumulative GPA of 3.0
- Undergraduate degree major
- The applicant's motivation for pursuit of a Master of Science in Cybersecurity degree, extent of related work experience in the field, and future goals related to the attainment of a Master of Science in Cybersecurity degree described in a letter of intent written by the applicant
- Submission of a resume
- Indication of the applicant's ability to succeed in our graduate program as reflected in three signed letters of recommendation

Students entering the program with a degree other than Computer Science or Information Technology may be required to complete prerequisite courses in computing and programming. The department offers the following foundational courses to complete the prerequisite coursework:

- COP5518: Foundations: Computing Essentials
- COP5007: Foundations: Programming Essentials

Graduation Requirements

In order to graduate, students must complete 30 semester hours of credit as described in the curriculum section. A minimum grade of "C" is required for all courses with a cumulative major GPA of 3.0 or higher.

Both the graduate admissions and graduation requirements are found in Appendix E.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives,

thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The M.S. in Cybersecurity degree program is comprised of 30 semester credit hours (SCH). Table 8 below shows that students will take:
- four 3 SCH courses in the core (12 SCH),
- two courses from a slate of four that allow them to tailor their studies toward software development or systems administration (6 SCH),
- three courses from an option of seven elective courses (9 SCH) , and
- one culminating seminar course (3 SCH).

Table 8. *Proposed M.S. in Cybersecurity Degree Program Curriculum.*

Core Courses		12 SCH
CIS 6394	Digital Forensics	3 SCH
CIS 6XX1-1	Data Security	3 SCH
CNT 5XX1-1	System and Network Security	3 SCH
COP 5725	Database Systems	3 SCH
Choose two courses from the following		**6 SCH**
CEN 5079	Secure Software Development	3 SCH
CEN 6074	Software Assurance and Security	3 SCH
CET 6882C	Network Performance Monitoring and Security	3 SCH
COP 5775	Database Administration	3 SCH
Electives		**9 SCH**
CAP 5771	Data Mining	3 SCH
CAP 5XX1-1	Big Data Analytics	3 SCH
CAP 6772	Data Warehousing	3 SCH
CNT 6519	Wireless Network Security	3 SCH
CTS 5XX1-1	Data Visualization	3 SCH

ISM 5327	Legal, Ethical, and Human Aspects of Cybersecurity	3 SCH
ISM 5328	Cybersecurity Risk Management	3 SCH
Seminar		**3 SCH**
COT 6XX1-1	Seminar in Cybersecurity	3 SCH
Total Hours		**30 SCH**

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Table 9 displays a typical four-semester course of study for a student who can take a full-time, 9 SCH load during fall and spring. The Chair of Computer Science anticipates that some of the students in the program will be working adults and will attend part-time. These students will take the same courses over a different period of time. Students must be enrolled in at least six SCH in a term to be eligible for an assistantship.

Table 9. *Proposed four-semester course of study for the M.S. in Cybersecurity Degree Program.*

Semester	Courses	SCH	Semester	Courses	SCH
Year 1					
Fall Term, Year 1	CNT 5XX1-1 System and Network Security COP 5725 Database Systems CEN 5079 Secure Software Development*	3 SCH 3 SCH 3 SCH	**Spring Term, Year 1**	CIS 6XX1-1 Data Security CIS 6394 Digital Forensics CEN 6074 Software Assurance and Security*	3 SCH 3 SCH 3 SCH
Semester Total 9 SCH			Semester Total 9 SCH		
Summer and Year 2					
Summer Term, Year 1	Elective (3sh)	3 SCH	**Fall Term, Year 2**	2 Electives (3 SCH each) COT 6XX1-1,Seminar in Cybersecurity	6 SCH 3 SCH
Semester Total 3 SCH			Semester Total 9 SCH		

Program Total 30 SCH

*Note: CET 6882C, Network Performance Monitoring and Security and COP 5775 Database Administration may be substituted for these courses.

     E.   **Provide a one- or two-sentence description of each required or elective course.**

Core Courses

CIS 6394 Digital Forensics
Provides a solid foundation for performing a digital forensic examination; introduces tools and techniques required for conducting a forensic analysis on systems and data pertaining to evidences in civil, criminal or administrative cases. Introduces systematic problem-solving techniques and applies them to digital investigations. Theories directly correlate to methods used to recover/restore data, ranging from litigation to fraud based investigations.

CIS 6XX1-1 Data Security
This course covers concepts of Data Security from a data centric perspective. Challenges faced by today's systems will be studied and the future of data security will be discussed.

CNT 5XX1-1 System and Network Security
This course covers the basic strategies and tools that prepare students to engage in proactive and aggressive cybersecurity activities, with an increased focus on computer, network and system security. Students will learn about protection strategies which are most effective when dealing with cyber attacks, especially in an age of increased reliance on distributed devices.

COP 5725 Database Systems
Introduction to database systems and database management system architectures. Various database models are discussed with emphasis on the relational model and relational database design. Case applications using fourth-generation languages, such as SQL are included.

CEN 5079 Secure Software Development
Examines the importance of building security into the design, implementation and testing phases of software development. Covers coding techniques that avoid known vulnerabilities and test strategies that can uncover previously unknown weaknesses. Includes discussion of security policies and design principles

CEN 6074 Software Assurance and Security
Concepts and principles related to developing and maintaining secure software systems with no exploitable vulnerabilities with high levels of integrity and reliability.

CET 6882C Network Performance Monitoring and Security
Examines network performance, strategies to optimize network performance and protocols related to network security. Students should have a basic understanding of computer networks.

COP 5775 Database Administration
Database administration skills covering installation, configuration and tuning a database, administering servers and server groups, managing and optimizing schemas, tables, indexes, and views, creating logins, configuring permissions, assigning roles and performing other essential security tasks, backup and recovery strategies, automation and maintenance.

Elective Courses

CAP 5771 Data Mining
Exposes students to data mining concepts and techniques and different data mining software. Covers data pre-processing and cleaning, concept hierarchy generation, attribute relevance analysis, association rule mining, classification algorithms, and cluster analysis.

CAP 5XX1-1 Big Data Analytics
Introduces students to the handling of Big Data on Hadoop's MapReduce environment. Students also learn Spark architecture and programming with the aim of doing big data analytics with machine learning algorithms in Spark. In addition, concepts of Spark streaming are covered.

CAP 6772 Data Warehousing
Data Warehousing and its applications to business intelligence. Areas of concentration are: requirements gathering for data warehousing; data warehouse architecture; dimensional model design for data warehousing; physical database design for data warehousing; extracting, transforming, and loading strategies; introduction to business intelligence; design and development of business intelligence applications; expansion and support of a data warehouse.

CNT 6519 Wireless Network Security
Study and understand the security and research challenges of existing and emerging wireless networks. Students will learn about various security issues such as key management, privacy, authentication and secure data aggregation and the algorithms used to resolve these issues.

CTS 5XX1-1 Data Visualization
Skills to describe theory and concepts related to efficient and effective display of data. Use a variety of tools necessary to prepare and present the factual data in a visually compelling manner. Data Visualization tools have a wide applicability. Tools and technologies allow students, researchers and other users of data leverage on these tools.

ISM 5327 Legal, Ethical, and Human Aspects of Cybersecurity
Human facets of cybersecurity. Includes ethics, legal and regulatory environment, psychology, and hacker culture. Focus on human element, motivation, and deterrence of cyber-crimes.

ISM 5328 Cybersecurity Risk Management
Focus on risk management theory and principles to information security policy. An additional major area of focus is incident response and contingency planning consisting of incident response planning, disaster recovery planning, and business continuity planning.

Required Seminar

COT 6XX1-1 Seminar in Cybersecurity
This graduate research seminar will provide cybersecurity graduate students with the opportunity to identify, research, report and discuss contemporary issues in cybersecurity. Students are expected to have completed the foundational courses in the curriculum and to work independently on a relevant topic approved by the instructor.

Prerequisite Courses
For Students Without a Degree in Computer Science or Information Technology

COP 5518 Foundations: Computing Essentials
This course reviews fundamental principles of modern operating systems and computer networks and relates them to computer programming. The course covers topics such as the design of various components of operating systems and services they provide to users and application developers, network structures & devices, network protocol stacks, network performance metrics, network routing algorithms, and network traffic analysis.

COP 5007 Java Programming Foundations: Programming Essentials
Students will gain a comprehensive understanding of principles/concepts of Java programming and how to apply those principles/concepts in conjunction with principles of software engineering to design and develop object- oriented software systems.

> **F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the <u>curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.</u>**

The experience gained through the development of the B.S. in Cybersecurity degree program curriculum (new fall 2018) to meet the criteria for the Center of Academic Excellence in Cybersecurity education had a major impact on the department's capability to design the curriculum and student learning outcomes for the M.S. in Cybersecurity degree program.

Additionally, the Department of Computer Science has an Industrial Advisory Board comprised of industry experts and UWF faculty that meets at a minimum once per year. The Industrial Advisory Board provides perspectives on the curriculum as well as trends in the field. Table 10, below provides the names of the Industrial Advisory Board members.

Table 10. *Members of the UWF Department of Computer Science Industrial Advisory Board.*

Name	Organization
Mr. Brian Clarke	Silver Bullet Pensacola, Florida
Ms. Terry Enos	Navy Federal Credit Union Pensacola, Florida
Dr. Alessandro Morelli	Institute for Human and Machine Cognition Pensacola, Florida
Mr. John Corliss	Department of Homeland Security Washington, D.C.
Mr. Heath Gardner	Jetpay Pensacola, Florida
Mr. Jesse Sweetland	AppRiver Gulf Breeze, Florida
Mr. Patrick Rooney	Coastal Services Pensacola, Florida

Dr. Thomas Reichherzer	UWF
Dr. John Coffey	UWF
Dr. Brian Eddy	UWF
Ms. Caroline John	UWF

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

Notably, UWF attained the designation of a Center of Academic Excellence for Cybersecurity education from the Department of Homeland Security and the National Security Agency in 2016. The Accreditation Board for Engineering and Technology (ABET) is the leading accrediting body for engineering and computer science programs such as those that appear under CIP code 11. While ABET does accredit certain master's level programs, at this time the University of West Florida does not plan to seek ABET accreditation for the M.S. in Cybersecurity degree program.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

Not applicable this is a not a doctoral degree program.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The M.S. in Cybersecurity degree program will be offered fully online by the Department of Computer Science in the Hal Marcus College of Science and Engineering, at the UWF Pensacola campus. The university has tools in place for delivery of online courses including the Canvas Learning Management System, WebEX online meeting software, Panopto captioning software for video closed captioning, and other resources needed for online delivery.

While resources, such as software, typically make STEM curricula relatively expensive to deliver, the proposed program will not require financial support at a greater level than other programs within the college. As this proposal seeks to convert the existing M.S. in IT specialization into a stand-alone degree program, the majority of the resources and infrastructure are already in place. In fact, the Year 1 through Year 5 E&G cost per FTE for the stand-alone M.S. in Cybersecurity is below the state average for CIP Code 11. Offering the program in collaboration with or jointly with other universities has not yet been explored by UWF.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

As shown in Appendix A Table 4, the following UWF full-time regular faculty will support the M.S. in Cybersecurity degree program:
- Sikha Bagui, Ed.D.
- Ezhil Kalaimannan, Ph.D.
- Amitab Mishra, Ph.D.
- Bernd Owsnicki-Klewe, Ph.D.
- Steve Bitner, Ph.D.
- New Hire, Ph.D.

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

The M.S. in Cybersecurity degree program is a conversion of a specialization in UWF's existing M.S. in Information Technology program. Therefore, most of the faculty resources are already in place. The program will hire one new lecturer who will devote 37.5 % of his or her .75 FTE or 3 courses per year to the new program.

Year 1 faculty salary and fringe shown in Appendix A Table 2 will come from E&G funds:
- Reallocated Base for Faculty = $88,293
- New Faculty $42,560
- Adjunct faculty Year 1 = $6,000

Year 5 faculty salary and fringe shown in Appendix A Table 2 will come from E&G funds:
- Continuing Base for Faculty (at 1.05% increase per year) = $159,052
- Adjunct faculty Year 5 $7,000

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

Faculty vitae in Appendix D include the following unit faculty who will be supporting the proposed degree program:
- Sikha Bagui, Ed.D.
- Ezhil Kalaimannan, Ph.D.
- Amitab Mishra, Ph.D.
- Bernd Owsnicki-Klewe, Ph.D.
- Steve Bitner, Ph.D.

D. **Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.**

In fall 2018, the Department of Computer Science had in excess of 600 majors across the various undergraduate and graduate programs. In academic year 2017-2018 the department awarded 104 undergraduate and 50 graduate diplomas. In fall 2018, Computer Science faculty conducted approximately 70 individual sections of online and face-to-face courses. Enrollment growth in the department has been strong; driven by increases in the undergraduate Cybersecurity program (stand-alone began fall 2018). The department anticipates that the proposed graduate degree program will experience the same positive enrollment numbers and will enhance existing undergraduate program enrollment.

In recent years, service activities of faculty have included extensive work on curricula including the development of the Cybersecurity program discussed here, significant work and progress toward ABET accreditation of the Computer Science degree program curriculum, participation in numerous departmental, college-level and university-level committees, service to the profession as reviewers, and community outreach.

Departmental Faculty Research Activity

Department of Computer Science faculty are actively engaged in research (Table 11) and the pursuit of extramural grant funding (Table 12).

Table 11. *Sample of Recent M.S. in Cybersecurity Degree Program Faculty Publications and Projects.*

Dr. Sikha Bagui	**Bagui, S.** and Earp, R. (2015). Practical Guide to Using SQL in Oracle, 2nd edition, BVT Publishing. ISBN: 978-1-62751-647-1 (e-Book) or ISBN: 978-1-62751-648-8 (loose leaf version).
	El-Sheikh, E., Reichherzer, T., White, L., Wilde, N., Coffey, J., **Bagui, S.,** Goehring, G., Baskin, A. (2013). Towards Enhanced Program Comprehension for Service Oriented Architecture (SOA) Systems, Journal of Software Engineering and Application (JSEA) Vol. 6(9), 435-445.
	Bagui, S. and Zaynako, A. (2014). Determining Approximate Functional Dependencies using Association Rule Mining, International Journal of Research in Computer Applications and Management (IJRCM), Vol. 4(1)
	Bagui, S., and Bouressa, J. (2014). Mapping RDF and RDF-Schema to the Entity Relationship Model, Journal of Emerging Trends in Computing and Information Sciences, Vol. 5(12), 953-961.
	Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S**., Wilde, N., Zimmerman, A. (2014). Ontological Support for the Evolution of Future Services Oriented Architectures, Transaction on Machine Learning and Artificial Intelligence (TMLAI), Vol. 2(6), 77-90.
	Bagui, S., and Nguyen, L. (2015). Database Sharding: To provide fault tolerance and scalability of Big Data on the Cloud, International Journal of Cloud Applications and Computing (IJCAC), Vol. 5(2), 36-52.

	Fridge, E., and Bagui, S. (2016). Impact of Automated Software Testing Tools on Reflective Thinking and Student Performance in Introductory Computer Science and Programming Classes, International Journal of Information and Communication Technology Education (IJICTE), 12(1), 24-40. **Bagui, S.,** Bagui, S, and Hemasinha, R. (2016). The Statistical Classification of Breast Cancer Data, International Journal of Statistics and Applications, 6(1), 15-22. **Bagui, S.,** Xingang, F., Kalaimmanan, E., Bagui, S., and Sheehan, J. (2017). Comparison of Machine Learning Algorithms for classification of VPN and non-VPN Network Traffic Flow Using Time-Related Features, Journal of Cyber Security Technology, 1(2), 108-126. Xingang F., **Bagui, S**., and Bagui, S. (2017). "Improving Virtual Screening Predictive Accuracy of Human Kallikrein 5 inhibitors using Machine Learning Models, Computational Biology and Chemistry, 69, 110-119. Cox, A., Guzman, I., Crommer, K., **Bagui, S**. (2017). Virtual world, Virtual Reality, and Augmented Reality: Different Types, Different Users, Different Purchase Intentions, Journal of Virtual Worlds Research, 10(1), 1-21. **Bagui, S**. and Devulapalli, K. (2018). A Comparison of Hive's Optimization Techniques, International Journal of Big Data Intelligence (IJBDI), 5(4), 243-257. **Bagui, S**., and Spratlin, S. (2018). A Review of Data Mining Algorithms on Hadoop's MapReduce, International Journal of Data Science, 3(2), 146-169.
Dr. Ezhil Kalaimannan	Journal Articles and Conference Proceedings since 2015 Bagui, S., Fang, X., **Kalaimannan, E.,** Bagui, S.C and Sheehan, J. "Comparison of machine-learning algorithms for classification of VPN network traffic flow using time-related features", Journal of Cybersecurity Technology, Vol. 1, No. 2, pp. 108-126, 2017. **Kalaimannan, E.** and Gupta, J.N.D. "The Security Development Lifecycle in the Context of Accreditation Policies and Standards", Security and Privacy, IEEE, Vol. 15, No. 1, pp. 52-57, 2017. [Impact Factor: 0.91] **Kalaimannan, E.,** John, S.K., DuBose, T and Pinto, A. "Influences on ransomware's evolution and predictions for the future challenges", Journal of Cybersecurity Technology, Vol. 1, No. 1, pp. 23-31, 2016. Gupta, J.N.D., **Kalaimannan, E.** and Yoo, S-M. "A heuristic for maximizing investigation effectiveness of digital forensic cases involving multiple investigators," Computers & Operations Research, Elsevier, Vol. 69, No. 1, pp. 1-9, 2015. [Impact Factor: 2.188] **Kalaimannan, E.** and John, C.S. "Security Development Life Cycle framework for web-based applications," Vol. 3, No. 1, pp. 23-29, 2016. Prithviraj, S., Sameer, V.U., Naskar, R and **Kalaimannan, E**., "Source Anonymization of Digital Images: A Counter–Forensic Attack on PRNU based Source Identification Techniques", accepted into 2017 Annual Conference on Digital Forensics, Security, and Law, Daytona Beach, 2017.

	Chakraborty, N and **Kalaimannan, E**, "Selective Scheduling: Controlling Non-Preemptive Devices in Smart Grid Environment", 8th Annual IEEE conference on Innovative Smart Grid Technologies, Arlington, Apr. 2017. Chi, H., Welch, S., Vasserman, E and **Kalaimannan, E**, "A Framework of Cybersecurity Approaches in Precision Agriculture" 12th International Conference on Cyber Warfare and Security, Dayton, pp. 90-95, Mar. 2017. Reichherzer, T., Mishra, A., **Kalaimannan, E** and Wilde, N, "A Case Study on the Trade-Offs Between Security, Scalability, and Efficiency in Smart Home Sensor Networks," Proceedings of the 2016 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2016, pp. 222-225. Chi, H., **Kalaimannan, E** and Hubbard, D, "Integrate Text Mining into Computer and Information Security Education", KSU Conference on Cybersecurity Education, Research, and Practice. Paper 11, Kennesaw **Kalaimannan, E.,** "Smart Device Forensics - Acquisition, Analysis and Interpretation of Digital Evidences," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015, pp. 837-838. Pandey, A., **Kalaimannan, E**., and Venkatesan, S., "An Information Diffusion Model to analyze the Behavior of Online Social Network based Malwares," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015, pp. 867-868. **Kalaimannan, E.,** Mitchell, C., Bagui, S., and Bagui, S, "An Automated Method of Classifying and Analyzing Malware based Operating System Calls," Work-in-Progress Abstract in the Annual Computer Security Applications Conference 2015 (ACSAC'15), Los Angeles, Dec. 2015.
Dr. Amitab Mishra	**A. Mishra**, and D. P. Agrawal. Enhancement and Appraisal of Internet of Things Healthcare Networks. Saarbrücken, Germany: Lap Lambert Academic Publishing, 2017. Print. T. Reichherzer, **A. Mishra**, E. Kalaimannan, N. Wilde, "A Case Study on the Trade-Offs between Security, Scalability, and Efficiency in Smart Home Sensor Networks", The International Conference on Computational Science and Computational Intelligence (CSCI 2016), Las Vegas, NV, USA, December 15-17, 2016. **A. Mishra** and S. Chakraborty, "Energy-efficient design methodologies for Wireless Body Area Sensor Networks in Healthcare Applications", BSN Conference 2016, San Francisco, CA, USA, June 14-17, 2016. **A. Mishra** and D. P. Agrawal, "Energy Conservation and Lifetime Optimization of Wireless Body Sensor Networks for 24x7 Physiological parameters' Monitoring," Journal of Communications, vol. 10, no. 9, pp. 685-695, 2015. Doi: 10.12720/jcm.10.9.685-695. **A. Mishra** and D. P. Agrawal, "Continuous Health Condition Monitoring by 24x7 Sensing and Transmission of Physiological data over 5-G Cellular Channels", International Conference on Computing, Networking and

	Communications (ICNC 2015), Feb 16-19, 2015, Anaheim, California, USA.
Dr. Bernd Owsnicki-Klewe	**Owsnicki-Klewe, B**., Algorithmen und Datenstrukturen (Algorithms and Data Structures), Verlag Wißner, Augsburg, 1995, 2nd ed. 1997, 3rd ed. 1998, 4th ed. 2002, ISBN 3-89639-172-0 **Owsnicki-Klewe, B**., Wissensrepräsentation und Logik - Eine Einführung (Knowledge Representation and Logic – An Introduction). In: Görz, G. (ed.): Handbuch der Künstlichen Intelligenz (Handbook of Artificial Intelligence), Addison-Wesley, 1993, 2nd ed. 1995, 3rd ed. 2000, ISBN 3-486-25049-3 (with K. v. Luck, B. Nebel). **Owsnicki-Klewe, B**., Objektorientierung in der Informatikausbildung auf der Basis von Smalltalk (Object Orientation in Computer Science Education based on Smalltalk). Informatik Spektrum No. 20, pp. 335-343, (with M. Böhm, J. Freytag, G. Pfeiffer, J. Raasch) [invited] **Owsnicki-Klewe, B**., Coffey, J. Introducing a Reflective Activity into the Design Process in an Advanced Computer Programming Course, CCSC-MS:
Dr. Steve Bitner	**Steven Bitner**, Ovidiu Daescu. Finding a Minimum Sum Dipolar Spanning Tree in R3. Computational Geometry: Theory and Applications, Vol. 45, Issue 9, pp. 476-481, 2012 **Steven Bitner**, Ovidiu Daescu. Farthest Segments and Extremal Triangles Spanned by Points in R3. Information Processing Letters, Vol. 109, Issue 20, pp. 1167-1171, 2009. **Steven Bitner**, Yam Cheung, Ovidiu Daescu. Minimum Separating Circle for Bichro-matic Points in the Plane. Proceedings of the 7th International Symposium on Voronoi Diagrams, pp. 50-55, June 2010. **Steven Bitner,** Yam Cheung, Atlas Cook IV, Ovidiu Daescu, Anastasia Kurdia, Carola Wenk. Visiting a Sequence of Points with a Bevel-Tip Needle. Proceedings of the 9th Latin American Theoretical Informatics Symposium, pp. 492-502, April 2010.

Table 12. *Recent Grant Activity by M.S. in Cybersecurity Degree Program Faculty.*

Project Title	Amount
Kalaimannan, E. Capacity Building Program Grant -- Florida Center for Cybersecurity (FC2), The University of South Florida, Role: Principal Investigator, June. 2017 - June. 2018.	$75,212
Kalaimannan, E. Collaborative seed grant offered by the Florida Center for Cybersecurity (FC2), The University of South Florida, March 2015 - Dec. 2016.	$12,500
Kalaimannan, E. Cross College Faculty Research (CCFR) grant offered by the Office of Vice President for Research, The University of Alabama in Huntsville, Aug. 2013 - $5,000 per year (Renewable for a total of 24 months and $10,000).	$15,000
Total	**$102,712**

X.   **Non-Faculty Resources**

   A.   **Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.**

The UWF Department of Computer Science currently offers a B.S. in Cybersecurity degree program and an M.S. in Information Technology with a specialization in Cybersecurity. The UWF Library is equipped to provide resources and services for the proposed stand-alone M.S. in Cybersecurity degree program.

The libraries shelve more than 800,000 print volumes and house an extensive microforms collection. Electronic resources include more than 160,000 e-books and access to approximately 80,000 journals and other serial titles through a discovery system. An analysis of holdings in relevant Library of Congress classifications indicates that UWF holds over 5000 books related to this cybersecurity, computer security, and information technology. The library also provides access to over 2000 relevant peer-reviewed e-journals.

Specialized indexing, abstracting, and full-text databases relevant to cybersecurity and computer science include the ACM Digital Library, Applied Science & Technology Source, IEEE/Xplore, Computer Science Collection (ProQuest), and Computer Database. More general resources supporting cybersecurity are Science Direct, Web of Science, Wiley Online Library, and Engineering Village. Full-text dissertations and theses are available through ProQuest Dissertations and Theses. Using their Argonet accounts, students and faculty may access electronic resources any time from any place.

Current library resources available to implement the proposed MS in Cybersecurity through Year 5 include:

Databases
   • ACM Digital Library
   • Applied Science & Technology Source
   • Computer Database (Gale)
   • Computer Science Collection (ProQuest)
   • Engineering Collection (ProQuest)
   • Engineering Village
   • IEEE Xplore
   • Science Full Text Select
   • ScienceDirect
   • Telecommunications (ProQuest)
   • Web of Science
   • Wiley Online

Major Peer-Reviewed Journals include, but are not limited to:
   • *ACM Transactions*

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- *Computer Fraud & Security*
- *Computer Law & Security Review*
- *Computers & Security*
- *Cryptologia*
- *Digital Investigation*
- *EURASIP Journal on Information Security*
- *IEEE Network*
- *IEE Proceedings: Information Security*
- *IEEE Security & Privacy*
- *IEEE Transactions on Dependable and Secure Computing*
- *IEEE Transactions on Information Forensics and Security*
- *IET Information Security*
- *Information and Computer Security*
- *Information & Security: An International Journal*
- *Information Security*
- *Information Security Journal: A Global Perspective*
- *Information Security Technical Report*
- *Information Systems Security*
- *International Journal of Business & Cyber-Security*
- *International Journal of Communication Networks and Information Security*
- *International Journal of Computer Network and Information Security*
- *International Journal of Cyber Criminology*
- *International Journal of Cyber Society and Education*
- *International Journal of Cyber Warfare & Terrorism*
- *International Journal of Cyber-Security and Digital Forensics*
- *International Journal of Secure Software Engineering*
- *International Journal of Information and Network Security*
- *International Journal of Information Security*
- *International Journal of Information Security and Privacy*
- *International Journal of Information Security Science*
- *International Journal on Information Technologies & Security*
- *International Journal of Intelligent Information and Database Systems*
- *Journal of Applied Intelligent System*
- *Journal of Computer Security*
- *Journal of Computer Virology and Hacking Techniques*
- *Journal of Counterterrorism and Homeland Security International*
- *Journal of Cryptology*
- *The Journal of Digital Forensics, Security and Law*
- *Journal of Homeland Security and Emergency Management*
- *Journal of Homeland Security Education*
- *Journal of Information Privacy & Security*
- *Journal of Information Security and Applications*
- *Journal of Intelligent Information Systems*
- *Journal of Internet Services and Information Security*

- *Journal of Network & Information Security*
- *Network Security*
- *Security Journal*
- *Software: Practice & Experience*

Each academic discipline is assigned a Reference Librarian to serve as a department liaison, providing library instruction, collection development, and reference assistance for the students and faculty in that discipline. To support the needs of online learners, students may also schedule a research consultation with their liaison via e-mail, online chat, telephone, or in person.

The library provides an Online Learners Library Guide (http://libguides.uwf.edu/online) outlining services and resources that support the increasing number of online learners. The library has also been responsive to the needs of clients who prefer to work from home. In addition to being able to access databases and materials in full-text online, UWF students and faculty may also take advantage of these online library services:

- Read course-required readings on electronic reserves
- Request books and articles from Interlibrary Loan
- Request Intercampus Loan (to/from the Fort Walton Beach Instructional Site library)
- Renew books
- Submit a reference question via text, email, or chat
- Request priority cataloging of an item that is on order
- Suggest the purchase of a particular book or journal
- Request an item to be recalled for use
- Have UWF and Interlibrary Loan books delivered to your home address for students and faculty who live over 50 miles from campus

   B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

The library services and resources currently available are adequate to support the Master of Science in Cybersecurity degree program through Year 5. Furthermore, UWF Libraries' current holdings are competitive. No additional resources are recommended by the UWF Dean of Libraries.

   C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

The M.S. in Cybersecurity degree program will be offered online through the Canvas Learning Management System; therefore, on-campus classroom space will not be needed except for possible face-to-face meetings with faculty to discuss course materials and work or research. Faculty do not anticipate any issues regarding workspace for such sessions.

Building 4 on the Pensacola campus currently provides office space for the proposed M.S. in Cybersecurity program faculty and the Hal Marcus College of Science and Engineering Dean.

The Department of Computer Science controls two classrooms in building 4, a Computing Research Lab and a Cybersecurity Lab:

Classrooms – Building 4, Rooms 348 and 349
Computer Science controls the scheduling of these rooms. They each have 1,120 square feet of floor space, 40 computers, and seating for forty students. They have white boards on three walls, projectors and retractable screens. The podiums have Crestron media controllers that takes input from a desktop computer on the podium, a laptop that can be brought to class, a document camera, and a DVD player. The room has an audio amplification system.

Cybersecurity Laboratory – Building 4, Room 250
The Cyber Lab has 580 square feet of floor space, 24 Dell PCs with Windows 10, plus two instructor PCs. The equipment in the room is configured so that the instructor can disconnect entirely from the Internet for computer war gaming without risk of unleashing malware locally or elsewhere. Besides its use for cybersecurity classes, the room is also scheduled as a general classroom by Computer Science as needed.

Computing Research Laboratory – Building 4, Room 247
This room has 1,120 square feet of floor space, 18 Dell PCs, 36 Cisco Catalyst 2900XL Switches, 12 Cisco 3600 Routers and 18 Cisco 2500 Routers. Computer Science shares the room with Electrical and Computer Engineering (ECE). ECE houses eight electronics workbenches, each with an oscilloscope, power supply, waveform generator, signal filter, multi-meter, and Dell PC. The lab is used for faculty and student research. Access to the room is controlled by a combination lock on the door. Authorized students are given the combination and they can use the room any time.

Other Workspaces
Technology Support:
- Hal Marcus College of Science and Engineering computer equipment hardware and software are maintained by the college technology support team.

Online Help:
- Canvas is maintained by the UWF university technology support team to include the Helpdesk for immediate student tech needs.

Faculty Offices:
- All full-time faculty have private offices nearby for easy access to students and student classrooms.

    D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

No additional classroom, teaching laboratory, research laboratory, or office space will be necessary to implement or maintain the proposed M.S. in Cybersecurity degree program through Year 5.

E. **If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.**

No new capital expenditure for instructional or research space is required to implement or sustain the proposed M.S. Cybersecurity degree program through Year 5.

F. **Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.**

Other than offices, computers, and the Canvas Learning Management System, all of which are in place, no specialized equipment is needed to implement or sustain the proposed M.S. in Cybersecurity degree program through Year 5.

G. **Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.**

No additional specialized equipment is needed to implement or sustain the proposed M.S. in Cybersecurity degree program through Year 5.

H. **Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.**

No additional special categories of resources are needed to implement or sustain the proposed M.S. in Cybersecurity degree program through Year 5.

I. **Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.**

As shown in Appendix A Table 2, the Department of Computer Science has allocated $13,120 for graduate assistantships and fellowships in Year 1 and $32,800 for Year 5. The department deems the supply of assistantship money adequate to fund anticipated demand for assistantships from the proposed M.S. in Cybersecurity degree program.

J. **Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.**

The undergraduate Cybersecurity program places students in internships with several organizations including the federal government as well as local firms such as AppRiver, and Navy Federal Credit Union. While graduate students are more commonly employed and less likely to seek internships, the Chair of Computer Science and the Industry Advisory Council affirm that graduate students will have internship opportunities at many of the same places as the undergraduate students.

APPENDICES

Appendix A

Table 1b Projected Headcount from Potential Sources (Graduate Degree Program)

Table 2 Projected Costs and Funding Sources

Table 3 Anticipated Reallocation of E&G Funds

Table 4 Anticipated Faculty Participation

APPENDIX A
TABLE 1-B
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(MS Cybersecurity)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	5	2.75	10	5.5	20	11	25	13.75	30	16.5
Students who transfer from other graduate programs within the university**	5	2.75	2	1.1	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	10	5.5	30	16.5	37	20.35	42	23.1	47	25.85
Individuals who graduated from preceding degree programs at other Florida public universities	5	2.75	10	5.5	20	11	25	13.75	25	13.75
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	0	0	0	0	0	0	0	0
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	2	1.1	5	2.75	10	5.5	15	8.25	15	8.25
Additional foreign residents***	3	1.65	3	1.65	3	1.65	3	1.65	3	1.65
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	30	16.5	60	33	90	49.5	110	60.5	120	66

*   List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

**   If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR category in a given COLUMN.

APPENDIX A

TABLE 2
PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1								Year 5						
	Funding Source							Subtotal coulumns 1+...+7	Funding Source						Subtotal coulumns 9+...+ 14
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds		Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits	88,293	0	42,560	0	0	0	0	$130,853	159,052	0	0	0	0	0	$159,052
A & P Salaries and Benefits	2,800	0	0	0	0	0	0	$2,800	3,403	0	0	0	0	0	$3,403
USPS Salaries and Benefits	0	0	0	0	0	0	0	$0	0	0	0	0	0	0	$0
Other Personal Services	6,000	0	0	0	0	0	0	$6,000	7,000	0	0	0	0	0	$7,000
Assistantships & Fellowships	13,120	0	0	0	0	0	0	$13,120	32,800	0	0	0	0	0	$32,800
Library	0	0	0	0	0	0	0	$0	0	0	0	0	0	0	$0
Expenses	798	0	0	0	0	0	0	$798	900	0	0	0	0	0	$900
Operating Capital Outlay	0	0	0	0	0	0	0	$0	0	0	0	0	0	0	$0
Special Categories	0	0	0	0	0	0	0	$0	0	0	0	0	0	0	$0
Total Costs	**$111,011**	**$0**	**$42,560**	**$0**	**$0**	**$0**	**$0**	**$153,571**	**$203,155**	**$0**	**$0**	**$0**	**$0**	**$0**	**$203,155**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	0.86	0.86
A & P (FTE)	0.05	0.05
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$153,571	$203,155
Annual Student FTE	16.5	66
E&G Cost per FTE	$9,307	$3,078

Table 2 Column Explanations

Reallocated Base* (E&G)	1	E&G funds that are already available in the university's budget and will be reallocated to support the new program. Please include these funds in the Table 3 – Anticipated reallocation of E&G funds and indicate their source.

Worksheet Table 2 Budget

Enrollment Growth (E&G)	2	Additional E&G funds allocated from the tuition and fees trust fund contingent on enrollment increases.
New Recurring (E&G)	3	Recurring funds appropriated by the Legislature to support implementation of the program.
New Non-Recurring (E&G)	4	Non-recurring funds appropriated by the Legislature to support implementation of the program. Please provide an explanation of the source of these funds in the budget section (section III. A.) of the proposal. These funds can include initial investments, such as infrastructure.
Contracts & Grants (C&G)	5	Contracts and grants funding available for the program.
Philanthropy Endowments	6	Funds provided through the foundation or other Direct Support Organizations (DSO) to support of the program.
Enterprise Auxiliary Funds	7	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 1+…+7	8	Subtotal of values included in columns 1 through 7.
Continuing Base** (E&G)	9	Includes the sum of columns 1, 2, and 3 over time.
New Enrollment Growth (E&G)	10	See explanation provided for column 2.
Other*** (E&G)	11	These are specific funds provided by the Legislature to support implementation of the program.
Contracts & Grants (C&G)	12	See explanation provided for column 5.
Philanthropy Endowments	13	See explanation provided for column 6.
Enterprise Auxiliary Funds	14	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 9+…+ 14	15	Subtotal of values included in columns 9 through 14.

Worksheet Table 2 Budget

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
Funds to be Reallocated from the Department of Computer Science	111,011	111,011	$0
	0	0	
	0	0	
	0	0	
	0	0	
	0	0	
Totals	$111,011	$111,011	$0

* If not reallocating funds, please submit a zeroed Table 3

Worksheet Table 3 Reallocation

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Sikha Bagui, Ed.D. C& I	Professor	Tenured	Fall 2019	9	0.75	0.13	0.09	9	0.75	0.13	0.09
A	Ezhil Kalaimannan, Ph.D. Computer Engineering	Assistant Professor	Tenure Earning	Fall 2019	9	0.75	0.25	0.19	9	0.75	0.25	0.19
A	Amitabh Mishra, Ph.D. Computer Science	Assistant Professor	Tenure Earning	Fall 2019	9	0.75	0.13	0.10	9	0.75	0.13	0.10
A	Bernd Owsnicki-Klewe, Ph.D. Computer Science	Lecturer	Non-Tenure Earning	Fall 2019	9	0.75	0.13	0.10	9	0.75	0.13	0.10
A	Steven Bitner, Ph.D. Computer Science	Assistant Professor	Tenure Earning	Fall 2019	9	0.75	0.13	0.10	9	0.75	0.13	0.10
C	New Hire, Ph.D. Computer Science	Lecturer	Tenure Tenure Earning	Fall 2019	9	0.75	0.38	0.28	9	0.75	0.38	0.29
	Total Person-Years (PY)							0.86				0.86

Faculty Code		Source of Funding	PY Workload by Budget Classsification		
			Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	0.58		0.86
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00		0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.28		0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
		Overall Totals for	Year 1 0.86		Year 5 0.86

Worksheet Table 4 Faculty

Appendix B

Signatures

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.

DocuSigned by:

Kim LeDuff

Signature of Equal Opportunity Officer   01/10/2019
                                                              Date

Kim LeDuff

Name of Equal Opportunity Officer

DocuSigned by:

Stephanie Clark

Signature of Dean of University Libraries   01/04/2019
                                                              Date

Stephanie Clark

Name of Dean of University Libraries

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

UWF also requires that a Request to Offer a New Degree program is reviewed by the Chief Technology Officer.

DocuSigned by:

Melanie J. Haveard

Signature of Chief Technology Officer   01/04/2019
                                                              Date

Melanie Haveard

Name of Chief Technology Officer

1

Appendix C

Academic Learning Plan, Student Learning Outcomes, and Curriculum Map

MASTER OF SCIENCE IN CYBERSECURITY

Mission Statement

The mission of the Department of Computer Science is to provide a high-quality, student-oriented educational experience to undergraduate and graduate students in the Northwest Florida region. The department prepares students for successful computing careers by empowering them with the knowledge and skills to contribute responsibly and creatively to a complex and ever-changing world, and to continue professional development and life-long learning.

Program Descriptions

The M.S. in Cybersecurity degree program prepares graduates to be leaders in the protection of data assets and analysis of potential threats to system and networks. The curriculum focuses on the techniques, policies, operational procedures, and technologies that secure and defend the availability, integrity, authentication, confidentiality, and non-repudiation of information and information systems and the development of secure software systems.

Student Learning Outcomes

Student learning outcomes for students in the Cybersecurity program are listed below. UWF Cybersecurity graduates should be able to do the following:

Content
- Analyze concepts, principles, and theories in computing technology for use in the cybersecurity field.

Critical Thinking
- Analyze cybersecurity problems and formulate and evaluate solutions.

Communication
- Deliver effective oral and written artifacts to document professional communications.

Integrity/Values
- Articulate professional, legal, and ethical issues in the discipline.

Assessment of Student Learning Outcomes

Cybersecurity graduate students will acquire advanced skills and knowledge that enable them to join a computing or information technology profession or continue a path of higher education towards a doctoral degree. They will be assessed in several cybersecurity classes as well as a research seminar, which is a required class completed at the end of their program of study. The seminar class allows students to demonstrate an integrative grasp of the outcomes by studying contemporary issues in cybersecurity and developing appropriate solutions to problems.

Job Prospects for Master's of Science in Cybersecurity Graduates

Security Analyst	Cybersecurity Engineer
Security Architect	Cybersecurity Specialist
Malware Analyst	Cybersecurity Advisor

For more information on the Cybersecurity Master's Program at UWF, please visit ***http://uwf.edu/computerscience/***

	3 SH	3 SH	3 SH	3 SH	Course Cluster (6 SH) (Students Select 2 Courses)				3 SH
Program SLOs	**CIS 6394 Digital Forensics**	**CIS 6XX1-1 Data Security**	**CNT 5XX1-1 System and Network Security**	**COP 5725 Database Systems**	**CEN 5079 Secure Software Dev.**	**CEN 6074 Software Assurance**	**CET 6882C Network Performance Monitoring &**	**COP 5775 Database Administration**	**COT 6XX1-1 Seminar in Cybersecurity**
Content									
SLO1	intro/ reinf.	intro/ reinf.	intro/ reinf.	intro	intro/ reinf.	intro/ reinf.	intro/ reinf.	intro/ reinf.	Master
Critical Thinking									
SLO2	intro/ reinf.	intro/ reinf.	intro/ reinf.						Master
Communication									
SLO3	intro/ reinf.	intro/ reinf.	intro/ reinf.	intro					Master
Integrity / Values									
SLO4	intro/ reinf.	intro/ reinf.	intro/ reinf.		intro/ reinf.	intro/ reinf.	intro/ reinf.	intro/ reinf.	Master
Department Name	**Computer Science**						**Program Name: M.S. Cybersecurity**		
Department URL	http://uwf.edu/hmcse/departments/computer-science/						**Creation Date: Fall 2019**		
SLO1:	Analyze concepts, principles, and theories in computing technology for use in the cybersecurity field								
SLO2:	Analyze cybersecurity problems and formulate and evaluate solutions								
SLO3:	Deliver effective oral and written artifacts to document professional communications								
SLO4:	Articulate professional, legal, and ethical issues in the discipline								

Appendix D

Faculty Curriculum Vitae

CURRICULUM VITAE

DR. SIKHA S BAGUI

ADDRESS   3021 Pelican Lane
  Pensacola, FL 32514, USA
  Email: bagui@uwf.edu

PHONE   (850)474-3022 (Office)

PERSONAL INFORMATION

  Citizenship: US citizen

ACADEMIC BACKGROUND

  Ed.D, Curriculum and Instruction. *Major: Math/Stat/Science/Computer Science*, University of West Florida, Pensacola, Florida, December, 2000.

  MBA, *IS specialization*, University of Toledo, Toledo, Ohio, August, 1986.

  BS**, Cuttington University, Monrovia, Liberia, January 1984.**

  (Also completed one year(1990-1991) in Ph.D. program at Kent State University, Kent, Ohio, MIS specialization).

ACADEMIC EXPERIENCE

  Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2013 – present)

  Associate Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2008 – August 2013).

  Assistant Professor, Department of Computer Science, University of West Florida, Pensacola, Florida (August 2004 – Aug 2008).

  Lecturer, Department of Computer Science, University of West Florida, Pensacola, Florida (August 1999-August 2004).

  Adjunct Instructor, Department of Computer Science, University of West Florida, Pensacola, Florida (Jan 1992-August 1999).

  Graduate Teaching Assistant, Department of Management Information Systems, Kent State University, Kent, Ohio, (August 1990-June 1991).

  Instructor, Department of Information Systems, University of Toledo, Toledo, Ohio (June 1986-August 1990).

ADMINISTRATIVE EXPERIENCE

  Chair, Department of Computer Science, University of West Florida, Pensacola, FL

(August 2012 – August 2017)

Founding Director, Center for Cybersecurity, University of West Florida, Pensacola, FL (January 2014 – March, 2015)

Interim Associate Chair, Department of Computer Science, University of West Florida, Pensacola, Florida (January 2011 – July 2012).

Program Director, CIS/IT, MSA/DBA, MS/CS-DB, Department of Computer Science, University of West Florida, Pensacola, Florida (Fall 2007 – August 2012).

COURSES TAUGHT

Database Systems, Data Mining, Database Administration, Advanced Database Systems, Seminar in SOA, Java Programming, Data Structures and Algorithms, Advanced Visual Programming, Visual Programming, Systems Documentation, Multimedia Systems, Business Systems Design, Microcomputer Application Packages, Introduction to Management Information Systems, COBOL I, COBOL II.

RESEARCH INTERESTS

Data mining and Big Data analytics, SQL, database design and architecture, object-oriented databases, web databases, pattern recognition, statistical computing, Computer Science Education.

PUBLICATIONS

Books

1. Earp, R. and **Bagui, S**. (2003). *Learning SQL: A Step-by-Step Guide using Oracle*, Addison Wesley, ISBN: 0-201-77363-5.

2. **Bagui, S.** and Earp, R. (2003). *Database Design Using ER Diagrams*, CRC Press, Auerbach Publications, ISBN: 0-8493-1548-4.

3. **Bagui, S**. and Earp, R. (2004). *Learning SQL: A Step-by-Step Guide using Access*, Addison Wesley, ISBN: 0-321-11904-5.

4. Earp, R., and **Bagui, S.** (2006). *Advanced SQL Functions in Oracle 10g*, Wordware Publishing, ISBN: 13: 978-1-59822-021-6.

5. **Bagui, S**. and Earp, R. (2006) *Learning SQL Using SQL Server 2005*, O'Reilly Publishers, ISBN: 0-596-10215-1.

6. Earp, R. and **Bagui, S**. (2008). *Practical Guide to Using SQL in Oracle*, Wordware Publishing, ISBN: 13:978-1-59822-063-6.

7. **Bagui, S**. and Earp, R. (2009). *SQL Essentials in Access*, Linus Publications, ISBN: 13:978-1-60797-040-8.

8. **Bagui, S**. and Earp, R. (2011). *Essential of SQL Using SQL Server 2008*, Jones and Bartlett, ISBN: 978-0-7637-8138-5.

9. **Bagui, S.** and Earp, R. (2012). *Database Design Using ER Diagrams*, 2nd edition, Taylor and Francis. ISBN: 9781439861769.

10. **Bagui, S.,** and Earp, R. (2015). *SQL Server 2014: A Step by Step Guide to Learning SQL*, Nova Publishers. ISBN: 978-1-63463-543-1. E-book version ISBN: 978-1-63463-554-7.

11. **Bagui, S**. and Earp, R. (2015). *Practical Guide to Using SQL in Oracle*, 2nd edition, BVT Publishing. ISBN: 978-1-62751-647-1 (e-Book) or ISBN: 978-1-62751-648-8 (loose leaf version).

International Editions (books)

12. Earp, R. and **Bagui, S**. (2003). *Learning SQL: A Step-by-Step Guide using Oracle*, Pearson Education Asia Limited and Tsinghua University Press, EISBN 0-201-77363-5 and ISBN: 7-302-06755-4 (In Chinese language).

13. **Bagui, S**. and Earp, R. (2004). *Learning SQL: A Step-by-Step Guide using Access*, Addison Wesley, ISBN: 0-321-21075-1 (International Edition).

14. **Bagui, S.** and Earp, R. (2007). *Naucite SQL na SQL Serveru 2005*, O'Reilly Publishers, ISBN: 978-86-7555-309-0.

Journal Articles (Published/Accepted)

1. **Bagui, S**. (1998). Reasons for increase in learning with multimedia, *The Journal of Educational Multimedia and Hypermedia,* **7**(1), 03-18.

2. Bagui, S.C., **Bagui, S.,** Pal, K., and Pal, N. (2003). Breast Cancer detection using Rank Nearest Neighbor Classification Rule, *Pattern Recognition*, **36**(1), 25-34.

3. **Bagui, S**. and Rodgers, E. (2003). Impact of Kolb's Learning Style on Selection of Media During Authoring of Multimedia, *Journal of Interactive Instruction and Development*, **15**(4), 3-11.

4. **Bagui, S**. (2003). Achievements and Weakness of Object-Oriented Databases, *Journal of Object Technology*, **2**(4), 29-41.

5. **Bagui, S**. and Rodgers, E. (2003). Correlation between Kolb's Experiential Learning Style and Selection of a Structure in Multimedia Authoring, *Journal of Interactive Instruction and Development*, **16**(2), 10-24.

6. **Bagui, S**. and Bagui, S.C. (2004). An Algorithm and Code for Computing Exact Critical Values for the Kruskal-Wallis Nonparametric One-Way ANOVA, *Journal of Modern Applied Statistical Methods*, **3**(1), 498-503.

7. **Bagui, S**. and Rodgers, E. (2005). Relationship between Kolb's Experiential Learning Style and Use of Navigational Features during the Authoring of Multimedia Projects, *Journal of Interactive Instruction and Development,* **17**(3), 3-14.

8. **Bagui, S**. and Bagui, S.C. (2005). An Algorithm and Code for Computing Exact Critical Values for Friedman's Nonparametric ANOVA, *Journal of Modern Applied Statistical Methods*, **4**(1), 312-318.

9. **Bagui, S**. (2006). An Approach to Mining Crime Patterns, *International Journal of Data Warehousing and Mining,* **2**(1), 50-80.

10. Bagui, S.C., **Bagui, S.,** Chatterjee, A., and Mehra, K.L. (2006). Classification with repeated independent measurements under separate sampling scheme, *Statistical Methodology*, **3**, 234-251.

11. **Bagui, S**., (2006). Rules for Migrating from Entity Relationship (ER) diagrams to Object Relationship (OR) diagrams, *Computing Letters*, **2**(4), 177-191.

12. **Bagui, S**. and Bagui, S.C. (2006). Computing Percentiles of Skew-Normal Distributions, *Journal of Modern Applied Statistical Methods,* **5**(2), 575-588.

13. **Bagui, S**., Mink, D., and Cash, P. (2007). Data Mining Techniques to Study Voting Patterns in the US, *Data Science Journal,* **6**, 46-63.

14. **Bagui, S**., (2007). A Formal Definition for Translating XML Documents to the ER Model, *International Journal of Metadata, Semantics and Ontologies,* **2**(1), 54-66.

15. **Bagui, S.**, Bagui, S.C., Pal, N.R., and Matin, M.A. (2007). Comparison between *k*-NN and *k*-RNN Classification Rules: A Monte Carlo Simulation Study, *Journal of Statistical Research,* **41**(1), 69-79.

16. **Bagui, S**., (2007). Mapping XML Schema to Entity Relationship and Extended Entity Relationship Models, *International Journal of Intelligent Information and Database Systems*, **3**(4), 325-345.

17. **Bagui, S.** Just, J., and Bagui, S. (2009). Deriving Strong Association Mining Rules Using a Dependency Criteria, the Lift Measure, *International Journal of Data Analysis Techniques and Strategies (IJDATS)*, **1**(3), 297-312.

18. **Bagui, S.** and Loggins, A. (2009). Generating Join Queries for Large Databases and Web Services, *International Journal of Information Technology and Web Engineering* (IJITWE), **4**(2), 54-72.

19. **Bagui, S.** and Ter Haar, L. (2009). Database Education in the New Millenium, *The Journal of Computing Sciences in Colleges*, **24**(4), 80-87.

20. **Bagui, S**. (2009). Mapping OWL to the Entity Relationship and Extended Entity Relationship Models, *International Journal of Knowledge and Web Intelligence (IJKWI),* **1**(1/2), 125-149.

21. Caffrey, J. M., Landing, W. M., Nolek, S. D., Gosnell, K., **Bagui, S. S.,** and Bagui, S.C. (2010). Atmospheric Deposition of Mercury and Major Ions to the Pensacola (Florida) Watershed: spatial, seasonal and inter-annual variability, *The Journal of Atmospheric Chemistry and Physics*, 10, 4593-4616.

22. **Bagui, S.** Just, J., Bagui, S, and Hemasinha, R. (2010). Using a Cosine-type Measure to Derive Strong Association Mining Rules, *International Journal of Knowledge Engineering and Data Mining (IJKEDM)*, **1**(1), 69-83.

23. **Bagui, S.** and Musgrove, C. (2010). Optimizing Outerjoins in Large Databases Using Cluster Based Partitioning. *International Journal of Data Analysis and Information Systems (IJDAIS),* **2**(2), 55-65.

24. **Bagui, S.** Islam, M., and Bagui, S. (2011). An Architecture for Query Optimization Using Association Rule Mining. *International Journal of Knowledge Based Organizations* (IJKBO), 1(4), 32-55.

25. **Bagui, S.,** Brown, J., Caffrey, J., and Bagui, S. (2012). Designing a Relational Database for Tracking and Analysis of Atmospheric Deposition of Mercury and Trace Metals in the Pensacola (Florida) Bay Watershed, *International Journal of Sustainable Society (IJSSoc),* 4(3), 240-265.

26. **Bagui, S**. and Sweetman, R. (2012). Modeling Service Data Objects (SDO's) To the Entity-Relationship (ER) Model, by Bagui and Sweetman. *International Journal of Information Technology and Web Engineering (IJITWE)*, 7(3), 14-36.

27. **Bagui, S.,** Spratlin, S., and Bagui, S. (2013). Calculating Support, Confidence and Lift in Multi-relational XML Data, *International Journal of Data Analysis and Information Systems* (IJDAIS), Vol. 5(1), 13-27.

28. Goehring, G., Reichherzer, T., El-Sheikh, E., Snider, D., Wilde, N., **Bagui, S**., Coffey, J., White, L.J. (2013). A Knowledge-Based System Approach for Extracting Abstractions from Service Oriented Architecture Artifacts in *International Journal of Advanced Research in Artificial Intelligence (IJARAI)*, Vol. 2(3), 44-52.

29. Bagui, S.C., **Bagui, S.**, and Hemasinha, R. (2013). Nonrigorous proofs of stirling's formula, *Mathematics and Computer Education*, Vol. 47(2), 115–125.

30. El-Sheikh, E., Reichherzer, T., White, L., Wilde, N., Coffey, J., **Bagui, S.**, Goehring, G., Baskin, A. (2013). Towards Enhanced Program Comprehension for Service Oriented Architecture (SOA) Systems*, Journal of Software Engineering and Application (JSEA)* Vol. 6(9), 435-445.

31. **Bagui, S.** and Zaynako, A. (2014). Determining Approximate Functional Dependencies using Association Rule Mining, *International Journal of Research in Computer Applications and Management (IJRCM),* Vol. 4(1), 10-17.

32. **Bagui, S.,** and Bouressa, J. (2014). Mapping RDF and RDF-Schema to the Entity Relationship Model, *Journal of Emerging Trends in Computing and Information Sciences*, Vol. 5(12), 953-961.

33. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** Wilde, N., Zimmerman, A. (2014). Ontological Support for the Evolution of Future Services Oriented Architectures, *Transaction on Machine Learning and Artificial Intelligence (TMLAI)*, Vol. 2(6), 77-90.

34. **Bagui, S.,** and Nguyen, L. (2015). Database Sharding: To provide fault tolerance and scalability of Big Data on the Cloud, *International Journal of Cloud Applications and Computing (IJCAC)*, Vol. 5(2), 36-52.

35. Fridge, E., and **Bagui, S.** (2016). Impact of Automated Software Testing Tools on Reflective Thinking and Student Performance in Introductory Computer Science and Programming Classes, *International Journal of Information and Communication Technology Education (IJICTE)*, 12(1), 24-40.

36. Bagui, S., **Bagui, S**, and Hemasinha, R. (2016). The Statistical Classification of Breast Cancer Data, *International Journal of Statistics and Applications*, 6(1), 15-22.

37. **Bagui, S.,** Xingang, F., Kalaimmanan, E., Bagui, S., and Sheehan, J. (2017). Comparison of Machine Learning Algorithms for classification of VPN and non-VPN Network Traffic Flow Using Time-Related Features, *Journal of Cyber Security Technology*, 1(2), 108-126.

38. Xingang F., **Bagui, S.,** and Bagui, S. (2017). "Improving Virtual Screening Predictive Accuracy of Human Kallikrein 5 inhibitors using Machine Learning Models, *Computational Biology and Chemistry*, 69, 110-119.

39. Cox, A., Guzman, I., Crommer, K., **Bagui, S.** (2017). Virtual world, Virtual Reality, and Augmented Reality: Different Types, Different Users, Different Purchase Intentions, *Journal of Virtual Worlds Research*, 10(1), 1-21.

40. **Bagui, S**. and Devulapalli, K. (2018). A Comparison of Hive's Optimization Techniques, *International Journal of Big Data Intelligence (IJBDI)*, 5(4), 243-257.

41. **Bagui, S.,** and Spratlin, S. (2018). A Review of Data Mining Algorithms on Hadoop's MapReduce, *International Journal of Data Science,* 3(2), 146-169.

42. **Bagui, S.,** John, S., Baggs, J., Bagui, S. (2018). A Parallel Implementation of Information Gain Using Hive in conjunction with MapReduce for Continuous Features, *Lecture Notes in Computer Science*, submitted.

Refereed Publication in Encyclopedia

1. **Bagui, S**. (2006). Generalizations and Specializations and Categories in ER Diagrams, *Encyclopedia of Database Technologies,* Idea Group Publishing, 233-239.

Refereed Proceedings

1. **Bagui, S.** (2005). Rules for Migrating from ER and EER diagrams to Object-Relationship (OR) diagram, *Proceedings of the 43rd ACM Southeast (ACMSE) Conference*, **1**, 243-244, Kennesaw, GA, March 18-20 (acceptance rate – about 28%).

2. **Bagui, S.** and Walker, D. (2006). A Java Based Parser Software for Converting XML Documents to the ER Model and Relational Databases, *Proceedings of the 2006 International Conference on Semantic Web and Web Services,* 166-169, Las Vegas, Nevada, June 26-29 (acceptance rate –approx. 32%).

3. **Bagui, S.** (2007). Developing a conceptual model for XML Schema, *Proceedings of the 2007 International Conference on Semantic Web and Web Services,* 69-71, Las Vegas, Nevada, June 25-28 (acceptance rate – about 32%).

4. Prayaga, L., White, L., **Bagui, S.** (2009). Innovative Strategies to Build IT Workforce, *Proceedings of 22nd Conference on Software Engineering Education and Training*, 202-209.

5. **Bagui, S**. Mohammad, I. (2010). Query optimization in large databases using Association Rule Mining, *Proceedings of the 48th ACM Southeast Conference*, Oxford, MS, April 15-17.

6. El-Sheikh, E., **Bagui, S.,** Firesmith, D., Petrov, I., Wilde, N., Zimmermann, A. (2013). Towards Semantic-Supported SmartLife System Architectures for Big Data Services in the Cloud. *Proceedings of the 5th International Conferences on Advanced Service Computing,* May 27-June 1, Valencia, Spain, IARIA XPS Press.

7. Zimmermann, A., Gonen, B., Schmidt, R., El-Sheikh, E., **Bagui**, **S**., and Wilde. N. (2014). Adaptable Enterprise Architectures for Software Evolution of SmartLife Ecosystem. Proceedings of IEEE EDOC – SoEA4EE 2104: *The Sixth Workshop on Service oriented Enterprise Architecture for Enterprise Engineering,* Sept. 1-5, 2014, Ulm, Germany.

8. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** Wilde, N., Zimmermann, A., and Petrov, I. (2014). Maintaining SOA Systems of the Future: How Can Ontological Modeling Help? Proceedings of KEOD 2014: *The International Conference on Knowledge Engineering and Ontology Development,* October 21 – 24, 2014, Rome, Italy.

Refereed Extended Abstracts

1. **Bagui, S**., Mondal, A. and Bagui, S. (2018). Efficient KNN algorithm using Locality Sensitive Hashing in the MapReduce Framework, *Proceedings of the ACMSE 2018 Conference*, Eastern Kentucky University, Richmond, KY, March 29-31.

2. **Bagui, S.,** Dhar, P. (2018). Mining Positive and Negative Association Rules in Hadoop's MapReduce Environment, *Proceedings of the ACMSE 2018 Conference*, Eastern Kentucky University, Richmond, KY, March 29-31.

3. **Bagui, S.,** Nandi, D., Bagui, S. (2018). A Hybrid Genetic Algorithm for Network Intrusion Detection, *Proceedings of the ACMSE 2018 Conference*, Eastern Kentucky University, Richmond, KY, March 29-31.

4. **Bagui, S.,** John, S., and Baggs, J. (2018). A Comparative Study of MapReduce and Hive Based on the Design of the Information Gain Algorithm for Analytical Workloads, *Proceedings of the ACMSE 2018 Conference*, Eastern Kentucky University, Richmond, KY, March 29-31.

Book Chapters

1. Earp, R. and **Bagui, S.** (2000). Building An Entity Relationship Diagram: A Software Engineering Approach, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-41**, Dec., 1-16.

2. Earp, R. and **Bagui, S**. (2001). Extending Relationships in the Entity Relationship Diagram, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-42**, May, 1-14.

3. Earp, R. and **Bagui, S**. (2002). Binary Relationships in Entity Relationships in Entity Relationship (ER) Diagrams, *Data Management Handbook,* CRC Press, Auerbach Publications*,* **22-10-43**, April, 1-17.

4. **Bagui, S**. and Earp, R. (2003). Ternary and Higher-Order ER Diagrams, *Data Management Handbook,* CRC Press, Auerbach Publications, **22-10-44**, June, 1-21.

5. Wilde, N., **Bagui, S**., Coffey, J., El-Sheikh, E., Reichherzer, T., White, L., Goehring, G., Terry, C., Baskin, A. (2013). Interoperable Systems and Software Evolution: Issues and Approaches, *Digital Enterprise Design and Management 2013, Advances in Intelligent Systems and Computing*, Volume 205, 2013, chapter 10, 45-56, Springer Berlin Heidelberg, doi={10.1007/978-3-642-37317-6_5}.

Other Publications

1. Earp, R., and **Bagui, S**. (2000). Oracle's Joins, *Oracle Internals,* **2**(3), 6-14.

2. Earp, R. and **Bagui, S**. (2001). Oracle's Triggers, *Oracle Internals,* **2**(10), 14-20.

3. Earp, R. and **Bagui, S**. (2001). An In-depth look at Oracle's Correlated Subqueries, *Oracle Internals*, **3**(4), 2-8.

4. **Saha, Sikha** (1988). Software Review of ENABLE, *Journal of Computer Based Instruction*, **15**(1).

5. **Saha, Sikha**, (1988). Book Review, Files and Databases, An Introduction, *Interfaces*, **18**(3).

Papers re-printed as Book Chapters

1. Earp, R., and **Bagui, S**. (2004). Oracle's Joins, *Oracle Internals: Tips, Tricks, and Techniques for DBAs,* edited by Donald K. Burleson, Auerbach Publications, Taylor and Francis Group.

2. Earp, R. and **Bagui, S**. (2004). Oracle's Triggers, *Oracle Internals: Tips, Tricks, and Techniques for DBAs,* edited by Donald K. Burleson, Auerbach Publications, Taylor and Francis Group.

3. Earp, R. and **Bagui, S**. (2004). An In-depth look at Oracle's Correlated Subqueries, Oracle SQL Training and CBO Internals, edited by Kimberly Floss, Rampant Press.

4. Earp, R., and **Bagui, S**. (2004). Oracle's Joins, Oracle SQL Training and CBO Internals, edited by Kimberly Floss, Rampant Press.

5. **Bagui, S**. (2008). An Approach to Mining Crime Patterns, *Data Warehousing and Mining: Concepts, Methodologies, Tools, and Applications,* edited by John Wang, IGI Global Publications.

6. **Bagui, S.** (2009). An Approach to Mining Crime Patterns, *Selected Readings on Database Technologies and Applications*, edited by Terry Halpin, IGI Global Publications.

7. **Bagui, S.** (2009). Mapping Generalizations and Specializations and Categories to Relational Databases, *Handbook of Research on Innovations in Database Technologies and Applications: Current and Future Trends*, edited by Viviana E. Ferraggine, Jorge H. Doorn, Laura C. Rivero, Information Science Reference. ISBN-13: 9781605662428, 1-11.

8. **Bagui, S.** and Loggins, A. (2011). Automating the Generation of Joins in Large Databases and Web Services, *Web Engineered Applications for Evolving Organizations: Emerging Knowledge,* edited by Ghazi, I. Alkhatib, IGI Global Publications. ISBN: 978-1-60960-523-0.

9. **Bagui, S**., Islam, M., and Bagui, S. (2012). An Architecture for Query Optimization Using Association Rule Mining, *Intelligence Methods and Systems Advancements for Knowledge-Based Business*, IGI Global.

10. **Bagui, S.,** and Nyugen, L. (2015). A Key Based Database Sharding Implementation for Big Data Analytics, *Advanced Research on Cloud Computing Design and Applications*, IGI Global (in press).

Workshops

1. Bilal Gonen, Xingang Fang, Eman El-Sheikh, Sikha Bagui, Norman Wilde, Semantic Traversing Documents by Using Semantic Relationships, *Workshop on Grand Challenges in Engineering and Applied Sciences,* Princeton University, Princeton, NJ, May 15-18, 2014.

Grant Reports

1. Caffrey, J., Landing, W., **Bagui, S**., Bagui, S. (2009). *Atmospheric Deposition of Mercury or Trace Metals to the Pensacola Bay Watershed*, February 15, 2009.

Submittals/In preparation
43. **Bagui, S.,** Devulapalli, K., Coffey, J., "A Heuristic Approach for Load Balancing the FP-Growth Algorithm on MapReduce, submitted to *IEEE* Transactions on Big Data, July 28, 2017.
44. **Bagui, S.,** Devulapalli, K., Sharon, J. "MapReduce Implementation of a Mixed and Multinomial Naïve Bayes Classifier," submitted to Data and Knowledge Engineering, Sept 14, 2018.
45. **Bagui, S.,** and Butler, J. "Mining Trends in Chronic Health Care Conditions in the United Stated from 2012-2015, submitted to IJHTM.

Series Editor for "Foundation for Database Design Books" for CRC press.
   Books in this series:
   1. Garmany, J, Walker, J., and Clark, T. (2005). *Logical Database Design Principles*, CRC Press, Auerbach Publications, ISBN: 0-8493-1853-X.

2. Chao, L. (2005). *Database Development and Management*, CRC Press, Auerbach Publications, ISBN: 0-8493-3318-0.

Editorial Board member:

i. *International Journal of Data Analysis Techniques and Strategies (IJDATS).*

ii. *World of Computer Science and Information Technology Journal (WSCIT).*

iii. *Universal Journal of Computer Science and Engineering Technology (UniCSE).*

iv. *Inventi Journals, http://www.inventi.in*

v. *Amity Journal of Engineering and Technology.*

vi. *Journal of Technologies (http://www.mdpi.com/journal/technologies, ISSN 2227-7080).*

vii. *Journal of Applied Information Science (http://submission.publishingindia.com/index.php/JAIS)*

viii. *International Journal of Technology in Computer Science and Engineering (IJTCSE).*

2. *Associate Editor:*

i. *International Journal of Advanced Computer Science and Applications (IJACSA).*

Technical Committee Member

International Conference on Intelligent Systems and Control (ISCO'2013).

REVIEWED

Articles for

IEEE Transactions for Data and Knowledge Engineering
IEEE Transactions for Parallel and Distributed Computing
IEEE/ACM Transactions on Computational Biology and Bioinformatics
IEEE Computer
Data and Knowledge Engineering
Pattern Recognition Letters
Journal of Big Data
Journal of Technologies
International Business Schools Computing Quarterly
Encyclopedia of Database Technologies and Applications
Iranian Journal of Electrical and Computer Engineering (IJECE)
Handbook for Technology Management
ACMSE
International Journal of Data Analysis Techniques and Strategies (IJDATS)
International Journal of Knowledge Engineering and Data Mining (IJKEDM)
International Journal of Intelligent Information and Database Systems (IJIIDS)
International Journal of Advanced Computer Science and Applications (IJACSA)
Consortium for Computing Sciences in Colleges (CCSC)
International Journal of Computer Engineering Research (IJCER)
Data Science Journal
Journal of Systems and Software
Intelligent Systems and Control (ISCO 2013)
8th International Conference on Knowledge Generation, Communication and Management: KGCM 2014.
Information.
2nd International Conference on Information System and Data Mining (ICISDM 2017).
3rd International Conference on Information System and Data Mining (ICISDM 2018).

Grants for

1. Kentucky Science and Engineering Foundation, 2007; April 2012.
2. Kentucky Science and Engineering Foundation. Grant title: Tools for reusing data modeling patterns: Development and evaluation, 2008.
3. NSF Database Grant for Kennesaw State University, titled: Animated Database Courseware (ADbC), 2009.
4. Florida Consortium in Cybersecurity, 2014.
5. Florida Consortium of Cybersecurity (FC2) Seed Grant Program, 2014-2015.

Books

1. *Data Structures and Algorithms in C++* (2002), by Goodrich, Tamassia, & Mount, for John Wiley & Sons.
2. *Oracle – Physical Database Design* by Don Burleson, for CRC Press.
3. *GO Series in Microsoft Office, 2003,* for Prentice Hall.
4. *Quick, Simple MicroSoft Office 2000*, by Erickson, for Prentice Hall.

HONORS & AWARDS

Research Awards
    1. Recipient of *2012 Distinguished Research and Creative Activities Award*, UWF.
    2. Recipient of *2007 Distinguished Research and Creative Activities Award*, UWF.

Teaching Awards
    1. Recipient of *Excellence in Teaching and Advising Award*, 2012, UWF.
    2. Recipient of *Excellence in Undergraduate Teaching and Advising Award*, 2006, UWF.
    3. Recipient of *Teaching Incentive Program (TIP)* Award, 2002-2003, UWF.
    4. Recipient of *Excellence in Undergraduate Teaching and Advising Award*, 2001-02, UWF.

Other
    Nominated for *Distinguished Teaching Award* by Student Government, 2000-01, UWF.
    Recipient of Special Summer Graduate *Scholarship*, 1999, UWF.
    Recipient of Delores A. Auzenne Graduate *Fellowship*, 1999, UWF.

GRANTS RECEIVED

1. NSF funded travel grant for Sixth Annual Winter Workshop: Data Mining, Statistical Learning and Bioinformatics, UF Gainesville, January 2004, $400.00.
2. Recipient of University Summer 2005 Research Award of $6250, for proposal entitled, *Pattern Classification in Breast Cancer Data: A Data Mining Approach.*
3. Grant recipient of Graduate Research Assistant, from Graduate Office, UWF, Spring 2006, $1,500.00.
4. Workshop: *Advanced SQL Server (Database) Training,* Operations IT Staff from Saufley Field, US Navy, L3 group (Summer 2005), conducted at ATC, UWF, $5,000.
5. **Senior Key Personnel,** Electric Power Research Institute (EPRI) Grant, titled: "*Atmospheric deposition of mercury and trace metals in the Pensacola Bay Watershed Phase II*", 2009, for $287,020.
6. **Co-PI,** Florida's Great North West Workforce Innovation Consortium Grant, North West Florida Computing and Engineering Training Scholarship Program (Fall 2009 – Dec 2010), $1,000,000.
7. **Senior Key Personnel,** Electric Power Research Institute (EPRI) Grant, titled: "*Atmospheric deposition of mercury and trace metals in the Pensacola Bay Watershed Phase III*", 2010, for $287,020.

GRANTS SUBMITTED (Not funded)

1. PI, *Mining Breast Cancer Data,* grant submitted to Department of Defense, for approx. $300,000 for 3 years. Submitted: 2002.
2. PI, Developing a Java Based Parser Software for Converting XML Documents to the ER and EER model and relational databases, for approx $186.800, for 2 years. Submitted: August 2006.
3. Co-PI, STEP Grant: *Building Sustainable Futures Through STEM Program Initiative*, $994,029, NSF 0856031, 5 years. Submitted: September 2008.
4. Co-PI, PRISM Grant: *PRISM Through Early Engagement of Introductory Level Students in Discovery and Research,* for $960,625. NSF: 08-596 IRF, 3 years. Submitted: February 2009.
5. PI, Longitudinal Study of Multiple Lipid Indices to Predict Cardiovascular Disease, NIH Challenge Grants, RFA-OD-09-003, $246,413, 1 year. Submitted: April 2009.

6. Senior Key Personnel for Synthesis and investigation of superconducting semiconductors and approach for a new generation of electronic components, submitted to AFOSR. Total: ~ $1,500,000 in total for 5 years. Submitted: Summer 2009.
7. Co-PI, S-STEM Grant: Scholarships to Promote Interdisciplinary Undergraduate STEM Research, NSF Proposal Number: 1060363: $598,785, 5yrs. Submitted: Summer 2010.
8. PI, TAACCCT, Department of Labor (DOL) Consortium grant, $500,000, June 2014
9. Co-PI, H1b Grant, DOL Consortium grant, $500,000, June 2014.
10. UWF PI, NSF Grant: Big Data Spokes SPOKE: SOUTH: Collaborative: The Academic and Professional Learning Initiative for Applied Data Science, $400,000, February, 2016.
11. Senior Key Personnel. Project Title: Integrated Water Quality and Habitat-Use Monitoring to Evaluate Restoration Success in the Florida Panhandle Estuaries, $1.46 million, Summer, 2017.
12. Co-PI, NSF Grant: IIS- BD Spokes: Small: South: Interactive Automated Data Analytics Using the Hadoop Framework – IADA, $384,499, September 2017.
13. PI, NSF Grant: "CSS&E: D3SC: ChemVec - Context-aware representation learning algorithms to generate meaningful chemical fragment vectors and molecular vectors", $282,876, October, 2017.
14. PI, NSF Grant: RET Site: Computer Science Research Experiences for Teachers Focused on Security of Internet of Things (IoT) and Data Analysis, $599,190, October, 2017.

PRESENTATIONS

International Conferences

1.*A Java Based Parser Software for Converting XML Documents to the ER Model and Relational Databases,* World Congress in Computer Science, WORLDCOMP 2007, Computer Engineering, and Applied Computing, Las Vegas, NV, June, 2006.
2. *Developing a Conceptual Model for XML Schema,* World Congress in Computer Science, WORLDCOMP 2007, Computer Engineering, and Applied Computing, Las Vegas, NV, June, 2007.
3. *Optimizing Outerjoins in Large Databases using Cluster-based partitioning*, World Multiconference on Systemics, Cybenetics and Informatics (WMSCI) 2010, Orlando, FL June 29-July 2, 2010.
4. *Role of Climate and Local Emission Sources in the Wet Deposition of Mercury and Major Ions in the Pensacola Region,* 10th International Conference on Mercury as a Global Pollutant (ICMGP), Halifax, Nova Scotia, July 24-29, 2011.
5. *Temporal and Spatial Variability of Mercury, pH, and Non-Sea Salt Sulfate Fluxes Associated with Changes in Anthropogenic Emissions in the Pensacola Bay Region*, Eighth National Monitoring Conference, April 30 – May 4, 2012, Portland, Oregon.
6. *Interoperable Systems and Software Evolution: Issues and Approaches,* Digital Enterprise Design & Management (DED&M), Paris, France, February, 2013.
7. *Towards Semantic-Supported SmartLife System Architectures for Big Data Service in the Cloud,* SERVICE COMPUTATION 2013, The Fifth International Conferences on Advanced Service Computing, Valencia, Spain, May/June, 2013, http://www.iaria.org/conferences2013.
8. *Ontology-Based SmartLife Enterprise Services Architectures for Big Data in the Cloud,* ESOCC 2013, Malaga, Spain, September 11 – 13, 2013.
9. Bilal Gonen, Xingang Fang, Eman El-Sheikh, **Sikha Bagui,** Norman Wilde, Alfred Zimmermann and Ilia Petrov, Semantic Search to Support the Evolution of SmartLife

Applications, *9th International Joint Conference on Software Technologies*, Vienna, Austria, August 29-31, 2014.

10. Alfred Zimmermann, Bilal Gonen, Rainer Schmidt, Eman El-Sheikh, **Sikha Bagui**, and Norman Wilde, Adaptable Enterprise Architectures for Software Evolution of SmartLife Ecosystems, *The 18th IEEE International EDOC Conference (EDOC 2014) "The Enterprise Computing Conference*", Ulm, Germany, September 1-5, 2014.

11. Kalaimannan, E., Mitchell, C., **Bagui, S.** and Bagui, S. (2015). *An Automated Method of Classifying and Analyzing Malware based Operating System Calls*, Annual Computer Security Applications Conference, December 2015, Los Angeles, CA.

12. **Bagui, S.,** John, S., Baggs, J., Bagui, S. (2018). A Parallel Implementation of Information Gain Using Hive in conjunction with MapReduce for Continuous Features, *PAISI, The 22nd Pacific Asia Conference on Knowledge Discovery and Data Mining (PAKDD),* Melbourne, Australia, June 3-6.

National Conferences

1. **Bagui, S**. (2004). Discovering Crime Patterns in a State Database, University of Florida *Sixth Annual Winter Workshop: Data Mining, Statistical Learning and Bioinformatics.*

2. **Bagui, S**. (2005). Rules for Migrating from Entity Relationship (ER) and Extended Entity Relationship (EER) diagrams to Object Relationship (OR) diagrams, *ACMSE*, Kennesaw, GA, March 18-20.

3. **Bagui, S.** (2009). Database Education in the New Millenium, *Consortium for Computing Sciences in Colleges* (CCSC), Hammond, LA, April 24-25.

4. Gonen, B., Xingang F. El-Sheikh, E., **Bagui, S**., Wilde, N. (2014). Semantic Traversing Documents by Using Semantic Relationships, *Workshop on Grand Challenges in Engineering and Applied Sciences,* Princeton University, Princeton, NJ, May 15-18.

5. **Bagui, S**., Mondal, A. and Bagui, S. (2018). Efficient KNN algorithm using Locality Sensitive Hashing in the MapReduce Framework, *ACMSE*, Richmond, KY, March 29-31 (poster presentation).

6. **Bagui, S**., Dhar, P. (2018). Mining Positive and Negative Association Rules in Hadoop's MapReduce Environment, *ACMSE*, Richmond, KY, March 29-31 (poster presentation).

7. **Bagui, S.,** Nandi, D., Bagui, S. (2018). A Hybrid Genetic Algorithm for Network Intrusion Detection, *ACMSE*, Richmond, KY, March 29-31 (poster presentation).

8. **Bagui, S.,** John, S., and Baggs, J. (2018). A Comparative Study of MapReduce and Hive Based on the Design of the Information Gain Algorithm for Analytical Workloads, *ACMSE*, Richmond, KY, March 29-31 (poster presentation).

Regional Conferences/Symposiums

1. "*Database Development for Atmospheric Deposition in Pensacola Bay Watershed*", Center for Environmental Diagnostics and Bioremediation (CEDB), University of West Florida, Pensacola, FL., Nov 6th, 2008.

2. "*Some Aspects of Skew-Normal Distribution*", Presented at Mathematics Association of America (MAA) Florida Chapter Meeting, The University of West Florida, Pensacola, FL., Nov. 21, 2008.

3. *"Designing a Relational Database for tracking and analysis of Atmospheric Deposition of Mercury and Trace Metals in the Pensacola Bay Watershed",* Mercury Deposition Meeting, Organized by Center for Diagnostics and Bioremediation, University of West Florida, Pensacola, FL, Jan 13-15, 2010.

4. *Database Development for Tracking and Analysis of Atmospheric Data,* Hg Measurements Meeting, University of West Florida, Pensacola, FL., February 2-3, 2011.
5. *Spatial and Temporal Trends in Atmospheric Deposition of Mercury, Trace Metals and Major Ions in the Pensacola Bay Watershed*, Hg Measurements Meeting, University of West Florida, Pensacola, FL, February 2-3, 2011.
6. *Nonrigorous Proofs of Stirling's Formula,* presented at the Florida Chapter of the MAA Meeting, The University of University of West Florida, November, 2012.

Other Presentations

1. Presented several seminars on using Enable, DBASE III Plus, and Lotus 123 to faculty at The University of Toledo in 1987.
2. "*Multimedia, Hypermedia & CD-ROM technology*", presented at Kent State University, April, 1991.
3. "*Impact of Kolb's Learning Style on the Authoring of Multimedia/Hypermedia*", presented at The Department of Computer Science, The University of West Florida, Pensacola, FL, October, 2000.
4. *"Breast Cancer Detection Using Rank Nearest Neighbor Classification Rules"*, presented in Joint Statistical Meetings of American Statistical Association, Atlanta, GA, August, 2001.
5. "*Mining Association Rules for Insurance Data*", presented at The Department of Computer Science, University of West Florida, Pensacola, FL, March, 2002.
6. "*Data Mining: Discovering Association Rules for Insurance Data,*" invited talk, presented at The Department of Computer Science, Florida A&M University, Tallahasse, FL, July 2002.
7. Invited Panel Discussion: *Challenges facing Information Studies/Information Technologies*, participated at Florida State University, College of Information Studies, Tallahasse, FL, July 2002.
8. Invited talk: *Database Concepts*, College of Information Technology, Georgia Southern University, Statesboro, GA, October, 2002.
9. Invited talk: *Database Interface of VB.Net*, Roger Williams University, Bristol, RI, February, 2003.
10. *"Association Rule Mining"*, presented at The Department of Computer Science, Florida A & M University, Tallahasse, FL, July 2003.

Local Symposium Presentations

1. "*An Algorithm and Code for Computing Exact Critical Values for the Kruskal-Wallis Nonparametric One-Way ANOVA*, presented at SEASTARS 2004, April 19, 2004 (poster session).
2. *"Discovering Crime Patterns in a State Database,"* presented at SEASTARS 2004, April 19, 2004 (poster session).
3. *"An Algorithm and Code for Computing Exact Critical Values for the Friedman's Nonparametric ANOVA",* presented at SEASTARS 2005, April 19, 2005 (poster session).
4. *"Rules for Migrating from Entity Relationship (ER) Diagrams,"* presented at SEASTARS 2005, April 19, 2005 (poster session).
5. "*A Java Based Parser Software for Converting XML Documents to ER Diagrams and Relational Databases,*" presented at SEASTARS 2006, April 26, 2006 (poster session).
6. "*An Algorithm and Code for Computing Percentiles of Skew-Normal Distributions*", presented at SEASTARS 2006, April 26, 2006 (poster session).

7. "*SOA and Databases*", departmental seminar series, Computer Science Department, Sept 8, 2008.
8. *Calculating Support, Confidence and Lift in Multi-relational XML Data,* SSE Seminar Series, Dec 7, 2012.
9. **Bagui, S.,** *The Transformation of Data*, Rite of Passage Lecture, The University of West Florida, March 28, 2014.
10. Gonen, B., Fang, X., El-Sheikh, E., **Bagui, S.,** and Wilde, N. (2014). Semantic Traversing Documents by Using Semantic Relationships. 2014 Faculty Research Showcase, University of West Florida, Pensacola, FL, April 24, 2014.
11. **Bagui, S.,** Cybersecurity at UWF, presentation made to UWF's IT Pack, October 29, 2014.
12. **Bagui, S.,** Cybersecurity, how does it work, presentation made at Open House, April 11, 2015.

SERVICE

Departmental Service, Fall 1999 – Spring 2005

1. Departmental committees:
   Undergraduate Committee (1999 - 2005); Online committee (2005); Chair Search committee (Spring 2005 – Summer 2005), Lecturer Search committee (Summer 2005), Java Programming Committee (COP2253) (Fall 2004 – 2005).
2. Course Coordinator commitments:
Aug 1999 – August 2005:
   Microcomputer Application Packages (CGS 2570), Multimedia Systems (CGS 3994), Web Page Design (CGS 3823), Database Systems (COP 4710), Advanced Database Systems (COP 5715), Desktop Publishing (CGS 2580), Visual Programming (CGS 3464). Developed CCRs for the above courses during this period, and was instrumental in putting Microcomputer Application Packages online for the first time.
Summer 2001 to August 2005:
   Database Systems (COP4710), Advanced Database Systems (COP5715), Data Structures and Algorithms (COP3530) (Summer 2001 – April 2003)
3. ABET coordinator for review for (Fall 1999 – Fall 2001):
   Database Systems (COP 4710), Data Structures and Algorithms (COP3530).
4. Programming Competitions
   1. Prepared, coordinated, and evaluated UWF's AITP C++ Programming Competition, Spring 2001.
   2. Prepared students for Oracle's Nation-wide competition, 2000-01.
5. Directed Independent Study students: Spring 2009 – 3; Fall 2008 – 1; Fall 2007 – 1; Spring – 2; Fall, 2005 – 1; Spring 2005 – 1; Spring 2003 – 1; Summer 2002 – 1; Fall 2001 – 1.
6. Conducted Java Boot Camp, Fall, 2005.

Departmental Service, FALL 2006 – Present

1. Coordinator, Ed.D. Program, Computer Science specialization (2007 – 2015).
2. Coordinator, Medical Information Technology Program (2007 – 2013).
3. Coordinator for CS Department's Certificate programs (2006 – present).
   Certificates developed:
   i.Certificate in Database Systems (2007).
   ii.Certificate in Web Technologies (2007).

    iii.Certificate in Cybersecurity (2014).

    iv.Certificate in GeoComputing (2014).

    v.GeoCyber Certificate (2015).

    vi.Data Science Certificate (2015).

4. MSDNAA Coordinator (2007 – 2010).
5. Program reviews:
   i. Chair, IT Program Review, 2009-2010.
   ii. Chair, CS Undergraduate and Graduate Program Review, 2013-2014.
   iii. Chair, IT Program Review, 2016-2017.
6. Committees served on:
a. Search Committees:
   i. Search committee, Office Support Specialist position (in Computer Science), member, Fall 2006
   ii. Chair, CS Faculty Search Committee, Fall 2009, Fall 2010.
   iii. Member, CS Department Faculty Search Committee, Spring, 2012.
   iv. Chair, CS coordinator/advisor search committee, Spring, 2012.
   v. Chair, Cybersecurity Faculty Search Committee, 2013-14.
   vi. Hiring official, Cybersecurity Office Administrator Search Committee, Summer, 2014.
   vii. Hiring official, Cybersecurity Advisor Search Committee, Summer, 2014.
   viii. Hiring official, IT Techie Search Committee, Fall, 2014.
   ix. Hiring official, Battle Lab Techie Search Committee, Fall 2014.
   x. Chair, CS Faculty Search Committee, 2014-15.
b. Other committees:
   i.Junior Faculty Mentoring committee (2005 – 2006)
   ii.Departmental Web Page development committee, 2007- present
   iii.SE Curriculum development committee, member, 2007-2008.
   iv.Grand Opening Planning Committee, member, Fall 2009.
   v.Assessment Committee, member, Summer 2010 – present.
   vi.Common Pre-requisites Committee, department representative, Spring 2011 – present.
   vii.Member, CS departmental scholarship committee, 2009 - present
   viii.Member, CS departmental assessment committee, 2011-present.
   ix.Chair, CS department strategic planning committee, 2013-present.
   x.Battle lab renovation committee, 2014-2015.
   xi.Hadoop Cluster Purchase committee, 2014-2015.
   xii.Chair, CS Department Equipment committee, 2014-present.
   xiii.Member, By-Laws Committee, 2014-present.
7. Developed CCRs for:
   i. Advanced Database Systems (COP6727) – graduate database course
   ii. Data Mining (CAP4770/5771) – dual listed data mining course
   iii. Database Administration (COP4723/5775) – dual listed course
   iv. CIS major, CIS minor, IT major, IT minor
   v. IT Tracks – Networking and Telecommunications Technologies, Human Computer Interaction, Information Technology, and Digital Enterprise.
   vi. MSIT program CCR, 2015.
   vii. MSIT/Cybersecurity specialization, 2015.
   viii. MSIT/Database specialization, 2015.
8. New Courses developed:
   1. Advanced Database Systems (COP6727)
   2. Data Mining(CAP4770/CAP5771)

    3.   Database Administration(COP4723/COP5775)
9. Online courses developed:
   1. Database Systems (COP4710/COP5725)
   2. Advanced Database Systems (COP6727)
   3. Data Mining(CAP4770/CAP5771)
   4. Database Administration(COP4723/COP5775)
   5. Seminar in SOA(COP5990).
10. New Specializations developed:
    1. MSA/DBA (2007).
    2. MS/CS/DB (2010).
    3. BS/CS/CyberSecurity (2013).
11. New Programs developed:
    1. MSIT
       i. MSIT/Database Management (2015).
       ii. MSIT/Cybersecurity (2015).
12. Student recruitment efforts
    1. Articulation with Junior Colleges: March 2007, March 2008.
    2. CS Department Open House: Jan 2007; Nov 2007; Feb 2009; Nov 2009; April 2010,; June 13, 2011; June 16, 2011; June 20, 2011; June 23, 2011; July 14, 2011; Sept 17, 2011; Oct 15, 2011, Mar 17, 2012; Nov 2013; Nov 11, 2014; April 11, 2014;
    3. Pensacola Junior College visits: March 20, 2008, April 8, 2008.
    4. Holodeck presentation to Middle School teachers, April 16, 2010.
    5. West Florida High School, May 2011.
13. Coordinated, prepared and administered test for student – to test out of Web Page Design Course (CGS3823), Spring 2006.
14. Outreach Activities – visited: Alpha Data Corporation, FW Beach, NAS Pensacola, Bullet Technologies, General Dynamics, Pall Corporation, Cogon, App River, Avalex Technologies, Media Com, Coco, Beyond.com, Booz Allen Hamilton.
15. Participated in SSE Grand Opening Events, Feb 3-5, 2010.
16. Directed independent study students: (2009-2010): 12; supervised one honors thesis; coordinated 6 internships; and served on one master's committee.
17. Advising:
    1. 2009-2010: 55 undergraduate advisees and 42 graduate advisees.
    2. 2010 – 2011: 60 undergraduate advisees and 45 graduate advisees
    3. 2011 – 2012: 55 undergraduate advisees and 48 graduate advisees
18. Chair, Ed.D. committee, 2011 – 2014.
19. International Collaborations:
    1. Working with China, 2013.
    2. Working with Faith University in Turkey, 2014-2015
    3. Working with Reutlingen University in Germany, 2011 – present.
20. Meetings:
    1. Organized and hosted Florida Consortium on Cybersecurity (FC2) at UWF's Department of Computer Science, Sept 16, 2014.
    2. Committee member, STARTUP weekend, 2013-present.
    3. Committee member, Cyberthon, 2015.
21. Articulation Agreements
    1. Articulation with Pensacola State College
22. Non-Disclosure Agreements
    1. General Dynamics IT (GDIT), February, 2015.

    2. Los Alamos Technical Associates, Inc. (LATA), February, 2015.
23. Accreditations and Designations
    1. Professional Master's Designation (PSM) for Master of Science in Administration, with a specialization in Cybersecurity.
    2. CAE, 2015.

COLLEGE-WIDE SERVICE

1. Elections Committee (At Large), member, 2006 -2008, 2008-2010, 2011-2013, 2013-2015.
2. Academic Standards Committee, member, 2006-2009.
3. CAS Council, member, 2007-2010.
    a. Chair, CAS Graduate Program Committee (CAS Council ad hoc committee), fall 2010.
4. Search Committee, Art Department, member, 2008.
5. Search Committee, CEDB, member, 2008.
6. Search Committee, Physics, member, 2008.
7. Tenure and promotion mentoring committee, Art Department, member, 2008-09, 2012-13.
8. Tenure and promotion mentoring committee, Biology, 2012-2013.
9. ATC Search Committee, member, Spring 2011.
10. Graduate Council, Fall 2018 – 2021.

UNIVERSITY-WIDE SERVICE

1. Excellence in Undergraduate Teaching and Advising Committee, member, 2002-2003.
2. Academic Technology Advisory Council (ATAC), member, Fall 2004 – 2006.
3. Faculty Merit Scholarship Program Review Committee, member, 2005 – 2006.
4. Faculty Phone-A-Thon, Admissions Office, UWF, student recruitment, Fall and Spring, 2006.
5. Excellence in Undergraduate Teaching and Advising Committee, member, 2007.
6. Co-chair, Faculty and Staff Campaign, UWF, 2007 – 2009; member, 2010.
7. Participated in UWF's Fund Raising Campaign – Great Futures Campaign, 2007.
8. Computer Science Video Clips for Office of Admissions (for recruitment), Summer 2009.
9. Faculty Video Profile for SSE, Summer 2009.
10. University Faculty Personnel Committee, 2010-2013.
11. Member of STRIDE task force (part of ADVANCE – NSF grant), 2012 – 2015
12. Member of ADVANCE (part of NSF grant), 2012-2015.
13. Member of Chair's Handbook Composition Committee, 2012-2013.

COMMUNITY SERVICE

1. Judge in Math/Computer Science Judge for 49th Annual West Panhandle Regional Science and Engineering Fair, February, 2004.
2. Lead judge in Math/Computer Science Judge for 50th Annual West Panhandle Regional Science and Engineering Fair, February, 2005.
3. Served for *Tsunami* fund raising event, January, 2005.

PROFESSIONAL SERVICE

1. Guided student in creating database for Gulf Coast Kids Club, Fall 2005.
1. Developed Alumni database for Department of Computer Science, UWF, (Fall 2006-Spring 2007).

2. Serving on Oracle Customer Advisory Panel, 2013 – 16.
3. On Advisory Council, Florida Center for Cybersecurity (FC2), 2014-2016.
4. Represent Department of Computer Science at Pensacola Chamber of Commerce, 2013-2016.

Conferences Chaired/Co-chaired

5. **Co-chaired** session at *World Multiconference on Systemics, Cybenetics and Informatics* (WMSCI) 2010, Orlando, FL June 29-July 2, 2010.
6. **Co-chaired** session at *PAISI, The 22nd Pacific Asia Conference on Knowledge Discovery and Data Mining (PAKDD),* Melbourne, Australia, June 3-6.

Conferences Committees

1. Serving on *International Conference on Information Systems and Data Mining (ICISDM)* Committee, 2017-2018.

PROFESSIONAL DEVELOPMENT

1. Attended UWF's Mini-Conference on Best Practices for Active Learning and Student Engagement (March, 2007).
2. CUTLA Workshop on Writing and Evaluating Student Learning Outcomes, May 16, 2007.
3. UWF 2007 Mini-Conference on Best Practices for Face-to-Face and Online Learning: Promoting Active Learning and Student Engagement, UWF, Nov 8, 2007.
4. Completed *LEAD*, UWF's Leadership Training Program, 2007-08.
5. Studio-e – Training for Online Teaching, Fall 2007-08.
6. Attended 2011 ABET Symposium, April 14-16, 2011.
7. Attended Howie-in-the-Hills, September, 2012.
8. Attended SPOL – Strategic Planning Online Workshop, Oct 2013.
9. Attended workshop on Discrimination and Harassment for Supervisors, 10/1/2013.
10. Attended STEM Retention Workshop, 2/28/2014.
11. Attended UWF's Office of General Counsel's, "Identity Theft: Protecting Personal Information," Nov, 21, 2014.
12. Attended Diversity Recruitment, Hiring and Retention, Department Chair Workshop, Jan 28th, 2015.

PROFESSIONAL MEMBERSHIPS

Member of ACM 2004-05; 2010 – 2012; 2018 – present.
Member of UWF Charter of Upsilon Pi Epsilon, an International Honor Society for Computing and Information Disciplines (2006 – present).

STUDENTS GUIDED

Graduate Project Advisor
Dustin Mink, 2006-2007, Datamining; Gerald Rush, Bioinformatics with BLAST, 2008-2009; Paul Brown, AERO Project, NAS Pensacola, 2008-2009; Sandeep Ramani, Genetic Algorithm, 2007-2008; Adam Loggins, 2008-2009; Jiri Just, 2008-2009; Brandon Youngblood, Optimizing Queries, 2009 – 2010; Mohammad Islam, Optimizing Queries, 2009-2010; Cecil Musgrove, Optimizing Queries, 2009-2010; Duane Christi, Data Warehousing for Escambia County's School

Board System, 2009-2010; James Teichart, 2011-2011; Robert Lyons, Cloud computing, 2012; Sweta Ghosh, 2011-2012; Anton Parker, 2012-2013; Loi Nguyen, Database Sharding, 2012-2014; Sean Spratlin, Mining XML Data, 2011-2013; Mariko Young, Data Mining, 2011-2012; James Bouressa, RDF, 2013-2014; Robert Jamie White, Phishing, 2014; Mason Evans, SQL Injection, 2014; Xingang Fang, Chem-informatics, 2014-2015; Joseph Sheehan, 2015-2016, Malware Analysis; Sharon Kirthana John, 2017-2018; Debarghya Nandi, 2017-2018; Probal Chandra Dhar, 2017-2018; Arup Kumar Mondal, 2017-2018; John Baggs, 2017-2018; John Compo, 2017-2018.

Thesis Committees
Carlos Perez, 2009-2010

Dissertation Committees (Chair)
Evorell Fridge, 2011-2014; Sean Spratlin, 2014 – present.

Computer Science Department Honors Project Advisor
Tabatha DeJesus, Fall 2013

Directed Studies and Undergraduate Research
Damien Walker, Developing JAVA based Parser Software, 2005; Utkarsh Shah, Optimizing Queries, Summer 2008; Nicholas Fox, Optimizing Queries, Summer 2008; Clark Mitchell, Malware Analysis - Datamining, Summer 2015; Renan Lordello, SQL Injection Attacks, Summer 2015; Keenal Shah, 2018; Bhaynesh Mishra, 2018.

External Dissertation Committee:
Angie Cox, 2015, Trident University; Dustin Mink, University of South Alabama.

PostDocs:
Xingang Fang (2015-2016)

Steven P. Bitner

Contact   stevenbitner@gmail.com   http://www.stevenbitner.com Information   Kansas City, MO

Research   Computational geometry and algorithm optimization. Interests

Other Interests Web programming, the U.S. Navy Reserves, rock climbing, hiking and camping.

Skills   **Operating Systems:** Mac, Linux , UNIX, Windows

Education   **Computer Languages:**

Work   Proficient in PHP, MySQL/MSSQL, Ajax, Java, C++, HTML, CSS,

experience   Javascript, jQuery,

Mustach, L^{A}TEX, LAMP/WAMP, UNIX

Shells Familiar with Perl, OpenGL,

AngularJS

Ph.D., Computer Science, August 2010

Under supervision of Dr. Ovidiu Daescu

University of Texas at Dallas, Dallas, TX

Dissertation title: "Proximity Problems in Two and Three Dimensional Euclidean Space"

M.S., Computer Science, 2008

Traditional track

University of Texas at Dallas, Dallas, TX

B.S., Computer Science, 2006

Department of Computer Science

Texas State University - San Marcos, San Marcos, TX, USA

Assistant Professor   **August 2018 to Present**

The University of West Florida

Develops and presents courses at the undergraduate and graduate levels. Conducts research for publication in peer-reviewed conference and journal media. Engages with students and teaching assistants to ensure successful implementation of learning objectives and a welcoming classroom environment. Works in a traditional classroom environment as well as in synchronous and asynchronous online learning environments.

Courses taught:

COP 3022: Intermediate Computer Programming

COP 5007: Software Engineering Foundations: Java Programming

COP 6727: Advanced Database Systems

Chief Architect   **March 2015 to Present**

First Principle Innovators

Works within the directives of the CEO to design, manage, and execute all of the engineering development for all web, mobile, frontend, backend, software, hardware, and manufacturing technologies and technological processes needed to create and maintain all of the company's products and services at the highest level of quality and performance.

Works within the directives of the CEO to select and procure third party sources of data, API sources, raw materials, license agreements, and partnerships, needed to enable the technology behind the company's products and services to function at the highest level of quality and performance.

Manages software engineering resources to ensure products are built to

specifications and thoroughly tested.

Lieutenant - Information Professional Officer **Sep 2013 to October 2017**

United States Navy Reserves

Served as Pacific Theater Multinational Exercise Support Officer in Charge for NR Expeditionary Strike Group 7. Responsible for coordinating support in accordance with the Joint Manning Documents for approximately 5 exercises each year. The cumulative manning exceeded 1000 days of direct support to the gaining command.

Served as Naval Liason Officer in exercises in South Korea, Thailand, Japan and the Philippine Islands. Provided amphibious planning support, knowledge management planning and general Naval expertise while serving with all branches of the US and foreign militaries.

Senior Software Developer **July 2013 to February 2015**

Answers Corporation

Served as the team lead for a number of owned and operated websites with over 100 million unique visitors per month. PHP, MySQL and Javascript based development for the largest privately owned website in the United States.

Responsible for greatly decreasing time to first byte (TTFB) via caching, query and script optimization. Maintained user interface code for content generation portals as well as multivariate testing development and support.

Adjunct Instructor **August 2012 to May 2013**

University of Missouri; Kansas City, MO

Courses taught:

CS/IT 490 WD (Web Development). Recreated the university's class anew with the focus as PHP/MySQL development. Taught HTML/CSS basics as well as PHP/MySQL interactions with PDO and user authentication using BCrypt. Oversaw multiple student projects involving design, authentication and database update capabilities, using HTML, CSS, PHP, MySQL, JavaScript and Ajax.

CS201 (Computer programming and problem solving II). Introductory C++ course covering from "hello world" type programs through basics of templating and object oriented programming. Instructed on the use of linked lists, arrays, vectors, stacks, queues, as well as user defined classes and structs. Additional concepts covered were inheritance, recursion and polymorphism. This is an ABET certified course.

Operations Research Analyst **Sep 2010 to July 2013**

US Army TRADOC Analysis Center; Fort Leavenworth, KS

Analyzed and improved existing line of site calculation methodologies for the Advanced Warfighting Simulation (AWARS) software model used by the US Army to make future combat decisions. Improved accuracy of expected human casualty calculation by modifying the methodology in accordance with newly available data.

Led software development cycle for Data Visualization Tool (DaViTo) as project lead and developer. This Java based tool utilizes OpenMap, R, and JFreeChart in order to enable warfighters the ability to perform exploratory data analysis based on enemy activity data.

Served as the government lead on a study into the effectiveness of village

stability and focussed operations in Afghanistan.

Proposed and implemented an employee dashboard software package that utilizes PHP, MySQL, and Ajax to track employee hours logged against reimbursable projects as well as training requirements and completion. Additionally, implemented emplyee skills capture and individual development plan interfaces to create a single daily sign-on point for all basic employee tasks.

Created PHP/MySQL based survey capture tool for field exercises that gathers and displays Likert scale data allowing for instant statistical analysis of collected training mission data.

Research Assistant **Sep 2006 to Aug 2010**

The University of Texas at Dallas; Richardson, TX

Supported by Jonsson Scholarship (2006-2008) and ASEE SMART Scholarship (2008 to 2010)

Conducted research and published results in the area of computational geometry with advisor Ovidiu Daescu.

Journal articles Steven Bitner, Ovidiu Daescu. *Finding a Minimum Sum Dipolar Spanning Tree in* R^3*.* Computational Geometry: Theory and Applications, Vol. 45, Issue 9, pp. 476-481, 2012

Steven Bitner, Ovidiu Daescu. *Farthest Segments and Extremal Triangles Spanned by Points in* R^3*.* Information Processing Letters, Vol. 109, Issue 20, pp. 1167-1171, 2009.

Conference Steven Bitner, Yam Cheung, Ovidiu Daescu. *Minimum Separating Circle for Bichro-*

publications *matic Points in the Plane.* Proceedings of the 7th International Symposium on Voronoi Diagrams, pp. 50-55, June 2010.

Steven Bitner, Yam Cheung, Atlas Cook IV, Ovidiu Daescu, Anastasia Kurdia, Carola Wenk. *Visiting a Sequence of Points with a Bevel-Tip Needle.* Proceedings of the 9th Latin American Theoretical Informatics Symposium, pp. 492-502, April 2010.

Steven Bitner, Ovidiu Daescu. *Finding a minimum-sum dipolar spanning tree in* R^3*.* Proceedings of the 41st Annual Hawaii International Conference on System Sciences, pp. 469-474, January 2008.

Steven Bitner, Ovidiu Daescu. *Finding segments and triangles spanned by points in* R^3*.* Proceedings of the 19th Annual Canadian Conference on Computational Geometry , pp. 17-20, August 2007.

Steven Bitner, Ovidiu Daescu. *Minimum-sum dipolar spanning tree for points in* R^3*.* Proceedings of the 19th Annual Canadian Conference on Computational Geometry , pp. 81-84, August 2007.

Presentations *Data Visualization Tool(DaViTo)*. *Barchi Prize Nomination.* 80th Military Operations Research Society Symposium, US Air Force Academy - Colorado Springs, CO, Jun. 14, 2012.

The Discrete 2-Center Problem in R^3. 20th Fall Workshop on Computational Geometry, State University of New York - Stony Brook, NY, Oct. 29, 2010.

Visiting a Sequence of Points with a Bevel-Tip Needle. 9th Latin American Theoretical Informatics Symposium, University of Oaxaca, Apr. 20, 2010.

On the Minimum Color Separation Circle. 19th Fall Workshop on Computational and Combinatorial Geometry, Tufts University, Nov. 14, 2009.

Geometric Problems in Wireless Networks. American Society of Engineering Education Science Mathematics And Research for Transformation scholarship program orientation, Monterey, CA, Jul. 14, 2009.

Finding segments and triangles spanned by points in R^3. 19th Annual Canadian Conference on Computational Geometry, Carleton University, Aug. 20, 2007

Minimum-sum dipolar spanning tree for points in R^3. 19th Annual Canadian Conference on Computational Geometry, Carleton University, Aug. 20, 2007

Finding segments and triangles spanned by points in R^3. Kyoto International Conference on Computational Geometry and Graph Theory, Kyoto University, Jun. 12, 2007

Farthest Segment Spanned by points in space. 16th Fall Workshop on Computational and Combinatorial Geometry, Smith College, Nov. 10, 2006.

Art Gallery Application at Texas State University. *Ungraduate research award, and student travel award.* 109th Annual Meeting of the Texas Academy of Science, Lamar University, Mar. 3, 2006.

EZHIL KALAIMANNAN

Address
Bldg.4, Room 241
University of West Florida
Department of Computer Science
11000 University Pkwy
Pensacola, FL 32514
Email: ekalaimannan@uwf.edu
Office: (850) 473-7005

Professional Preparation

Anna University, India, Electrical Engineering B.E., 2006
University of Alabama in Huntsville, Computer Engineering, M.S., 2008
University of Alabama in Huntsville, Cyber Security, Post-Bachelor Certificate, 2012
University of Alabama in Huntsville, Computer Engineering, Ph.D., 2014

Appointments

Since 2014   Assistant Professor, Department of Computer Science, University of West
                  Florida, Pensacola, FL
2010 – 2014   Adjunct Instructor, College of Business Administration, University of
                  Alabama   in Huntsville, Huntsville, AL
2009 - 2012   Graduate Teaching Assistant, Department of Electrical and Computer
                  Engineering, University of Alabama in Huntsville, Huntsville, AL

Synergistic Activities

- Capacity Building Program Grant -- Florida Center for Cybersecurity (FC2), The University of South Florida, Role: Principal Investigator, June. 2017 -- June. 2018; Funded Amount - $75,212.
    - *Research Project Title: A Novel Framework to Teach Hands-on Laboratory Exercises in Cybersecurity.*

- Recipient of the Collaborative seed grant offered by the Florida Center for Cybersecurity (FC2), *The University of South Florida, Mar. 2015* – Dec. 2016, $12,500.
    - *Research Project Title: Exploring Security Attacks in Cache Enabled Tactical Hybrid Networks*

- Recipient of the Cross College Faculty Research (CCFR) grant offered by the Office of Vice President for Research, *The University of Alabama in Huntsville, Aug. 2013* - $5,000/year (Renewable for a total of 24 months and $10,000).
    - *Research Project Title: Computational Optimization Models for Investigating Crime in Digital Forensics*

- Technical Program Committee Member: *Pre-ICIS Workshop on Information Security and Privacy (WISP 2012)*; Annual ADFSL Conference on Digital Forensics, Security and Law (ADFSL 2015, 2016, 2017); 17th International Conference on Computer and Information Technology (ICCIT 2014, 2015); 15th Annual Digital Forensics Research Conference (DFRWS USA 2015, 2016, 2017); Seed Grant Program funded by the Florida Center for Cybersecurity (FC2).

- Journal Referee: Adhoc member of Elsevier Digital Investigation Journal, Journal of Digital Forensics, Security and Law, and International Journal of Computational Intelligence (Advance Computing Science).

Peer-Reviewed Publications

Journal Articles:

- Bagui, S., Fang, X., *Kalaimannan, E.*, Bagui, S.C and Sheehan, J. "Comparison of machine-learning algorithms for classification of VPN network traffic flow using time-related features", Journal of Cybersecurity Technology, Vol. 1, No. 2, pp. 108-126, 2017.

- *Kalaimannan, E* and Gupta, J.N.D. "The Security Development Lifecycle in the Context of Accreditation Policies and Standards", *Security and Privacy, IEEE,* Vol. 15, No. 1, pp. 52-57, 2017. *[Impact Factor: 0.91]*

- *Kalaimannan, E.*, John, S.K., DuBose, T and Pinto, A. "Influences on ransomware's evolution and predictions for the future challenges", *Journal of Cybersecurity Technology*, Vol. 1, No. 1, pp. 23-31, 2016.

- Gupta, J.N.D., *Kalaimannan, E* and Yoo, S-M. "A heuristic for maximizing investigation effectiveness of digital forensic cases involving multiple investigators," *Computers & Operations Research, Elsevier,* Vol. 69, No. 1, pp. 1-9, 2015*. [Impact Factor: 2.188]*

- *Kalaimannan, E* and John, C.S. "Security Development Life Cycle framework for web-based applications," Vol. 3, No. 1, pp. 23-29, 2016.

Articles in Conference Proceedings:

- Prithviraj, S., Sameer, V.U., Naskar, R and *Kalaimannan, E*, "Source Anonymization of Digital Images: A Counter–Forensic Attack on PRNU based Source Identification Techniques", accepted into 2017 Annual Conference on Digital Forensics, Security, and Law, Daytona Beach, May. 2017.
- Chakraborty, N and *Kalaimannan, E*, "Selective Scheduling: Controlling Non-Preemptive Devices in Smart Grid Environment", Accepted into the 8th Annual IEEE conference on Innovative Smart Grid Technologies, Arlington, Apr. 2017.

- Chi, H., Welch, S., Vasserman, E and *Kalaimannan, E*, "A Framework of Cybersecurity Approaches in Precision Agriculture ", Proceedings of the 12th International Conference on Cyber Warfare and Security, Dayton, pp. 90-95, Mar. 2017.

- Reichherzer, T., Mishra, A., *Kalaimannan, E* and Wilde, N, "A Case Study on the Trade-Offs Between Security, Scalability, and Efficiency in Smart Home Sensor Networks," Proceedings of the 2016 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2016, pp. 222-225.

- Chi, H., *Kalaimannan, E* and Hubbard, D, "Integrate Text Mining into Computer and Information Security Education", KSU Conference on Cybersecurity Education, Research, and Practice. Paper 11, Kennesaw, Oct. 2016.

- *Kalaimannan, E*., "Smart Device Forensics - Acquisition, Analysis and Interpretation of Digital Evidences," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015, pp. 837-838.

- *Pandey, A., Kalaimannan, E*., and Venkatesan, S., "An Information Diffusion Model to analyze the Behavior of Online Social Network based Malwares," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015, pp. 867-868.

- *Kalaimannan, E*., Mitchell, C., Bagui, S., and Bagui, S, "An Automated Method of Classifying and Analyzing Malware based Operating System Calls," Work-in-Progress Abstract in the Annual Computer Security Applications Conference 2015 (ACSAC'15), Los Angeles, Dec. 2015.

- *Kalaimannan, E*., Gupta, J. N. D., and Yoo, S-M., "Maximizing investigation effectiveness in digital forensic cases," Proceedings of the 5th Annual ASE/IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT- 2013), Washington D.C., USA, pp. 618 - 623, Sep. 2013. [Acceptance Rate: 9.6%]

- Gupta, J. N. D., *Kalaimannan, E*., and Patnayakuni, R., "IDS Alarms investigation with limited resources," Pre-ICIS Workshop on Information Security and Privacy (WISP), Orlando, Florida, Dec 2012.

- *Kalaimannan, E*., Gupta, J. N. D., and Yoo, S-M., "Maximizing investigation effectiveness for time critical forensic cases" in Operational Excellence: A Key to Performance Excellence, R. K. Jain, B. A. Metri, and J. N. D. Gupta (eds), Excel Books, 2013.

Presentations/Talks

- *Kalaimannan, E* (2016). Integrate Text Mining into Computer and Information Security Education. Paper presented at the KSU Conference on Cybersecurity Education, Research, and Practice, Oct. 2016, Kennesaw, USA.

- *Kalaimannan, E* (2015). Smart Device Forensics - Acquisition, Analysis and Interpretation of Digital Evidences. Paper presented at the *International Conference on Computational Science and Computational Intelligence (CSCI'15)*, Dec. 7-9, Las Vegas, USA.

- *Kalaimannan, E* (2015). An Information Diffusion Model to analyze the Behavior of Online Social Network based Malwares. Paper presented at the *International Conference on Computational Science and Computational Intelligence (CSCI'15)*, Dec. 7-9, Las Vegas, USA.

- *Kalaimannan, E* (2015). An Automated Method of Classifying and Analyzing Malware based Operating System Calls. Work-in-Progress abstract presented at the *Annual Computer Security Applications Conference 2015 (ACSAC'15)*, Dec. 9-12, Los Angeles, USA.

- *Kalaimannan, E* (2013). Maximizing investigation effectiveness in digital forensic cases. Paper presented at the *ASE/IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT),* Sep. 8-14, Washington D.C., USA.

- *Kalaimannan, E* (2012). Maximizing investigation effectiveness for time critical forensic cases. Paper presented at the *6th International Conference on Decision Sciences for Performance Excellence,* Dec. 27-29, Hyderabad, India.

Collaborators & Other Affiliations

- **Collaborators and Co-Editors.** Jatinder N.D. Gupta (UAHuntsville), Ravi Patnayakuni (UAHuntsville), Seong Moo-Yoo (UAHuntsville), Sikha Bagui (University of West Florida), Norman Wilde (University of West Florida), Swapnoneel Roy (University of Central Florida), Hongmei Chi (Florida A&M University), Sumit Kumar Jha (University of Central Florida), Jinpeng Wei (Florida International University), Geethapriya Thamilarasu (University of Washington Bothell), Cyril Raj (M.G.R. Educational & Research Institute, India).

- **Graduate Advisors and Postdoctoral Sponsors.** Prof. Jatinder N.D. Gupta and Dr. Seong Moo-Yoo (University of Alabama in Huntsville, Huntsville, AL, USA).

- **Thesis Advisor and Postgraduate-Scholar Sponsor.** None.

AMITABH MISHRA

amishra@uwf.edu.

SUMMARY

A qualified academic professional with experience in secondary learning environment, and a wealth of knowledge in development and implementation of educational technology tools and applications in college classrooms and labs with a touch of industrial exposure, working for an educational institution currently.

PROFESSIONAL EXCELLENCE SUMMARY

- Have over sixteen years of experience in teaching at the college and university level, both in USA and India.
- Have six years of industrial work experience in coal mining and steel industries as a technical manager, technical evaluator, project coordinator and trainer on computerized automation.
- As the In-charge of Lab development, was responsible for the development of networked computer labs and other labs related to process control and automation with hands-on experience on hardware.
- Implemented innovative methods to develop relations and a better interface between the students, teaching staff and administrative staff.

TECHNICAL SKILLS

- Over **15** years of software development experience of **programming** in: **C**, **C++**, **Java**, **Python**, **Fortran**, **Pascal**, **Assembly** – Microprocessors/Microcontrollers
- Over **10** years of working with **scripting languages**: **HTML/CSS**, **Javascript**, **Shell Scripting** (**bash**), **SQL** and **XML**
- Over **10** years of experience of working with **operating systems**: **Windows**, **Linux**, **Solaris**
- Over **10** years of experience of working with **scientific software**: **LabVIEW**, **MATLAB - Simulink**, **R** Programming, **TinyOS** and **NesC**, **Qualnet**, **OMNET**, **Castalia**
- Experience in working with **computer and communication hardware**: Computer system assembly, setting up wired and wireless network infrastructure, TelosB and Tmote Wireless Sensor Platforms, Toshiba DCS and standalone controllers, Taylor MOD DCS, Siemens PLC, Allen Bradley PLC

EDUCATION

PhD in **Computing Science & Engineering**   September 2008 – July 2015
University of Cincinnati, Cincinnati, OH – GPA 3.89
            Finished with a CGPA of 3.93 and nine publications in international conferences and journals
Selected Coursework: Advanced Programming Concepts, Advanced Operating Systems, Advanced Algorithms I/II, Artificial Intelligence I, Data Mining and Warehousing, Advanced Mobile Computing, Wireless Ad Hoc & Sensor Networks, Sensor Networks Design.
Research Group: Center for Distributed and Mobile Computing (CDMC) – PI: Prof. Dharma P. Agrawal
Research Areas: Wireless Sensor Networks, Heterogeneous Networks, Wireless Control.
Dissertation: Modeling and Performance Evaluation of Wireless Body Area Networks for Healthcare Applications.
Master of Technology in **Instrumentation**   July 1999 – June 2001

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Devi Ahilya University, Indore, India – First Class Honors Degree
        Topped the merit list across all semesters in the Class of 2001

PG Diploma **in Personnel Management**   July 2002 – August 2004
National Institute of Personnel Management, Kolkata, India – First Class Honors
        Topped the merit list at All-India level and bagged 3 gold medals and a national award

PG Diploma in **Biomedical Informatics**   July 2003 – June 2004
Bioinformatics Institute of India, NOIDA, India – First Class Honors

Bachelor of Engineering in **Electronics**   August 1986 – July 1990
Ravi Shankar University, Raipur, India – First Class Degree

Certification:

"Internet of Things: Roadmap to a Connected World" – Massachusetts Institute of Technology, May 2016
"Advance Ad-hoc and Sensor Networks" - University of Mumbai, India – 2007
"Computing" – IGNOU, India – 2003
"German Language" – Maxmüller Bhavan, Rourkela, India – 1993

TEACHING EXPERIENCE

University of West Florida, Pensacola, FL, USA, Aug 2015 – Till date
Assistant Professor, Department of Computer Science
- Taught 9 undergrad courses since Fall'15 semester – Algorithm and Program Design in C, Introduction to Computer Organization, Operating System Fundamentals, Data Sturctures and Algorithms – I, Object Oriented Programming
- Teaching 3 undergrad courses in the Spring'17 semester – Data Structures and Algorithms I – 2 sections, Operating System Fundamentals
- Engaged in Cybersecurity research with the Center of Cybersecurity ad working on IoT Security
- Holding a courtesy appointment as a Visiting Research Scientist at the Florida Institute for Human and Machine Cognition, Inc. (IHMC)
- Recipient of the UWF GROW Institute Summer Award for grant-writing; submitted an NSF grant proposal under the Secure and Trustworthy Computing program
- Site Director, Association for Computing Machinery (ACM) International Collegiate Programming Contest
  (ICPC) 2016, Southeast USA Regional Site, UWF, Pensacola, FL
  [https://ser.cs.fit.edu/ser2016/]
- Faculty In-charge, Computer Science Tutoring, HMCSE-UWF since 2016
- Serving in Growth and Development Committee, UWF, 2016
- Served in Summer Undergraduate Research Project Review Committee, HMCSE, UWF, 2016
- Served in Presidential Scholarship Application Review as an Interviewer, UWF, 2015 and 2016

Northern Kentucky University, Highland Heights, KY, USA, Aug 2012 – May 2013
Lecturer, School of Computing Sciences and Informatics
- Taught 6 courses - Object-Oriented Programming in Java, Data Structures and Algorithms, Information Technology Fundamentals Lab
- Received an average rating ranging between *fair* and *good* in students' feedback

University of Cincinnati, CINCINNATI, OH, USA, 2008 – June 2012

Graduate Teaching Assistant, School of Computing Sciences and Informatics
- Taught 5 courses: **Network and System Programming** – three courses, **Computer Fundamentals: Data Structures** – two courses
- Received an average rating ranging between *good* and *excellent* in students' feedback
- Taught computer programming in **Java** to school kids in the 2-week long summer camps organized by the department for the last three summers
- Assisted in teaching sixteen courses covering **Data Structures**, **Network Programming**, **Computer Architecture**, Programming in **MATLAB**, **C++**, and **Java**, **Computer Networks**, **Wireless and Mobile Networks**, **Ad-hoc and Sensor Networks** – provided help on course associated projects
- Occasionally taught classes in the absence of instructors
- Conducted two training sessions for graduate students on installation of **TinyOS** and **network simulators**
- Developed a web based tutorial for hands-on training on **TinyOS** for other graduate students
- Worked in three projects on application of wireless sensor networks in generation of music for dance in collaboration with College Conservatory of Music, UC.
- In-charge of equipment inventory and acquisition for the CDMC research group [voluntary]
- Handled computer and network troubleshooting for the CDMC research group [voluntary]

Undergraduate Level Courses Taught at UC
1. Network and System Programming – taught three courses
2. Computer Fundamentals: Data Structures – taught two courses **Teaching**

Assistant at UC:
1. Data Structures – one course
2. Network Programming – one course
3. Computer Architecture – one course
4. MATLAB programming– two courses
5. C++ Programming – one course
6. Java Programming – three courses
7. Computer Networks – three courses
8. Wireless and Mobile Networks – two courses
9. Ad-hoc and Sensor Networks – two courses

Associate Professor, Computer Science and Engineering, Bhilai Institute of Technology, Durg (C.G.), INDIA*, 1997 – 2008 and 1990 – Jan 1992*

Graduate Level Courses Taught in India
1. Design of Industrial Transducers and Sensors — 4 courses
2. Process Control and Industrial Automation — 3 courses
3. Analytical Instrumentation — 2 courses
4. Biomedical Instrumentation — 1 course
5. Business Management — 1 course
6. Microprocessors: Architecture. Programming and Interfacing — 3 course

Undergraduate Level Courses Taught in India
1. Electronic Instrumentation — 9 courses
2. Mobile Communication and Computing — 6 courses
3. Digital Signal Processing — 4 courses
4. Principles of Communication Systems — 3 courses
5. Microprocessors and Interfacing — 2 courses

6. Digital Electronics — 2 courses
7. Advanced Microprocessors — 2 courses
8. Industrial Transducers and Sensors — 2 courses
9. Computer Fundamentals — 1 course
10. Radio Engineering — 1 course
11. Network Analysis — 1 course
12. Electronic Engg. Materials — 1 course

Projects supervised in India: Graduate–12, UG–46 at Bhilai Institute of Technology, Durg (C.G.),

1997 – 2008 and 1990 – Jan 1992

• Taught courses and labs related to computers and communication (Programming courses taught – C, C++, Java, HTML, SQL, LabVIEW, MATLAB, Assembly – 8085, 8086, 8051)
• Supervised undergrad and grad projects in engineering and inspired students to integrate technology into daily classroom activities
• Solely responsible for setting-up the Computer Centre for the school with OFC and UTP wired backbone and wireless networking and Internet services in the institute
• Completed 2 consultancy projects for solving industrial problems
• Chief Organizer for 9 technical and education-oriented workshops, conferences, trainings and special university events

Record of service: Administrative Assignments (BIT, Durg, India)

Coordinator,	M. Tech. Program, Instrumentation and Control.	2006-08
Coordinator,	Depts. of Electronics and Telecom Engg., Computer Science and Engg., Information Technology, and Computer Applications	2007-08
Coordinator,	Continuing Education Cell	2006-08
Prof. In-charge	Students' Association	2000-07
Founder,	Music Club	2005
Head,	Dept. of Computer Science and Engg.	2003-06
Prof. In-charge	Internet Services, BIT	2001-06
Administrator	Official Website, BIT	2001-06
Prof. In-charge	Training and Placement, BIT	2004-05
		2001-03
Prof. In-charge	Central Library, BIT	2003-05
Founder	Book Bank	
Prof. In-charge	Alumni Activities	2001-05
Labs developed:	Microprocessors and Microcontrollers Lab, Instrumentation Lab, Computer Hardware Lab Computer Centre, BIT Electronics Workshop	
Team Member	CG State Engineering Admissions	2002-03
Team Member	Examination Control Centre	1997-2008
Examiner	6 universities and 2 autonomous Institutes	

| Expert | Conduction of theory and practical examinations.
Question paper setter and evaluator
University Interview Committees:
Faculty and Technical Staff recruitment | 2005-08 |

SELECTED COURSE PROJECTS
Multilevel Encryption-Decryption for Windows CE using Random Number Generator

2006

- Working on Arduino microcontroller controlled sensing, acquisition and transmission of physiological parameters
- Aiming at cognitive utilization of voice and data networks around the smartphone for transmission of sensed parameters

Virtual 3-D tour engine *2005*
- Developed algorithms for packet shortening in order to save energy and enhance the lifetime of WBANs
- Evaluated energy savings for critical, real-life, real-time physiological data in the suggested WBAN framework

Automatic Speaker Recognition System using pitch and formant analysis *2004*
- Designed, implemented and tested a testbed involving Tmote sensors for studying link parameters over multiple transmission channels and various power levels
- Studied packet transmission, link quality and received signal strength parameters and analyzed the results received

Selected Publications:
1. **A. Mishra**, and D. P. Agrawal. *Enhancement and Appraisal of Internet of Things Healthcare Networks*. Saarbrücken, Germany: Lap Lambert Academic Publishing, 2017. Print.
2. T. Reichherzer, **A. Mishra,** E. Kalaimannan, N. Wilde, "A Case Study on the Trade-Offs between Security, Scalability, and Efficiency in Smart Home Sensor Networks", The International Conference on Computational Science and Computational Intelligence (CSCI 2016), Las Vegas, NV, USA, December 15-17, 2016.
3. **A. Mishra** and S. Chakraborty, "Energy-efficient design methodologies for Wireless Body Area Sensor Networks in Healthcare Applications", BSN Conference 2016, San Francisco, CA, USA, June 14-17, 2016.
4. **A. Mishra** and D. P. Agrawal, "Energy Conservation and Lifetime Optimization of Wireless Body Sensor Networks for 24x7 Physiological parameters' Monitoring," Journal of Communications, vol. 10, no. 9, pp. 685-695, 2015. Doi: 10.12720/jcm.10.9.685-695.
5. **A. Mishra** and D. P. Agrawal, "Continuous Health Condition Monitoring by 24x7 Sensing and Transmission of Physiological data over 5-G Cellular Channels", International Conference on Computing, Networking and Communications (ICNC 2015), Feb 16-19, 2015, Anaheim, California, USA.
6. A. Jamthe, **A. Mishra**, and D. P. Agrawal, "Scheduling schemes for Interference Suppression in Healthcare Sensor Networks", ICC-2014, Sydney, Australia, 10-14 June 2014.
7. **A. Mishra**, S. Chakraborty, H. Li, and D. P. Agrawal, "Error Minimization and Energy Conservation by predicting data in Wireless Body Sensor Networks using Artificial Neural Network and Analysis of Error", CCNC-2014, Las Vegas, NV, USA, Jan 10-13, 2014.

8. N. Weragama, J. H. Jun, **A. Mishra** and D. P. Agrawal, "Simulation of Mobility Aware Dynamic Virtual Cells Utilizing Multiple Multicast Trees", IEEE ComSoc TCSIM Quarterly Newsletter, vol. 15, pp. 2-4, Dec 2012.

9. D. Agrawal and **A. Mishra**, "Designing Wireless Sensor Networks: from Theory to Applications," WCSN 2011, Seventh IEEE Conference on Wireless Communication and Sensor Networks, Dec 5-9, 2011, Panna, India.

10. M. Helmuth, R. Danard, J. H. Jun, T. Oliveira, **A. Mishra**, and D. P. Agrawal, "Water Birds: Compositional Collaboration with Clarinets, Wireless Sensors, and RTcmix," SEAMUS 2011, 26th Annual Conference of the Society for Electro-Acoustic Music in the United States, January 20–22, 2011, Miami, Florida.

11. M. Helmuth, J. H. Jun, T. Oliveira, J. B. Merkowitz, **A. Mishra**, Ahmad Mostafa, Dharma Agrawal, "Wireless Sensor Networks and Computer Music, Dance and Installation Implementations," International Computer Music Conference 2010, New York, USA, June 1-5, 2010.

12. **A. Mishra** and S. R. K. Rao, "Mathematical Modelling for Auto-running of Discontinuous Heat Exchanger System used for heating of process fluids," special reference to Cowper Stoves, Proceedings of INCON–2004-International Conference on Control and Instrumentation, College of Engineering, Pune, December 2004.

13. **A. Mishra** and S. R. K. Rao, "Control of Adiabatic Flame Temperature in the Raceway Zone in Iron Making using Steam Injection into hot air input," Proceedings of the CISCON — 2004, National Conference on Control and Instrumentation, Manipal Institute of Technology, Manipal, November 2004.

14. **A. Mishra** et al., "Development of Algorithm for the Analysis of Vibration signal of Rotating Machines," Proceedings of the National Level Conference on Advanced Control and Instrumentation, St. Joseph's College of Engineering, Chennai, January 2004, pp. 110 - 114.

Guest Lectures and Talks delivered/ Technical and Training Sessions conducted

• Delivered two technical lectures on "The concept of Comprehensive Environmental Monitoring and Control System (CEMACS) and typical CEMACS design" and "CEVIACS using Wireless Sensors" in the workshop on – 'Trends of Instrumentation and Control towards environmental challenges', 5th - 6th October 2007, sponsored by Chhattisgarh State Council for Science and Technology, organized by Bhilai Institute of Technology, Durg, India

• Conducted two technical sessions on "Drug Design and Discovery: Steps and Considerations" and "Computer Aided Drug Design" in the short-term course on 'Trends in Antidepressant Drugs - Innovations in Science and Technology: 2007', 5th - 19th July 2007, sponsored by All India Council for Technical Education, organized by Bhilai Institute of Technology, Durg India

• Delivered a talk on "Connectivity for the Youth: Trends, Services and Challenges", in the Symposium on 'World Telecommunications and Information Society Day – 2007', 17th May 2007, organized by BSNL and Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India

• Delivered a talk on "OLEDs - The material and technology that one can fold, roll and wear" in the National Seminar on 'RECENT TRENDS IN ELECTRONIC MATERIALS and PHYSICAL SCIENCES', 15th -16th
September 2006, organized by Department of Electronics and Physics, St Thomas College, Bhilai, India

• Delivered two technical lectures on "Wireless Sensor Networks - Design Considerations, Architecture and Hardware" and "Wireless Sensor Network Applications" in the national workshop on "Sensor Instrumentation for Environmental Pollution Monitoring", 5th -17th June 2006, organized by Chhattisgarh Swami Vivekanand Technical University in

collaboration with Centre for Environmental Science and Engineering, Bhilai Institute of Technology, Durg, India
- Delivered two technical lectures on – "Mobile Telephony in a nutshell" and "Emerging trends in Mobile Telephony" in the one-day Seminar on Modern Trends in Mobile Communication, 25th February, 2006, organized by MPC College of Engg. Technology, Bhilai, India
- Conducted a one-day workshop on "MATLAB programming for Engineers" at Rai University, Raipur, India on 15th of January, 2006
- Conducted the Telecom Quiz on 'World Telecommunication Day – 2004', 17th May 2004, organized by Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India
- Presented a technical paper on "E-learning" in the National Seminar and Symposium on 'Education through Net - A new concept', 22nd August 2003, Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India
- Presented a technical paper on "Telecommunication in Medical Health Care" in the National Seminar and Symposium on 'World Telecommunication Day – 2003', 17th May 2003, organized by Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India
- Presented a technical paper on "VoIP and Internet Telephony" in the National Seminar and Symposium on 'World Telecommunication Day – 2002', 17th May 2002 organized by Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India
- Presented a technical paper on "The New Internet Technology - in the face of changing world scenario" in the National Seminar and Symposium on 'World Telecommunication Day – 2001', 17th May 2001, organized by Institution of Engineers (India), Bhilai Local Chapter, Bhilai, India
- Guest faculty for the course titled "Computer Networks and UNIX NOS" for Master of Computers in Management program under DA University, Indore, India during 1999-2000 academic session

Conferences/ Seminars/ Short Term Courses / Training Programs Organized
- Chaired the session on 'Business Process Reengineering and Network Security (26th October. 2007) in the national conference titled "Technological Revolution in Application Development and Intelligent Systems", under 'Technovision-2007', organized by Department of Computer Applications, SS College of Engg. and Technology, Bhilai, India
- Coordinator for the workshop on "Trends of Instrumentation and Control towards environmental challenges", 5th-6th October 2007, sponsored by Chhattisgarh State Council for Science and Technology, organized by Bhilai Institute of Technology, Durg, India
- Resource person and faculty for the ongoing 60-hours refresher program – "Improving on technical and HR skills" meant for pre-final year undergraduate students. (started July 2007)
- Member of the organizing committee and Coordinator for Technical Sessions for the National Conference on "Broadband Communications", under BITCON, organized by Department of Electronics and Telecommunication Engg., Bhilai Institute of Technology, Durg, India, March 2007
- Coordinator for the National Conference on "Innovative Information Technologies and Secure Transactions", under BITCON, organized by Department of Information Technology, Bhilai Institute of Technology, Durg, India, March 2007
- Coordinator for the National Conference on "Technological Advancements in Processing and Decision making", under BITCON, organized by Department of Computer Applications, Bhilai Institute of Technology, Durg, India, March 2007

- Executive Committee for All India Seminars on "Advanced Communication Techniques and Networking: Exploring Challenges", 6th-7th January 2007, organized by Institution of Engineers (India), Bhilai Local Chapter and SS College of Engg. and Technology, Bhilai, INDIA
- Coordinator for the workshop on -MATLAB and S1MULINK programming for Scientists and Engineers", 12th December, 2006 organized by Dept. of Electronics and Telecommunication Engg., Bhilai Institute of Technology, Durg, India
- Conducted a 45-Hour Comprehensive Training Program (Oct-Nov 2006) for undergraduate students in the Pre-final year of their studies in order to improve upon their preparedness for facing job recruitment drives, organized under the banner of Training and Placement Office of the Institute.
- Coordinated a training program on "Virtual Instrumentation using LabVIEW-7 and NI-ELVIS", 4th-5th August 2006, organized by Dept. of Electronics and Telecommunication Engg., Bhilai Institute of Technology, Durg, India
- Coordinator for the workshop on "MATLAB: Toolboxes for Power Systems, Communications, Signal Processing, Neural Networks, Image Processing and Control", July 2006, organized by Dept. of Electronics and Telecommunication Engg., Bhilai Institute of Technology, Durg, India
- Convener for 'Phoenix-2006 - A national level student talent colloquium involving students' technical paper and poster presentation, technical project and computer programming contests organized by Bhilai Institute of Technology, Durg, CG, India on 7th-8th April 2006
- Initiator and Organizer of "Campus Training Forum" (CTF) at Bhilai Institute of Technology. CTF is a forum that works towards all-round development of students as true professionals. (Functioning started on 11th Feb 2006).
- Coordinator for 'ACT-2005', a National Conference on "Advance Communication Techniques" held at Bhilai Institute of Technology, Durg, India on 5th-6th April 2005
- Coordinator for 'Techno-Melange-2004', State-level students' technical paper presentation contest organized by Bhilai Institute of Technology, Durg, India on 23rd-24th August 2004

SELECTED RESEARCH AND CONSULTANCY PROJECTS

Android Smartphone based Coordinator for Wireless Body Area Networks   *2014*
- Working on Arduino microcontroller controlled sensing, acquisition and transmission of physiological parameters
- Aiming at cognitive utilization of voice and data networks around the smartphone for transmission of sensed parameters

Lifetime enhancement of Wireless Body Area Networks   *2013*
- Developed algorithms for packet shortening in order to save energy and enhance the lifetime of WBANs
- Evaluated energy savings for critical, real-life, real-time physiological data in the suggested WBAN framework

Wireless Sensor Network Testbed   *2011*
- Designed, implemented and tested a testbed involving Tmote sensors for studying link parameters over multiple transmission channels and various power levels

- Studied packet transmission, link quality and received signal strength parameters and analyzed the results received
- Used for various other studies by senior members in the research group

Wireless Sensor Network based control of Music   *2009*
- Worked on five different projects involving dancers, clarinetists and pianists with College of Music, UC
- Designed, fabricated and tested interface and conditioning circuits for external pressure, IR, optical and 3-axis accelerometer transducers for Tmote and TelosB sensors for use in sensor localization and music control
- Coded the NesC modules for data acquisition, caching and transmission for the TelosB/Tmotes
- The wireless sensor network would sense and relay the control command for playing the music to a base station Mac computer

Plate Mill, Rourkela Steel Plant, Rourkela, India   *2005*
- Successfully implemented *LIVE - Logically Interactive Virtual Eyes* - An optical solution development project for dividing shear problem in Plate Mill, RSP, Rourkela, India
- The project involved image sensing of long plates using multiple cameras, compositing the images in a nonconventional display resolution and projecting them into conventional PAL-TV monitor in the control pulpit for Operator assistance

Blast Furnace 7, Bhilai Steel Plant, Bhilai, India   *2001*
- Developed the algorithm, coded and implemented a network inter-process communication mailbox in UNIX for the supervisory computer system
- The mailbox was responsible for communicating sensor data from programmable logic controllers using TCP/IP, via a Terminal Server, through a UNIX server, to a Windows computer

Satpura Power, Jabalpur, India   *1999*
- Designed, implemented and commissioned the automatic charging system for the Biomass Gasifier used in the generation of electrical power using firewood
- Responsible for making detailed electrical drawings, equipment planning and procurement, overseeing of installation, testing and commissioning

SELECTED ACADEMIC PROJECTS

Multilevel Encryption-Decryption for Windows CE using Random Number Generator
                              2006
- Working on Arduino microcontroller controlled sensing, acquisition and transmission of physiological parameters
- Aiming at cognitive utilization of voice and data networks around the smartphone for transmission of sensed parameters

Virtual 3-D tour engine   2005
- Developed algorithms for packet shortening in order to save energy and enhance the lifetime of WBANs
- Evaluated energy savings for critical, real-life, real-time physiological data in the suggested WBAN framework

Automatic Speaker Recognition System using pitch and formant analysis 2004
- Developed algorithms for packet shortening in order to save energy and enhance the lifetime of WBANs
- Evaluated energy savings for critical, real-life, real-time physiological data in the suggested WBAN framework

RF Switching
- ISM Band frequency transmitter and receiver circuits for controlling home consumer electronic appliances
- Transmitter acts as a four-channel NLOS remote controller with a much higher range than conventional IR based remotes

DAQ for Temperature measurement using NI ELVIS 3.0
- Instrumentation system designed for temperature transducers, signal conditioning and linearization, and secondary display devices using NI ELVIS and LabVIEW
- The system can accept RTDs, Thermistors and Thermocouple transducers

DIP using C
- Utilities for edge detection, image transforms, histogram equalization, color to grayscale conversion written in C language
- Use of DFT, DCT, DST, Hadamard, Discrete Walsh and KL Transform for comparison of speed and energy compaction

Optical networking through Dense Wavelength Division Multiplexing
- Optical networking for meeting high BW data demand using DWDM for routing, grooming, optical amplification and restoration at wavelength level and data capacity enhancement
- Optical layer transparent to SONET layer; provides restoration, performance monitoring and provisioning of individual wavelength instead of electrical SONET signals
- Provides ultra-fast communication over a short distance of a few meters, stationary network ⬚ Capability extension possible up to a Terabit LAN

Design and implementation of a convolutional coder and decoder in FPGA
- 4-state Coder-Decoder pair using FPGA with error detection and correction, tested for noisy conditions (AWGN)
- The pair is designed for convolutional Trellis Coded Modulation for high speed modems operating in bandwidth limited channels

EVM
- Microprocessor 8085 based EVM
- Program and subroutines stored in EPROM

Collapse Indicating Devices
- Checks the pressure on any supporting surface using a piezoelectric crystal/strain gauge and gives out an alarm if the pressure exceeds predetermined unit
- Possible uses in public places, terraces, underground mines, weighing machines and elevators

FM Remote speaker system using PLCC
- HF Audio signals coupled with HV power line; signal travel along the power line and ensuring no attenuation due to bus-bar capacitance
- Isolation of power and communication equipment, power line EMI, modulation issues handled
  - ☐ FM provides auto-volume control
- Duplex asynchronous serial link between two computers @9600 bauds with error detection and correction

Telephone Remote Control Switch
- ON-OFF control for home appliances through telephone calls via a circuit interfaced to the remote telephone line/device by dialing specific DTMF digits
- Audio feedback/ACK on control action completed

Local Positioning System
- Inertial Guidance - dead reckoning based local reference system from an initial reference

PC Controlled Obstacle detection and collision avoidance in a robotic rover
- Robo-rover using IR sensor TSOP-1738 for obstacle sensing
- Rover control program in C-language (stepper motor control through parallel port)

Parallel Telephones with Auto Secrecy and intercom facility
- Disabling of other parallel phones (3 of the 4 in parallel) when one has been lifted

Anti-Theft Messenger
- Auto messaging in the event of theft or fire
- Fully reconfigurable microcontroller based embedded system with battery support

Microcontroller based access control system
- ☐ PIC 16F84 microcontroller based lock-unlock system operated by access codes
- ☐ Programmed in microchip assembly language; secure password reset

Control of Home Appliances through Telephone line using PLC
- DTMF 8-channel switching via power line and Teleremote control via telephone lines
- 4-bit DTMF data sent through power main line for appliance ON/OFF control using 8 relays

Face Recognition using Eigen face method
- Uses image-vector based approach, in which there is statistics-based dimensionality reduction by using Eigen weight method
- The method also uses the extraction of some local features to determine tilt and rotation

PC-based wireless appliance control system
- Parallel port for control of devices through wireless transmitter and receiver ☐ C++ program for control with multiple possible user accounts

Health Monitoring System
- Microcontroller-based, low cost monitoring system for human body parameters

INDUSTRIAL EXPERIENCE

Assistant Manager (Instrumentation), Instrumentation Department
Steel Authority of India Limited, Bhilai Steel Plant, BHILAI, CG, India, 1992 – Nov 1997
- Planned, co-ordinated and controlled the C&I systems overhaul, additions, modifications, revamping
- Head of a team of 30 qualified technicians, responsible for scheduling preventive, shutdown and breakdown maintenance and training the team on the computerized automation systems and safety
- Responsible for implementing ISO-9001:2000 standards of calibration, testing, installation and maintenance of sensor systems, associated electronics, programmable logic controllers and distributed computer control systems
- Responsible for association and co-ordination between engineering agencies involved in the development of green field projects
- Conducted monthly contact classes and training programmes for the development of skilled manpower in the department.

Projects worth mention:
- Designed the logic, programmed and implemented the boiler drum level control loop program for the DCS automation system of a Power Station Boiler using TCL language
- Designed the logic, programmed and implemented the Raceway Flame Temperature Control Loops (assembly level and machine programming) for Blast Furnaces on Toshiba controllers
- Designed the logic, programmed and implemented the automatic model for online control of Blast Furnace Cowper Stoves on Q-Basic language
- Designed and engineered the fabrication of a modified Hot Blast and Stove Dome Thermocouple fixing assemblies for in-situ fixing in very short shutdown time

Coal India Limited, South Eastern Coalfields Limited, BILASPUR, CG, India, Jan – Aug 1992
Junior Executive Trainee, Electronics and Telecommunication Department
- Worked on Strowger and Electronic Automatic Telephone Exchanges, Landline telephone network, VHF Communications Wireless links
- Well versed with telephone system electronics, telephone network wiring and terminations
- Performed a technical evaluation for an upcoming UHF-TDMA Radio Telephony project

ACCOLADES AND AWARDS
1. Project with CCM-UC was the cover story of UC Grad School Yearbook 2009
2. NIPM – PGDPM Examination 2004
   i. Tarneja National Award – Recitation and Cash award
   ii. NIPM Proficiency Gold Medal
   iii. AIOE Gold Medal for highest marks in "Industrial Relations" paper
   iv. Karnataka State Gold Medal for highest percentage of marks in the country
3. University top, M.Tech. (Instrumentation), Class of 2001, Devi Ahilya University, Indore
4. 5th in Post-Training Merit List, SAIL-BSP's Management Trainees (Technical) - 1992 Batch
   5. Best Student of the School – BMHS School, Raipur, India - 1983-84

MEMBERSHIPS

- Student Member, IEEE
- Student Member, ComSoc
- Life Member, Indian Society for Technical Education
- Member, Institution of Engineers (India)
- Life Member, Biomedical Society of India
- Life Member, Instrument Society of India
- Member of Panel of Jury, CII Chhattisgarh HR Excellence Awards - 2005
- Member, Board of Studies, Electronics and Telecommunication Engg. Stream, Faculty of Engineering and Technology, CSV Technical University, Bhilai, CG, India, 2006-2008
- Member, Board of Studies, Electronics Stream of studies, Govt. V.Y.T. P.G. Autonomous College, Durg, CG under Pt. RS Shukla University, Raipur, CG, India, 2005-2008

COMMUNITY SERVICE

- Mentor for a Blue Team participating in CyberThon 2016 and the winning UWF team in CyberThon 2017, Pensacola, FL, USA
- Volunteer for preparing the middle-school students' team for the CyberPatriot competitions at Ferry Pass Middle
  School, Pensacola, FL where I teach computer programming and cyber-security basics
- Grad Student Volunteer at University of Cincinnati – Computer Science Summer Camp
  June 2009, June 2011
  Helped in teaching of "Beginners' Java Programming" and in making robotics and sensors projects in two-week long Summer Camp - 2009 for high school students, organized by CS Dept, CEAS, UC.

  June 2010
  Taught "Beginners' Java Programming" and helped in making robotics and sensors projects in two-week long Summer Camp - 2010 for high school students, organized by CS Dept, CEAS, UC.
- Member, Volunteer and Historian for University of Cincinnati – Bhakti Yoga (Aug 2009 - July 2015)
  'University of Cincinnati – Bhakti Yoga' is a students' group for general help in life through morals, spirituality, vegetarian food and healthy practices. I have participated and volunteered in all the group events that include lecture events, potlucks and fundraising efforts organized by the group since Fall 2009.
- Member and Historian for University of Cincinnati Vegetarian Club (Aug 2012 - July 2013)
  UCVC is a students' group for promoting healthy living and vegetarianism among UC students that was formed in Fall 2012. I was responsible for maintaining and promoting the group as one of the Administrators of the Facebook page for the group. As the Historian, I was responsible for photographing, cataloging and sharing the details of group events on social media. I have also volunteered for monthly vegan potluck events as well as daylong promotion and fundraising events for the group.
- Volunteer for '**Association for India's Development' (AID)**; worked in fundraising events, 2008-2011
- Member, Regional representative and Auditor of a social group '**EhSaaS India**', that takes up specific help tasks for the Institutes for physically and mentally challenged in the country, by surveying their specific needs or problems and helping them out, 2005 – 2008

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- Planned and managed a fundraising event in 2005 with the help of BIT Alumni for helping '**Sneh Sampada**', Bhilai, CG, India – a residential institution for the mentally challenged
- Volunteer for '**Anand Niketan**', Bilaspur, CG, India – a residential Institution for the education and development of the hearing challenged, since 1992
- Organizing Committee Member and Volunteer for BIT Durg Alumni Association (July 2001 - June 2008)
  Volunteered for and helped organize annual Alumni Meets for my Alma Mater from 2001 - 2008

Dr. rer. nat. (Ph.D.) Bernd Owsnicki-Klewe

Email: bowsnickiklewe@uwf.edu

RECENT ACTIVITIES AT UWF (LECTURE DETAILS UNDER POINT F)

2010 through today:	Assessment coordination for the CS department
2014 through 2016	ABET collaborator
Since 2008	Member of various departmental/university committees
Spring 2017	Currently CASL

	CGS 3183:	Basic Web Applications
	CIS 4592:	Capstone 2
	COP 4027:	Advanced Computer Programming
	COT 4420:	Theory of Computation (F2F/online)

Fall 2016

	COP 2253:	Java Programming
	CEN 4400:	Introduction to Operations Research
	CTS 4817:	Web Server Administration
	COP 4856:	Distributed Software Architectures 1 (F2F/online)
	Support of the ACM ICPC South-East Regional	

Summer 2016
  CGS 3853: Web Page Design
Spring 2016

	COT 3100:	Discrete Structures
	CGS 3183:	Web Design for E-Commerce
	CIS 4592:	Capstone 1
	COT 4420:	Theory of Computation (F2F/online)

Fall 2015

	COP 2253:	Java Programming
	CEN 4400:	Introduction to Operations Research
	CTS 4817:	Web Server Administration
	COP 4856:	Distributed Software Architectures 1 (F2F/online)
	Organization of the ACM ICPC South-East Regional	

Summer 2015
  CGS 3853: Web Page Design
Spring 2015

	COT 3100:	Discrete Structures (F2F/online)
	CGS 3183:	Web Design for E-Commerce
	CIS 4592:	Capstone Research Experience

COT 4420:   Theory of Computation (F2F/online)

Fall 2014

COP 2253:   Java Programming

CIS 4595C: Capstone Project

CTS 4817:   Web Server Administration

COP 4856:   Distributed Software Architectures 1 (F2F/online)

Organization of the ACM ICPC South-East Regional

Summer 2014

CIS 4905: Directed Study "Web Application Security"

CGS 3853: Web Page Design

Spring 2013

COT 3100C: Discrete Structures

CGS 3183:   Web Design for E-Commerce

CIS 4592:   Capstone Research Experience

COT 4420:   Theory of Computation (F2F/online)

COP 4857: Distributed Software Architectures 2 (online)

Fall 2013

COP 2253:   Java Programming

CIS 4595C: Capstone Project

CTS 4817:   Web Server Administration

COP 4856:   Distributed Software Architectures 1 (F2F/online)

Organization of the ACM ICPC South-East Regional

Summer 2013

CGS 3853: Web Page Design

Spring 2013

COT 3100/L: Discrete Structures with Lab

CGS 3183:   Web Design for E-Commerce

CIS 4592:   Capstone Research Experience

COT 4420:   Theory of Computation (F2F/online)

Fall 2012

COP 2253:   Java Programming

CIS 4595C: Capstone Project

CTS 4817:   Web Server Administration

COP 4865:   Distributed Software Architectures 1 (F2F/online)

Organization of the ACM ICPC South-East Regional

Summer 2012

CGS 3853: Web Page Design

Spring 2012

COT 3100/L: Discrete Structures with Lab

COP 4814:   Net-Centric Applications

CIS 4592:   Capstone Research Experience

COT 4420:   Theory of Computation (F2F/online)

COP 4534L: Data Structures and Algorithms 2 Lab

Fall 2011

CGS 2060L: Excursions in Computing Lab

COP 2253:   Java Programming

CTS 4817:   Web Server Administration

COP 4865:   Distributed Software Architectures 1 (F2F/online)

Organization of the ACM ICPC South-East Regional
Spring 2011
 COT 3100/L: Discrete Structures with Lab (Pensacola)
 COP 4814: Net-Centric Applications (Pensacola)
 CIS 4592: Capstone Research Experience
 COT 4420: Theory of Computation (DL, Online, Pensacola)
Fall 2010

 COP 2253: Java Programming (3 sections, Pensacola/online)
 CTS 4817: Web Server Administration
Organization of the ACM ICPC South-East Regional
Summer 2010
 COP 2253: Java Programming
 CGS 3853: Web Page Design
Spring 2010
 COP 2253: Java Programming (Online)
COT 3100/L: Discrete Structures with Lab (Pensacola)
 CIS 4592: Capstone Research Experience
 COT 4420: Theory of Computation (Pensacola)
Fall 2009
 COP 2253: Java Programming (Pensacola/online)
 CTS 4817: Web Server Administration
 COP 4865:Distributed Software Architectures 1 (Pensacola)Spring 2009
 COP 2253: Java Programming (Pensacola)
COT 3100/L: Discrete Structures with Lab (Pensacola)
COP 3022/L: Intermediate Programming with Lab (Pensacola)
 COT 4420: Theory of Computation (Pensacola)
Argoforge: Training group for Programming Competitionsi
Fall 2008
 COP 2253: Java Programming (Pensacola/online)
COT 3100/L: Discrete Structures with Lab (Pensacola)
 COP 4865: Distributed Software Architectures 1 (Pensacola)ii
Coach for the 2008 ACM International Collegiate Programming Contest

Spring 2008
 COP 2253: Java Programming (Pensacola/online) [3 sections]
 COT 3100: Applications of Discrete Structures
Fall 2007

 COP 2253: Java Programming (Pensacola) [2 sections]
 CGS 3823: Web Page Design (Pensacola)
 COT 4420: Theory of Computation (Pensacola)
Organization of the UWF Second Life presenceiii
Contact faculty for Bits & Bytes – UWF/CS Student's Group
Spring 2007
 COP 3022: Intermediate Programming (Pensacola) [2 sections]
 COT 4420: Theory of Computation (Pensacola)
 COT 3100: Applications of Discrete Structures

CEN 5915:   Graduate CS research: Embedded Systems

UWF Honors Seminar "Great Works of Science": Frontiers of Computing

Participation in Curriculum Reform Working Group

Participation in the setup of the new CS department web server

Final development, launch and maintenance of the CS web site

Fall 2006

CIS 3020:   Science of Computing (Pensacola) [2 sections]

CGS 3604:   Applications of Information Technology (Pensacola)

CGS 3823:   Web Page Design (Pensacola)

CEN 4905:   Directed Study (Client/Server Architectures)

Participation in Curriculum Reform Working Group

Development of a concept for the CS web site

Participation in ITS training "Certified Web Developer"

Member of the Association for Computing Machinery (ACM)

Spring 2006

CIS 3020:   Science of Computing (FWB, Pensacola) [2 sections]

COP 3022:   Intermediate Programming (FWB)

COT 4420:   Theory of Computation (FWB)

Co-organization of "Seastars 06"

Fall 2005

CEN 3031:   Software Engineering (FWB)

COP 3530:   Algorithms and Data Structures (FWB)

COP 3022:   Intermediate Programming (FWB)

CIS 3020:   Science of Computing (FWB)

A.   EDUCATION

1984   Doctorate (Ph.D, Dr. rer. nat.) in Computer Science from the University of Hamburgiv (Grade A, "Magna cum laude"). Thesis supervisors: Prof. Dr. F. Schwenkel (Univ. of Hamburg), Prof. Dr. W. Brauer (Technical Univ. of Munich), Prof. Dr. H.-J. Schneider (Technical Univ. of Berlin)

1980 Diploma in Computer Science from the University of Hamburg (Grade A) on subject of "Knowledge Based Systems"

B.   PROFESSIONAL HISTORY

- current   Lecturer at the Department of Computer Sciencev at the University of West Floridavi.

2004 - 2005 Settling over to the USA, received work permit and SSN. Work on a CS textbook, improving photography and Photoshop/Flash skills.

1990 – 2004 Full Professor for Foundations of Computer Science and Applications of Computer Science in Economy at University of Applied Sciences Hamburgvii, Department of Electrical Engineering and Computer Scienceviii.

1984 – 1990 Researcher with PHILIPSix Research Laboratory, Hamburg. Research topics: Theoretical considerations, design and nucleus
implementation of a taxonomic knowledge representation system (based on description logics a la KL-ONE) at PHILIPS Research Laboratory, Hamburg. Several publications, invited talks and lectures within and outside of PHILIPS. Since December 1987: Project leader (leading 4 scientists) supervising system extensions like connecting to a DBMS and integration of nonmonotonic and vague reasoning. Work on example applications: Computer configuration and text understanding.

1980 – 1984 Freelance employee with REDA GmbH, Hamburg/Grossensee, a consulting firm

Revised December 8, 2016

with focus on accounting and cost control for medium-sized manufacturing companies. Leading designer and implementation supervisor of BABSSY, a software system for integrated accounting, cost controlling and production control.

Responsibilities: Management of two pilot installations (in jewelry and mechanical engineering companies), technical and organizational support, consultant to customer management and general maintenance of customer relations. Reported directly to CEO. Later awarded procuration for REDA until leave in 1984.

1973 – 1980 Freelance employee with SCHIFFKO GmbHx, Hamburg. Design and implementation of software (FORTRAN) for Computer Aided Manufacturing (CAM) in shipbuilding. Esp. S16-BS, an interactive graphical program for interactive arrangement of pieces on steel plates for oxygen or laser cutting. Participation in several workshops and exhibitions on CAM and cutting technology.

C.   Professional Services

2002 – 2004 Designer and webmaster of the Computer Science website at UAS Hamburgxi.

1998 – 2004 Member of the Study Reform Committee of the Department of Electrical Engineering and Computer Science. Member of the work group on the definition of the revised CS study system, including introduction of Bachelor's and Master's degrees in CS. Participation in several auditions for accrediting Bachelor and Master courses in Computer Science and Information Engineering.

1997 – 1999 Member of the department's working group on cooperation with local high schools on issues of CS education in high schools.

1997 – 1999 Participation in the University work group on the agreement upon "Ergonomic guidelines for computer workplaces". Definition of ergonomic rules and their implementation within the around 800 staff computer workplaces at the University.

1995 – 2004 Reviewer of several books on AI and C++ programming (details available upon request)

1994 – 1995 Expert referee for several Federal Research Funding Applications procedures (by the German Secretary for Research and Technology)

1992 - 1994 Head of the "Laboratory for Software Technology" at the Dept. of EE and CS at FH Hamburg, overseeing five laboratory assistants/technicians. The laboratory is responsible for carrying out teaching support for more than 400 students of "Software Technology" and "Technical Computer Science".

1992 – 1994 Member of the "Computer Council Berliner Tor". Council objectives: Planning and overseeing the future technical and staff development of computer equipment for four major departments of the university.

1990   Referee for the German Workshop on AI, GWAI-90

1990 – 1999 Member of several committees for the appointment of professors in Hamburg, Leipzig and Elmshorn (Northern Academy)

1989   Referee for the workshop on "Modeling" at the Austrian AI Conference, ÖGAI-89

1988   Program Chairman, organization and management of the 6th Spring School on AI, KIFS-88, Günne

1988   Member of the program committee of the German Workshop on AI, GWAI88

1987   Expert referee for "Informatik in Forschung und Entwicklung" (Computer

Science in Research and Development)

1987   Referee for the German Workshop on AI, GWAI-87

1979 – 1980 Participation in the "CAD Working Group" at the "German Research Center for Shipbuilding". Emphasis on discussion and recommendation of "Guidelines for Future CAD Applications in Shipbuilding and Maintenance Technology" (recommendation to the German Secretary for Research and Technology). Evaluation of several Computer Graphics kernel systems, esp. GKS

D.   Publications (In chronological order)

Graphische Datenverarbeitung – Eine marktnahe Neuentwicklung zur Steigerung der Effektivität in der Fertigungsvorbereitung (Graphical Data Processing – A close-tomarket development to increase efficiency in production planning). HANSA – Schiffahrt – Schiffbau – Hafen, 114, No. 18, pp. 1599-1601, 1977 (with B. Pruin).

Bauteile SMD, ein in die Praxis eingeführtes EDV-Paket für die blechverarbeitende Industrie (Parts SMD, a practical EDP package for the steel processing industry). HANSA – Schiffahrt – Schiffbau – Hafen, 115, No. 18, pp. 1463-1672, 1978 (with H. Dittmann, U. Kipp, B. Pruin).

Repräsentation von strategischem Schachwissen (Representation of Strategic Chess Knowledge). KI-Rundbrief der GI Nr. 21, pp. 2-6, 1980 (with K. v. Luck)

Structures for Knowledge Based Chess Programs. In: J. Siekmann (ed.): GWAI-81, German Workshop on Artificial Intelligence, pp. 297-306, Springer Verlag, 1981 (with K. v. Luck) [refereed]

N.N. A View on Planning in Chess. In: W. Wahlster (ed.): GWAI-82, German Workshop on Artificial Intelligence, pp. 92-101, Springer Verlag, 1982 (with K. v. Luck) [refereed]

N.N. A Case Study in Chess Knowledge Representation. In: D. Beal (ed.): Advances in Computer Chess IV, pp. 127-146, Pergamon Press, 1984 (with K. v. Luck) [refereed]

Declarative Representation of Control Structures. In: J. Laubsch (ed.): GWAI-84, German Workshop on Artificial Intelligence, pp. 181-190, Springer Verlag, 1984 (with K. v. Luck) [refereed]

Repräsentation von postionellem Schachwissen mit Methoden der Künstlichen Intelligenz (Representation of Positional Chess Knowledge with Artificial Intelligence Methods), Ph.D. Thesis. Also: Report No. 111, Department of Computer Science, University of Hamburg

Data Models in Knowledge Representation Systems. In: C.-R. Rollinger, W. Horn (eds.): GWAI-86, German Workshop on Artificial Intelligence, pp. 69-74, Springer Verlag, 1986 (with J. Edelmann) [refereed]

Neuere KI-Formalismen zur Repräsentation von Wissen. In: T. Christaller (ed.): Künstliche Intelligenz, KIFS-87, 5. Frühjahrsschule für Künstliche Intelligenz, Springer Verlag, 1989 (with K. v. Luck) [invited]. English version: New AI formalisms for Knowledge Representation, KIT Report, TU Berlin, 1987

Configuration as a Consistency Maintenance Task. In: W. Hoeppner (ed.): GWAI-88, German Workshop on Artificial Intelligence, Springer Verlag, 1988 [refereed]

Probabilistic Inheritance and Reasoning in a Hybrid Knowledge Representation System. In: W. Hoeppner (ed.): GWAI-88, German Workshop on Artificial Intelligence, Springer Verlag, 1988 (with J. Heinsohn) [refereed]

Ein integriertes System zur Repräsentation von Wissen (An Integrated System for the Representation of Knowledge). PHILIPS "Unsere Forschung in Deutschland" (Our Research in Germany), 1989

A General Characterization of Term Description Languages. In: K.H. Bläsius, U.

Hedstück, C.-R. Rollinger (eds.): Sorts and Types in Artificial Intelligence, Springer Lecture Notes in Artificial Intelligence, pp. 183-189, Springer Verlag, 1989 [invited]

A Cardinality-Based Approach to Incomplete Knowledge. In: L.C. Aiello (ed.): Proceeding of the European Conference on Artificial Intelligence, ECAI-90, pp. 491-496, Pitman Publishing, London, 1990 [refereed]

Term Subsumption Languages in Knowledge Representation. AI Magazine, No. 2, pp.16-23, 1990 (with P. F. Patel-Schneider, A. Kobsa, N. Guarino, R. M. MacGregor, W. S. Mark, D. L. McGuiness, B. Nebel, A. Schmiedel, J. Yen)

KL-ONE – Eine Einführung (KL-ONE – An Introduction). In: P. Struß (ed.): Wissensrepräsentation (Knowledge Representation), Oldenbourg Verlag, 1991 (with K. v. Luck) [invited]

Integrating Cognitive Systems: First Intermediate Report - Project Outline, 1995 (with K. von Luck)

Smalltalk als Plattform zur Integration unterschiedlicher Softwarekonzepte (Smalltalk as a Platform for the Integration of Various Software Concepts). Proceedings of the STJA (Smalltalk and Java in Industry and Education) ’97, pp. 209-214, 1997 (with M. Böhm, G. Pfeiffer, J. Raasch) [refereed]

Integration kognitiver Systeme - ein Zwischenbericht (Integration of Cognitive Systems – an Intermediate Report). KI (German magazine on Artificial Intelligence), No. 2/97, pp. 33-36, 1997 (with M. Böhm, G. Klemke, K. v. Luck, G. Pfeiffer)

Objektorientierung in der Informatikausbildung auf der Basis von Smalltalk (Object Orientation in Computer Science Education based on Smalltalk). Informatik Spektrum No. 20, pp. 335-343, 1997 (with M. Böhm, J. Freytag, G. Pfeiffer, J. Raasch) [invited]

Introducing a Reflective Activity into the Design Process in an Advanced Computer Programming Course, CCSC-MS: 2016 (with J. Coffey)

E. Books

Algorithmen und Datenstrukturen (Algorithms and Data Structures), Verlag Wißner, Augsburg, 1995, 2nd ed. 1997, 3rd ed. 1998, 4th ed. 2002, ISBN 3-89639-172-0

Wissensrepräsentation und Logik - Eine Einführung (Knowledge Representation and Logic – An Introduction). In: Görz, G. (ed.): Handbuch der Künstlichen Intelligenz

(Handbook of Artificial Intelligence), Addison-Wesley, 1993, 2nd ed. 1995, 3rd ed. 2000, ISBN 3-486-25049-3 (with K. v. Luck, B. Nebel). Responsible chapter editor of the chapter on "Knowledge Representation".

F. PRESENTATIONS (SELECTION, IN CHRONOLOGICAL ORDER)

Wissensrepräsentation mit Semantischen Netzen (Knowledge Representation with Semantic Networks). PHILIPS Research Laboratories, Hamburg, 1986

Semantic Networks. ISA Colloqium on Conceptual Modeling, Eindhoven, 1986

The MESON Knowledge Representation System. PHILAI-86, PHILIPS Workshop on Artificial Intelligence, 1986

Notes on the Role of Semantics in Knowledge Representation Systems. Tutorial at the German Workshop on Artificial Intelligence GWAI-86, 1986

On the Representation of Uncertainty in Semantic Networks. PHILAI-87, PHILIPS Workshop on Artificial Intelligence, 1987

Non-Concepts and Non-Roles. 1st German KL-ONE workshop, Saarbrücken, 1987

Advanced Course: New AI Formalisms for Knowledge Representation. 5th Spring School on AI (KIFS-87), Günne, (with K. v. Luck), 1987

Basic Course: Knowledge Representation. 6th Spring School on AI (KIFS-88), Günne, (with K. v. Luck), 1988

Configuration in the MESON Knowledge Representation System. PHILIPS TDS Appeldoorn, 1988

Verstehen und Referenz in der KI (Understanding and Reference in AI). Workshop on the Philosophy of Understanding, Dagstuhl, 1989

Knowledge Representation for Text Understanding. Institute for Perception Research, Eindhoven, 1989

Terminologische Repräsentationssysteme (Terminological Representation Systems). Univ. Bielefeld, 1989

The MESON Knowledge Representation System. AAAI Workshop on "Term Subsumption Languages in Knowledge Representation", Thorn Hill, NH, 1989

Wohin steuert die KI? (Where is AI heading to?). Spring School on Artificial Intelligence, Günne, 1991

Künstliche Intelligenz - Ein Thema für das Gymnasium? (Artificial Intelligence - A Topic in High-School Education?). Annual Conference of the MNU (Society for Education in Science and Mathematics), Stuttgart, 1992 (with Y. Klewe)

Semantic Networks and Term Description Languages for Knowledge Representation. Advanced Tutorial at the Conference on Artificial Intelligence in Medicine (AIME-93), Munich, 1993

Several presentations to high school representatives on "CS education in high school", 1997-1999

Programming Languages (position statement). Workshop on "Object Orientation in Education". GI-Tagung Informatik und Ausbildung (Conference of the German CS Society on Computer Science and Education), Stuttgart, 1998

oo-m-ai: Object-oriented Methods for Artificial Intelligence. Presentation at the Institute for Human and Machine Cognition, Pensacola, Florida, 2001.

G. TEACHING EXPERIENCE

The following courses have been held at different Universities and academies in and around Hamburg.

Semantisch fundierte Wissensrepräsentationssysteme (Semantically Well-founded Knowledge Representation Systems). Seminar, Univ. of Hamburg, (with K. v. Luck), Fall 1988

Modellbildung in wissensbasierten Systemem (Modeling in Knowledge Based Systems). Seminar, Univ. of Hamburg, (with K. v. Luck), Spring 1989

Algorithms and Data Structures. Northern Academyxii, Elmshorn, 1996 – 2003. See below

Theoretical Foundations of Computer Science 3. Northern Academy, Elmshorn, 1999
Formal languages, grammars, Chomsky hierarchy of grammars and languages, Pumping Lemma for regular languages, context-free languages, parsing problem, Compiler architecture, LL(1) parsing

Weekend seminar: Introduction to Java. Northern Academy, Elmshorn, 1999/2001/2002
See Programming 2 (Java) below

The following courses have been held at the University of Applied Science, Hamburg. Some have been held multiple times since 1990. Some lecture's material might overlap due to changes in the curriculum over the years.

Programming 1 (Pascal)
Simple data types, control structures, compound data types, procedural abstraction, data abstraction, top-down development, correctness (assertions, invariants)

Programming 2 (Pascal)
> Basic algorithms, sorting and searching, information systems architectures, practical case studies

Programming 1 (Smalltalk)
> Principles of object-orientation, CRC principle, message passing, classes, instances, methods, iterations, collections, streams, abstract classes and methods, design and redesign issues, GUI design, information systems architectures, simple design patterns ("Observer", "Factory", "Singleton", …)

Programming 2 (Java)
> Distinctions between Smalltalk and Java, static vs. dynamic typing, type casts, design using abstract classes and interfaces, containers, exceptions, threads, events, AWT, applet programming, http services, reflective programming, advanced design patterns ("Strategy", "COR", …)

Programming for Students of Electrical Engineering (Pascal) Simple data
> types, control structures, compound data types, procedural abstraction, top-down development, numerical methods, basic algorithms (sorting and searching)

Algorithms and Data Structures (Pascal, C++ and Java)
> Quality of algorithms, abstract data types, asymptotic analysis, sorting algorithms, divide-and-conquer algorithms, external sorting, binary search trees, B-Trees, tree and graph searching, optimization (greedy, Dynamic Programming), data compression

Functional and Logic Programming (Scheme/Prolog)
> Functional programming paradigm, functions as first-class objects, lambda abstraction, higher-order functions, lexical and dynamic binding, encapsulation principle, delayed evaluation, streams, meta programming, logical programming paradigm, pattern matching and unification, WAM, Prolog programming styles, non-deterministic programming, information systems in Prolog, deductive databases, introduction to NLP and DCG parsing

Artificial Intelligence (Scheme/Common Lisp)
> Introduction to Scheme/Lisp, list processing, list representation of complex data structures, objectives and methods of Artificial Intelligence, pattern matching, deduction algorithms, frame-based representation schemes, Micro-Flavors, Expert Systems

Applications of Artificial Intelligence (Prolog)
> Advanced Prolog programming, backtracking control (cut, fail), non-deterministic parsing, Definite Clause Grammars, syntax, compositional semantics, world models and references, QA systems, semantic anomalies, issues of ambiguity

Applications of Artificial Intelligence (Smalltalk)
> Objectives and methods of Artificial Intelligence, symbolic and sub-symbolic AI, symbols and denotation, logic, basic model theory, uninformed search methods, "Generate and Test", backtracking search, constraint solving, backward checking, forward checking, dependency-directed backtracking, informed search methods, gradient search, A* search, Means-End search, diagnostic problems, truth maintenance, uncertain knowledge, representation of temporal constraints, planning and configuration

Computer Science 1 (C++, in English for the international course on "Information Engineering")
> Algorithms, data structures and abstract data types, Discrete Mathematics introduction (summations and products, asymptotic analysis), sorting algorithms, divide-and-

conquer algorithms, binary search trees, B-Trees, data compression, tree and graph searching

The Semantic Web (Elective module)xiii

Current state of WWW services, Berners-Lee's "Semantic Web" vision, Search Engines,Annotations, SW activities by W3C and SemanticWeb.org, Semantics, Logic and Set Theory, Ontologies (Aristotle to modern), Languages (RDF, Description Logics, (DAML, OIL, …), Tools (Amaya, OilEd, …), Ontology construction and use

Introduction to Computer Science

Overview of CS, history of CS, coding schemes, the concept of information, redundancy, logic circuits and arithmetic, hardware abstraction layers, equivalence of hardware and software, programming languages and paradigms, automata and limits of computation.

Automata Theory

Alphabets, formal languages, grammars, Chomsky hierarchy of grammars, finite automata, acceptance conditions, regular languages, non-deterministic FAs, regular expressions, pumping lemma for regular languages, finite machines, applications in UI and protocol design, context-free languages and LL(1) parsing, push-down automata, normal forms, pumping lemma for CFLs, equivalence of CFLs and PDAs.

Compiler Construction

Compiler/Interpreter architecture, lexical analysis with finite machines, LL(1) parsing, elimination of left recursion, left factorization, manual conflict resolution, error recovery strategies, issues of semantics, attributed grammars, syntaxdirected translation, type checking, intermediate code generation (Reverse Polish Notation), code design, limits of syntax-directed translation, bottom-up parsing, (S)LR parsing, lex and yacc

Theory of Computability

Objectives of Computability Theory, historical outline, Turing Machines, TMs as acceptors, recursively enumerable (Turing-acceptable) languages, computable functions, existence of non-computable functions, enumerable sets, decidable sets, construction of enumerators (dovetailing), Chomsky type 0 languages, equivalence of r.e./enumerable/type 0 languages, the Universal Turing Machine, non-deterministic TMs, undecidable problems, Halting Problem, equivalence of TMs, non-r.e. languages, undecidable languages, Rice's Theorem, Recursive functions, Introduction to Complexity Theory

Seminar on Applied Computer Science (Examples of tutored student presentations) Non-deterministic algorithms, probabilistic algorithms, encryption and compression algorithms, compression and transmission standards, computer viruses, XML, VPNs, Java 2 and JFC, Servlets, Web Services, distributed systems, electronic marketplaces

Seminar on Technical Computer Science (Examples of tutored student presentations) XML, DTDs and XMLS, URIs and XML namespaces, CSS and XSL/XSLT, XPath, XLink, XPointer, XQuery, XML development tools, XML extensions (RDF, DAML+OIL, etc.), XML applications

Introduction to CS

History of CS, areas of CS, number systems, elementary circuit design, effective procedures (algorithms), Turing machines, efficiency issues, asymptotic analysis, PL paradigms (imperative, functional, logical), syntax/semantics/translation of PLs, social implications of CS.

Automata and Formal Languages

Alphabets, formal languages, grammars, Chomsky hierarchy of grammars, finite

automata, acceptance conditions, regular languages, non-deterministic FAs, regular expressions, pumping lemma for regular languages, finite machines, applications in UI and protocol design, context-free languages and LL(1) parsing

The following courses have been held at the University of West Florida.

Science of Computing

Data storage, data manipulation, operating systems, networking, algorithms, programming, software engineering, data abstractions, database systems, artificial intelligence, theory of computation

Intermediate Programming in Java

Arrays, Arraylists, Interfaces, inheritance, graphics, events, GUIs, exceptions, files and streams

Introduction to Software Engineering

Software Life-Cycle models, Software process models, teams, requirements analysis, OO analysis, OO design, implementation, post-delivery maintenance

Data Structures and Algorithms

Analysis of algorithms, Stacks and Queues, Binary Trees, self-adjusting trees (AVL, B-Trees), Hashing, Sorting, Graph algorithms

Theory of Computation

Sets, alphabets, mappings, formal languages, grammars, finite automata, acceptance conditions, regular languages, non-deterministic FAs, regular expressions, pumping lemma for regular languages, context-free languages, derivations, derivation trees, Chomsky Normal Form, pumping lemma for CFLs, Turing Machines, acceptance, recursively enumerable languages, construction of TMs, TMs as enumerators, Church-Turing Thesis, Halting Problem, undecidable languages, reduction proofs, Post's Correspondence Problem

Applications of Information Technology

Computer terminology, computer components, hardware, software, HumanComputer interaction, GUIs, interface usage, networks, WAN/LAN, Internet, files and folders, HTML, tags, links, pictures, WWW search and information retrieval, information representation, bit, byte, codes, computer organization, CPU, peripherals, machine programs, operating systems, programming languages, algorithms, digital media, sound, images, sampling, compression, social implications of IT, computer hazards, legal issues, spreadsheets, Excel, databases, basic concepts, query composition, database design, privacy and security

Web Page Design

Introduction to the WWW, clients and servers, history, protocols, URLs, HTML/XHTML basics, tags, colors, fonts, advanced XHTML, lists, tables, Cascading Style Sheets (CSS), association via tags/classes, specific styles, elements, external style sheets, CSS positioning, images, formats, preparation and embedding, copyright issues, design basics, usability, accessibility, aesthetics, page navigation schemes, form and color, website planning and construction, browser differences, Javascript basics, Document Object Model (DOM), Javascript and DOM, Multimedia basics, Audio/Video preparation and publishing, codes and Codecs, compression, SMIL

Applications of Discrete Structures

Propositional logic, truth tables, equivalences, predicates, quantifiers, inferences rules, proofs (direct, indirect), sets, operations, Venn diagrams, functions, surjective/injective/bijective, inverse functions, sequences and summations, summation rules, algorithms, asymptotic analysis, function growth (O, W, Q), definitions, proofs, algorithm complexity, induction proofs (mathematical, strong, structural), recursive definition, recursive algorithms, recursion and recurrences, solving linear recurrences, divide-and-conquer algorithms, Master Theorem, Boolean functions, construction of Boolean functions (Disjunctive/Conjunctive Normal

Forms)

Distributed Software Architectures 1

Classification of Distributed Architectures, Client/Server, P2P, Three-Tier Architecture, Databases, Relational Model, Keys, Integrity, Relational Algebra, DB Design, Transactions, Two-Phase Lock Protocol, SQL, MySQL, JDBC, XML, Web Tier, Web Servers, http, Application Servers, GlassFish, NetBeans, Servlets, Java Server Pages, JavaBeans, MVC, Server/Client-Side Validation, Java Server Faces, Distributed Objects, Error Semantics, Sockets, RMI, JRMP, IIOP, CORBA, EJB, Dependency Injection, JNDI, JPA, JTA

Web Server Administration

Installation and administration of the Apache web server under unix, user management, backups, support software (ftp,ssh), server extensions (CGI, PHP, tomcat), web application deployment, server security, secure connections (SSL/TLS), MS Server 2008 and IIS, .NET applications, virtualization

Capstone Research Experience

Research topic selection, literature selection, research project planning, presentation techniques, research report structure, practical aspects (project documentation, three presentations, one research report)

Net-Centric Applications

XML, basics, well-formedness, validation, DTD and XML Schema, CSS, XSLT, client-side scripting, JavaScript, jQUERY, AJAX, server-side processing, PHP, MySql database, web application security (XSS, SQL injection, …), session management, web services, WSDL and SOAP, deployment strategies

Excursions in Computing Lab

Hands-on experience with Search Engines, Web Page Design, Cooperative Work, Media, Operating Systems, Databases, Programming, Research and Presentations

Data Structures and Algorithms 2 Lab

Design studies by course projects, coding and debugging, probabilistic algorithms, applications of asymptotic analysis (recurrences, Master Therorem), Counting and Combinatorics, Greedy Algorithms

Capstone Project

Development of a software system for a real-world client while working in small teams. Development and delivery of relevant artifacts such as a project proposal, design, test plan, code, user's manual, and project log with metrics as the software system evolves throughout the course. A final presentation and evaluation of the project experience is required.

Web Design for E-Commerce

Introduction to software components in e-commerce, Infrastructure for ecommerce, Security and legal issues in e-commerce, Creating a web site for an industry, Accessibility and Usability issues, expanding a web site to include catalogs and shopping carts, Future of e-commerce software; technology: HTML/CSS, Relational DBMS, PHP

Distributed Software Architecture 2

Advanced concepts in Java EE: Details of MVC, EJBs and Dependency Injection (DI), DI by Annotations or JNDI lookup, Bean life cycle and call-backs, Web Services: REST and SOAP-based. Object-Relational Mapping, JPA/JTA (Java Persistence/Transaction API), JMS (Java Message Service), Overview over distributed Dbs (Cassandra, MongoDB).

Directed Study "Web Application Security"
>   TCP/IP, TLS/SSL (https), attack forms and defenses; analysis of GOTOFAIL and HEARTBLEED, DANE/DNSSEC, Server-side TLS/SSL (Apache), Applicationside TLS/SSL; Server Hardening, Server-side encryption, (hashes/salting), Injection attacks (sanitizing).

Introduction to Operations Research
>   Game Theory, zero-sum games, equilibria and probabilistic solutions; special optimization problems: Shortest path, transport and scheduling; Linear Optimization: Graphical and computational solutions. Predictions by probability distributions; Introduction to Data Analysis: Analysis of raw data, five number analysis, box plots, geographical data; Programming in R: vectors, matrices, data frames, APIs for optimization and statistical analysis.

Advanced Computer Programming
>   Asymptotics; basic data structures: Queues, Stacks, trees. Sorting algorithms, Advanced DS: Hash maps, heaps, graphs. OO Design and UML; Java Generics; Design Patterns; Multithreading; DB and Web programming

H.   PROJECTS

G1.   Research projects

2012 – 2014 Scavenger: Semantic Representations for location-based services and planning.

2011 – 2014 SARIDE: Semantic Representations for Media Objects

2001 – 2004 Initiation of the "oo-m-ai" (OO methods for AI) research project. Project objectives: Develop a coherent, reusable object oriented framework for AIbased problem solving methods. Expanded to dealing with issues of the "Semantic Web" in 2002

1995 – 1997 Initiation and outline of a research project "Integration of Cognitive Systems" at the University of Applied Sciences, Hamburg, Department of Electrical Engineering and Computer Science (with Kai von Luck)xiv. Project goals: Integration of symbolic and sub-symbolic methods for problem solving. Supervision of several student's theses emerging from this project, esp. in the area of symbolic planning and robot control.

1981 – 1984 Design and prototypical implementation of N.N., a Chess knowledge base for strategic middle game positions at the Department of Computer Science at the University of Hamburg as the Ph.D. project (with Kai von Luck).

G2.   Student's (educational) projects

- Logic Programming and Planning (Prolog)
- Visualization for Software Engineering
- Visualization of Finite Automata (Pascal)
- Chess Programmingxv
- Java Evaluation
- Java Applications

I. THESES SUPERVISED (SOME IN COOPERATION WITH LOCAL COMPANIES - SELECTION)

- An Expert System for Human Resource Scheduling
- A Compiler for the Simulation of Robot Motion
- Core Production Planning System
- Mobile Robot Design for Serving Multiple Goals
- A Knowledge Representation Framework for Simulation
- Planning with Blackboard Abstractions
- An Object Oriented Robot Simulation System

- Design of a Cooperative Internet Agent
- An Open Logic-Programming Environment for Smalltalk
- The Use of Annotations in the "Semantic Web"
- Ontologies and Web Search Engines

J.   Online Resources (Lectures & Downloads)

- Online slides for the "Semantic Web" course (Spring 2003) http://www.informatik.haw-hamburg.de/~semweb/online/
- Course material for "Computer Science 1" http://www.informatik.haw-hamburg.de/~owsnicki/cs1.html
- Handout "Theory of Computablity" (ps, zip, in German) http://www.informatik.haw-hamburg.de/~owsnicki/public/theo.zip ☐ Slides "Compiler Construction" (rtf, zip, in German) http://www.informatik.haw-hamburg.de/~owsnicki/public/folrtf.zip
- Slides "Applications of AI" (ps, zip, in German) http://www.informatik.haw-hamburg.de/~owsnicki/public/kips.zip
- Slides "Functional and Logical Programming" (ps, zip, in German) http://www.informatik.haw-hamburg.de/~owsnicki/public/flfolien.zip

K. COMPUTER-RELATED SKILLS

FORTRAN IV/80, Common Lisp, Scheme, Prolog, Java, C/C++, Smalltalk, XML/HTML, JSON, OWL, CSS, JavaScript, Flash, Photoshop, MySQL, MongoDB, Apache, LaTeX, Linux, R, PHP

L. MISCELLANEOUS SKILLS/HOBBIES

- Audio production and hard disk recording
- Composition and Songwriting
- Guitar, bass, flute playing
- Digital/analog photography and web design
- Chess
- English language (fluent)
- German language (native)

Appendix E

University of West Florida Graduate Admissions and Graduation Requirements

ADMISSION AND GRADUATION REQUIREMENTS

http://catalog.uwf.edu/graduate/academicpolicies/graduation/

GENERAL INFORMATION

The Graduate School administers the application, admission, and readmission process for all degree-seeking and non-degree seeking graduate students. It also assists prospective graduate students in obtaining information about UWF.

General Policies
The University of West Florida encourages applications for admission from qualified students regardless of gender, culture, religion, ethnic background, age, marital status, or disability. Students with documented visual impairments, hearing impairments, motor impairments, or specific learning disabilities may petition for substitution of admission requirements provided such substitution does not significantly alter the nature of the program for which admission is being sought. For more information about the University's admission requirement substitution policy contact the Graduate School.
Admission of students to the University of West Florida is within the jurisdiction of the University, but subject to the minimum standards adopted by the UWF Board of Trustees and the Florida Board of Governors.

Conditions of Admission
The Graduate School will notify the applicants of the admission decision. Admission to the University is often contingent upon the subsequent receipt of satisfactory and official college or university transcripts and verification of baccalaureate degrees. Failure to submit such documents may result in the cancellation of admission. Refer to Provisional Admission for more information.

Ownership of Submitted Documents
All credentials and documents submitted become the property of the University of West Florida. The originals or copies of the originals will not be returned to the applicant or forwarded to another institution, agency, or person.

Fraudulent Records
If it is found that an applicant has made a false or fraudulent statement or a deliberate omission on the application for admission, the residency statement, or any other accompanying documents or statements, the applicant may be denied admission. If the student is already enrolled when the fraud is discovered, the case will be adjudicated using the procedures specified for violations of the UWF Student Conduct System as contained in the Student Handbook.

Applicant Conduct
The University shall evaluate an applicant's previous conduct to determine whether offering the applicant admission is in the best interest of the University. Applicants with a record of previous misconduct at an educational institution or criminal conduct will be evaluated during the admission process in accordance with UWF/REG 3.003.

Request for Admission for a Later Semester
Applicants are admitted to the University only for the semester for which they apply. Students

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who do not enroll in the semester for which they have been admitted and want consideration for a different semester must reapply for admission and pay another application processing fee. Applicants will be considered for admission under the policies in effect at that time. Admission is not automatic. If an applicant has attended, or is currently attending, another collegiate institution since the submission of the previous application, the applicant must indicate the institution on the new application and provide an official transcript of all work attempted.

Admission Documents Required
Applicants for graduate admission must provide the Graduate School with the following documents:

Application for Admission
Applicants must apply for graduate level admission online. The application for admission and a non-refundable, non-deferrable $30 processing, fee payable to the University of West Florida, should be submitted six to nine months prior to the semester for which admission is requested. It is the policy of the University not to defer or waive the application for admission and the application processing fee. The application processing fee must be in U.S. currency and drawn from a U.S. bank. There is an option to pay via credit card when the web application is submitted.

College Transcripts
Applicants must submit one official transcript from each college and university attended to the Graduate School. Applicants who received their undergraduate degree from UWF do not need to provide UWF transcripts. Transcripts are considered official when they are sent from a college or university directly to the Graduate School and bear an official seal and signature. Transcripts bearing the statement "Issued to Student," faxed transcripts, or transcripts submitted by the applicant are not considered official. Original documents, or signed officially certified photocopies of original documents, may be submitted by the applicant only when institutions outside the U.S. will not send academic records to other institutions. The verifying signature should preferably be that of an officer of the institution attended. All academic records that are not in English must be accompanied by certified English translations.

Test Scores
Official test results from a nationally standardized graduate admission test are required for all applicants unless otherwise specified by the graduate program to which the applicant is applying. Applicants should contact the graduate department for which he/she applied to inquire as to which test is acceptable for that program or if it may be waived. The University of West Florida accepts the Graduate Record Examination (GRE), the Miller Analogies Test (MAT), and the Graduate Management Admissions Test (GMAT). For the majority of departments, it is recommended that the graduate admission test be taken no later than April for the fall semester, August for the spring semester, or January for the summer semester. Applicants should contact the specific department for departmental deadlines for admission tests. Applicants to the Ed.D. program should take the GRE, MAT, or GMAT one year prior to desired admission. The test scores are considered official only when they are sent directly to the Graduate School from the testing agency. Examinee copies are not considered official. The GRE, GMAT, and MAT are offered several times a year at numerous testing centers in the U.S. and abroad. Advanced registration is required. Registration forms, as well as detailed information on the availability and character of the examinations, may be obtained from the UWF Testing Center.

Departmental Requirements
Some departments have additional admission requirements such as auditions, portfolios, goal statements, letters of recommendation, departmental applications, writing samples, personal interviews, and diagnostic testing. Applicants should contact the department directly regarding any departmental admission requirements.

Deadlines for Applications and Supporting Documents
The final deadlines for applications and supporting documents for graduate applicants are: Because some departments have earlier deadlines, applicants should contact the specific academic departments for departmental deadlines. It is in an applicant's best interest to apply early. Files completed after the published deadlines may not be processed in time for the applicant to be considered for enrollment in the desired semester.

Application for Graduation
Applications for Graduation are submitted for the term in which the student is completing their degree requirements. All applications must be submitted during the application period. Specific dates are noted in the Academic Calendar. Students who miss the deadline should contact their academic department to determine eligibility and to request a late submission. Students submitting a late application risk not being included in the commencement program important graduation communication.
Retroactive graduation to a prior semester will not be approved.

Master's and Specialist Degrees
Students fulfilling requirements for a UWF master's or specialist degree must follow the instructions for Applying for Graduation and also the Graduation Guide.

GRADUATION PROCESS

Degree Requirements
All degree requirements must be complete by the last day of the semester for which the graduation application is submitted. Students whose Graduation Application is denied for any reason or do not meet the requirements for graduation must submit a new application for the semester in which the requirements are met.

Good Standing Status
A student must be in good standing to receive a UWF degree. Accordingly, any student who is subject to suspension or probation for scholastic or disciplinary reasons will not graduate until the conditions of suspension or probation have been satisfied.

Appendix F

Dr. Sudeep Sarkar, Professor and Chair Computer Science and Engineering at USF

October 10, 2018

Prof. Thomas Reichherzer

Chair, Computer Science and Engineering

University of West Florida

Dear Professor Reichherzer:

The Computer Science and Engineering Department at the University of South Florida, Tampa is supportive of your creating a separate MS degree program in Cybersecurity. UWF's offering along with ours in the future will offer a diversity of options to Florida students in the field of Cybersecurity, which is in high demand among employers. There are plenty of open Cybersecurity jobs in the state and there is severe shortage of high-tech workers in the field.

We look forward to following your success in this degree implementation and continuing our collaborative efforts to establish the state of Florida as the leader in Cybersecurity education and research.

Sincerely,

Prof. Sudeep Sarkar, Professor and Chair
Computer Science and Engineering