

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

Electrical and Computer Engineering

Name of College(s) or School(s)

Name of Department(s)/ Division(s)

Engineering

Master of Science in Engineering

Academic Specialty or Field

Complete Name of Degree

14.0101

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)	
	HC	FTE
Year 1	25	13.75
Year 2	40	22.0
Year 3	48	26.4
Year 4	62	34.1
Year 5	66	36.3

Projected Program Costs (From Table 2)				
E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
\$39,387	\$541,567	0	0	\$541,567
\$18,307	\$664,554	0	0	\$664,554

Note: This outline and the questions pertaining to each section 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) Master of Science

(b) Engineering

(c) 30 Semester Credit Hours beyond the bachelor's degree

(d) The University of West Florida (UWF) seeks to offer a Master of Science (MS) degree program in Engineering in CIP Code 14.0101. The program will be a collaboration between the Department of Electrical and Computer Engineering (ECE) and the Department of Mechanical Engineering (ME); however, it will be housed in the ECE department within the Hal Marcus College of Science and Engineering (HMCSE). The proposed program will consist of 30 semester credit hours (SCH) beyond the bachelor's degree. Graduates from the degree program will work in a variety of high-technology industries such as renewable energy, power grid protection, robotics, autonomous vehicles, advanced manufacturing, defense, and transportation. With Northwest Florida being a hub for advanced manufacturing and home to numerous military bases and technology companies (especially around Fort Walton Beach), graduates of this program will have excellent job opportunities locally, in the state, and nationally.

The proposed degree program aligns with the Florida Board of Governors' 2025 Strategic Plan to have "well-educated citizens who are working in diverse fields, from science and engineering to medicine and bioscience to computer science, the arts and so much more."

- 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 4/14/2017 meeting, there were no concerns raised by the Council of Academic Vice Presidents (CAVP).

- 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 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

The MS Engineering program will directly support the Florida Board of Governor's goal of increasing the number of advanced degrees from Florida universities awarded in a STEM discipline. The program builds upon the existing strength of UWF's current engineering programs which have developed an excellent reputation among regional employers for quality graduates. In addition, the proposed degree program will have three concentrations areas which have been the focus of the undergraduate engineering programs at UWF and the driver behind their success: Robotics, Power, and Advanced Materials. For example, the emphasis on robotics within the Electrical and Computer Engineering degree program has allowed UWF's engineering students to shine in regional, national, and international robotics and unmanned vehicle competitions, often beating teams from larger and better known programs (<http://news.uwf.edu/uwf-robotics-team-takes-home-second-place-in-ieee-southeastcon-competition/>).

Increase Community and Business Workforce

The creation of the proposed degree program is in direct response to requests by UWF students, graduates, and the local community to offer a graduate level engineering program. During the university's 2011-2012 academic visioning process, the addition of new engineering programs (both at the undergraduate and graduate levels) was one of the top priorities indicated by both internal and external stakeholders. Northwest Florida is home to numerous military bases (e.g. Naval Air Station, Pensacola and Eglin Air Force Base), technology companies (e.g. BAE Systems), and research laboratories (e.g. Air Force Research Laboratory) hiring engineers with advanced degrees. For example, among approximately 1,000 engineers employed at the Eglin Air Force Base 96th Test Wing and Life Cycle Management Center in Fort Walton Beach, half of them hold master's degrees (data provided by Mr. George Mooney who is the Site Senior Functional for the Scientists and Engineers on Eglin. He is responsible for the policies, hiring, education, professional development, and recruiting of the workforce. He is also a member of UWF's Military Advisory Council). Many of these engineers graduated with their BS degree in Engineering from UWF but had to go elsewhere to earn their MS degree. Local employers have asked UWF to build and offer an entire suite of undergraduate and graduate engineering programs for the benefit of its student body and the community at large.

- 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)

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 MS Engineering program fits in the current Programs of Strategic Emphasis category Science, Technology, Engineering, and Math (STEM) which includes CIP code 14 (Engineering). The CIP code for the proposed degree program is 14.0101 (Engineering, General).

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 proposed MS Engineering degree program will be delivered in a fashion similar to the successful MS in Math and Statistics degree program at UWF. The courses will be offered using a blend of face to face, synchronous distance learning (DL), and online delivery. The ECE and ME departments have been very successful in delivering all of their undergraduate programs via a synchronous DL setting between UWF's Pensacola campus and the Fort Walton Beach instructional site; therefore, the faculty are very comfortable and proficient in using the system. In addition, the ECE and ME faculty deliver courses online and are familiar and comfortable with the Canvas Learning Management System.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

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 and Statistics, the Crestview-Fort Walton Beach-Destin area has one of the highest concentrations of engineering jobs in the nation with a location quotient of 1.87 (location quotient is the ratio of the area concentration of occupational employment to the national average concentration; a location quotient > 1 indicates the occupation has a higher share of employment than average) and annual mean wage of \$111,000 (source: <https://www.bls.gov/oes/current/oes172071.htm>).

State

The Florida Department of Economic Opportunity projects an 11% growth in engineering jobs in the state between 2016 and 2024 with 11.4% increase in the field of electrical engineering and 12.7% in the field of mechanical engineering, the two fields affected by the proposed degree program.

- 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.

Engineering is one of the fastest growing academic disciplines at UWF. Enrollment in all programs has increased from 272 students enrolled in fall 2008 to 674 students enrolled in fall 2018.

One reason enrollment in UWF's engineering programs is growing is because graduates earn high starting salaries. MS degrees in electrical and computer engineering are among the nation's top ten best paying master's degrees with a median salary of \$130,000 and \$129,000, respectively (<https://www.monster.com/career-advice/article/best-and-worst-paying-masters-degrees>). Another incentive to enrollment is demand by employers for graduates with engineering skills. According to the National Association of Colleges and Employers, master's degrees in engineering are among employers' top three in demand graduate degrees (<http://www.nacweb.org/job-market/trends-and-predictions/employer-demand-for-graduates-by-degree-level/>).

There is a great demand in Northwest Florida for engineers with graduate degrees, especially around the Crestview-Fort Walton Beach-Destin area where there is a concentration of military bases and high tech companies.

The local community consistently has requested that UWF expand its engineering offerings at both undergraduate and graduate levels. There is a consensus among local community leaders that the success of the current engineering programs, their steady growth, and their excellent reputation, are strong indicators that UWF can successfully offer a graduate level engineering program.

According to a recent survey of graduates of UWF's engineering programs, approximately 8-10% of the respondents pursue a graduate degree in engineering at top ranked universities, including Johns Hopkins, Carnegie Mellon, and Georgia Institute of Technology. However, a sizeable portion of UWF students are place-bound due to military, financial, or family obligations. These students have asked for and will benefit from a master's level engineering program at UWF.

- 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.**

Only the University of South Florida (USF) and Florida Polytechnic University (FL Poly) offer an MS Engineering degree program within the same CIP code 14.0101 (Table 1). USF's MS Engineering Sciences degree program is offered through the Dean's Office in the College of Engineering and is designed mainly for students who do not have an undergraduate degree program in an engineering field. In an email conversation with Dr. Tom Weller, the previous Chair of the Electrical Engineering Department at USF, he indicated that most students opted for an MS in Civil or Mechanical Engineering instead of an MS in Engineering Sciences. The MS Engineering at FL Poly is housed in the Electrical and Computer Engineering Department. It started in Fall 2017 with a concentration area in electronics, communication, and control. In fall 2018, a robotics concentration area was introduced. In a phone conversation with Dr.

Muhammad Rashid, the Chair of the ECE department at FL Poly, he indicated that students enrolled in MS Engineering are required to complete a thesis (no project option), to engage with faculty and support their research agenda. He also indicated that the program is growing steadily and that many students benefit from tuition waivers and graduate assistantships.

UWF will house the proposed degree program in the ECE Department with its own allocated faculty lines and support staff. In addition, with the ECE and ME concentration areas offered within the program (Power, Robotics, and Advanced Materials), this MS degree program will be very attractive to undergraduate ECE and ME students who would like to continue their education at UWF.

Table 1. *Florida Institutions that Offer an MS Engineering or Similar Degree*

Institution	Public/ Private	Location Program Offered	CIP Code	Degree Name
University of South Florida	Public	Tampa	14.0101	MS Engineering Sciences
Florida Polytechnic University	Public	Lakeland	14.0101	MS Engineering

- 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.

The proposed MS Engineering program will be the first master's level engineering program at UWF. The Department Chair and HMCSE Dean anticipate that initial enrollment will consist of individuals who have recently graduated from existing STEM degree programs at UWF and individuals, including older returning students, drawn from agencies and industries in the Northwest Florida region (e.g. around Fort Walton Beach area where there is a concentration of tech companies). As the program establishes itself and becomes better known in the region and throughout the state, the department anticipates it will start attracting more in-state and out-of-state students, including international students. As shown in Appendix A Table 1-B, Year 1 enrollment should be around 25 students for an FTE of 13.75. With Year 5 enrollment at 66 students for an FTE of 36.3 (Appendix A Table 1-B).

Student demand for this program is demonstrated in Section II.A. which details a three-fold increase in enrollment in UWF engineering programs over a ten-year period, and in Sections I.D. and II.B. which discuss local employer and community requests for more engineering graduates from UWF.

- 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. 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.

Regarding UWF's proposed MS Engineering degree program, no comments were expressed concerning impact on programs at FAMU or FIU during the 4/14/2017 meeting of the Council of Academic Vice Presidents (CAVP) Program Coordination Work Group.

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. Recruitment efforts extend to many geographic regions to attract prospective students.

The proposed MS Engineering degree program will be marketed to multiple student segments: students from agencies and industries in UWF's service area, students from other UWF programs, students from other institutions, and students from other countries. Program faculty and staff will use multiple outreach methods to ensure diversity in the program. For example, there has been a steady increase in the enrollment of female engineering students aided, in part, by the establishment of endowed scholarships and the re-focusing of recruitment strategies (Figure 1). The HMCSE will implement a marketing campaign to promote the proposed degree program to the aforementioned student segments. The HMCSE currently attracts a diverse student body to its programs, and this trend is expected to extend to the new degree program (Figure 2).

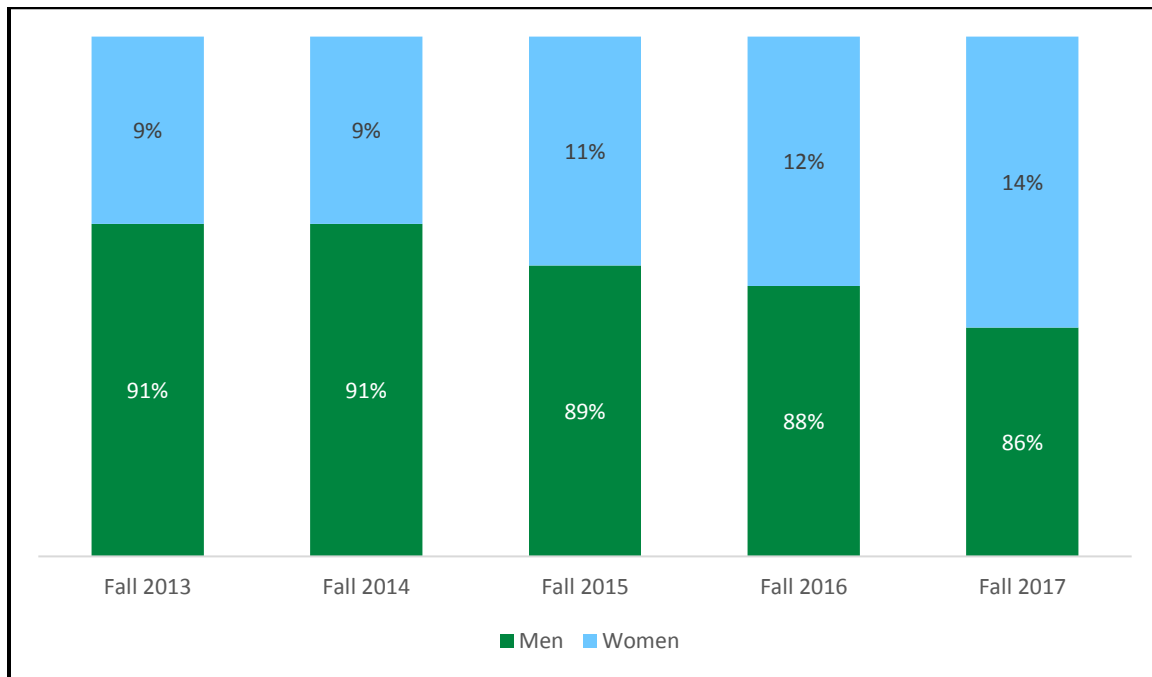


Figure 1. Five-year demonstration of increasing enrollment of women in UWF's engineering programs.

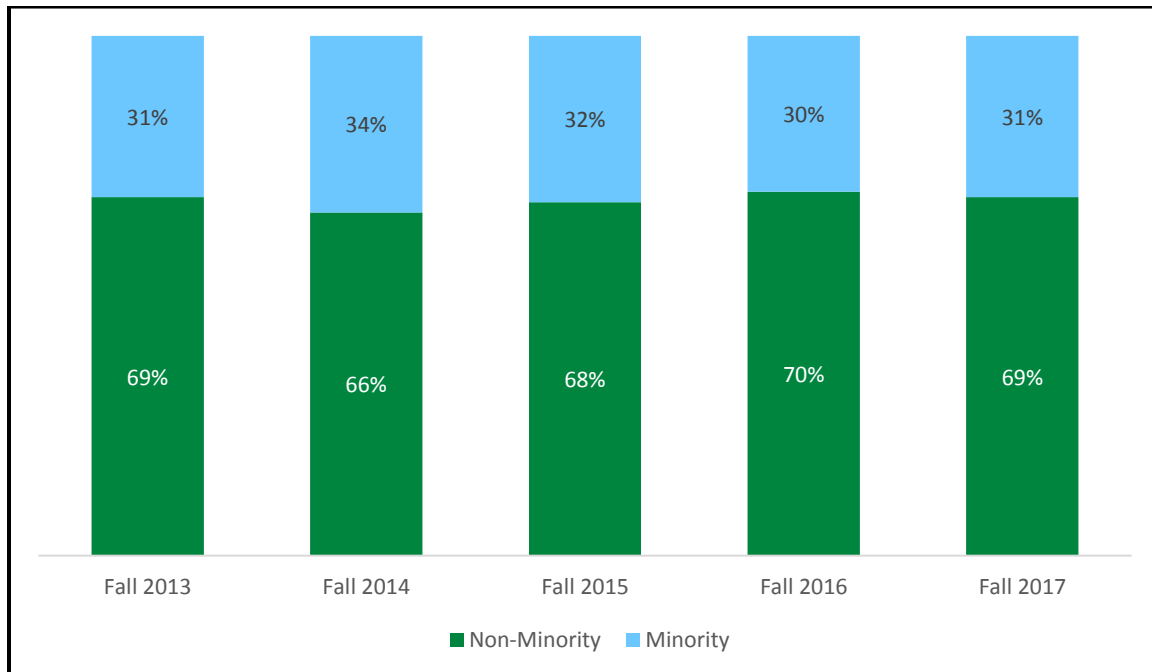


Figure 2. Five-year chart demonstrating diversity in UWF's engineering programs.

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.)

Expected total expenses for Year 1 of the program are \$541,567 from E&G (Appendix A Table 2). The largest items of the Year 1 budget are for a one-time operating capital outlay (\$300,000), faculty salaries and benefits (\$149,267), and graduate student assistantships and fellowships (\$39,000).

- The \$300,000 in operating capital outlay will be used to:
 - Equip a research/teaching lab (e.g robotic arms, CNC machines, smart grid simulation equipment, etc.) to support the faculty and graduate students' research and teaching agendas (\$110,000)
 - Add DL capability to a pair of classrooms (one at the Pensacola campus and one at the Fort Walton Beach instructional site) to support the blend of synchronous DL and online delivery of the program (\$190,000).
- Portions of current UWF full time faculty salaries (\$149,267) will be reallocated from the departments of Electrical and Computer Engineering and Mechanical Engineering (Appendix A Tables 3 and 4).
- The \$39,000 earmarked for assistantships and fellowships will be used to provide graduate assistantship and tuition waiver for three students.

Other Year 1 E&G expenses include \$26,300 for staff salaries, a portion of which (\$6,300) will be reallocation from the departments of Electrical and Computer Engineering and Mechanical Engineering and the remaining \$20,000 will be for a part time staff position. A \$7,000 for OPS and a \$20,000 in various miscellaneous expenses complete the \$541,567 total budget for Year 1. No library expenses are anticipated as the existing collection of journals, electronic databases, and other library holdings are sufficient to implement the program in Year 1 and sustain this program through Year 5.

The projected Year 1 E&G Cost per FTE is projected to be \$39,387, higher than the SUS average for MS Engineering programs of \$16,749. This is mainly due to the startup costs of equipping a research/teaching lab, hiring two new faculty, and the relatively low initial enrollment of the new program in Year 1.

Expected expenses for Year 5 of the program are \$664,554 from E&G (Appendix A Table 2). In Year 5, Table 2 shows the total for faculty salaries at \$453,554. This includes salary and benefits for current UWF faculty, one new faculty hired in Year 1 on an existing line, and two additional new faculty hires on existing lines (one in Year 2 and one in Year 3) increased at a rate of 5% per year.

The second biggest expense of Year 5 is \$104,000 earmarked for graduate assistantships and tuition waivers to support eight students. Other Year 5 E&G costs include \$63,000 in salary and benefit expenses for a full time administrative staff person, \$14,000 in OPS expenses, and \$30,000 in miscellaneous program expenses. By Year 5, enrollment increases lower the E&G Cost per FTE by over 54% to \$18,307.

UWF expects the benefits of this degree program to the university, region, and state to be significant in terms of advancing research, reputation, and grant opportunities.

- 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.

- 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 engineering faculty and Chair as well as the Dean of the HMCSE do not anticipate any negative impact by the proposed MS Engineering degree program on existing UWF programs. The faculty and Dean of the HMCSE anticipate that the program will have a positive impact on enrollments in the related undergraduate programs of Electrical and Computer Engineering, Mechanical Engineering, Computer Science, and other related science disciplines.

- 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).**

As a graduate program, the proposed MS Engineering degree program will have no impact upon general education or common prerequisite courses.

- 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.**

During the university's 2011-2012 academic visioning process, the local community represented by members of the local businesses, industrial organizations, military bases, etc. identified engineering programs, both undergraduate and graduate, as a top priority for UWF. UWF has received substantial local financial support earmarked for its engineering programs. This included \$5,000,000 to support the college of Science and Engineering (renamed Hal Marcus College of Science and Engineering in honor of the donor), \$700,000 to support the launch of the Mechanical Engineering degree program, \$300,000 to support the power lab at the Electrical and

Computer Engineering department, about \$200,000 in engineering endowments, and close to \$80,000 in support of robotics activities. This is evidence that the local community is ready to support this program and other graduate programs that enhance the engineering offerings at UWF.

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.

University

The new program will enhance the research done by UWF’s engineering faculty. Faculty research productivity will be aided by the program’s graduate research assistants. Each of the proposed concentration areas within the proposed degree program (Power, Robotics, and Advanced Materials) is already an active area of research within the ECE and ME departments. Being affiliated with a graduate degree program positively affects a faculty’s chance of receiving external research funding. The creation of the proposed degree program will also enhance research collaborations with other graduate programs at UWF, especially the MS programs in Computer Science and Math and Statistics.

The creation of the proposed MS Engineering degree program will have clear benefits to the university. Specifically, it will achieve the following:

- Complement the existing Electrical and Computer Engineering and Mechanical Engineering programs and strengthen aspects within their curricula (e.g., robotics, unmanned systems, etc.).
- Make the university more responsive to the regional workforce needs. If the undergraduate engineering programs can be taken as an indicator, more than 50% of the MS Engineering degree program graduates are expected to find job opportunities in the Northwest Florida region.
- Provide more research and collaboration opportunities within the university and outside entities, including Institute of Human and Machine Cognition in Pensacola and Air Force Research Laboratory in Fort Walton Beach.

Local

The proposed program will also have clear benefits to the local community and state. Specifically, the program will:

- Satisfy the local workforce need for engineers with advanced degrees.
- Enhance the local economy by helping engender more high-tech industry and well-paying jobs in Northwest Florida. Graduates with an MS degree in an engineering field

earn an average annual salary in excess of \$100,000 (<https://www.monster.com/career-advice/article/best-and-worst-paying-masters-degrees>).

- Match the state demand for graduates in robotics and advanced materials (two concentration areas within the proposed program) with the existing Northwest Florida hub for advanced manufacturing and military bases.

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 graduate 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 [the resource page for new program proposal](#)). 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 graduate 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 will not be a formal Limited Access 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 [the resource page for new program proposal](#)). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

Not applicable, this is not an AS-to-BS capstone 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 [the resource page for new program proposal](#)).

Our 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

The MS Engineering degree program strongly aligns with the University of West Florida Mission as well as its 2017-2025 Strategic Plan as follows:

Strategic Direction 1.1: Provide high-quality learning and co-curricular experiences that inspire students to become enlightened and engaged global citizens and successful professionals.

The MS Engineering program is an example of high-quality graduate education. The program provides students with opportunities to learn and collaborate with faculty teaching and researching in areas of high demand. UWF faculty will mentor graduate students as they expand their creativity and critical thinking skills thereby adding to the body of knowledge and innovation in the program's areas of concentration.

UWF values research opportunities for students at all levels through initiatives that allow students to develop research and professional skills as well as develop the ability to think critically, acquire confidence, and inspire creativity. These professional skills and personal qualities are highly valued by employers searching for future employees who will seek to sustain and grow their businesses.

Strategic Direction 3.3: Augment and invest in academic and research programs that meet professional, personal, scholastic, and workforce needs.

The Northwest region of Florida and the state of Florida as a whole have identified the need for a workforce skilled in technology and engineering fields to support growth in defense, aerospace, advanced manufacturing, transportation, and healthcare. To meet existing and future workforce demands, UWF has developed the MS Engineering program to enhance the pool of highly-skilled professionals to support economic growth at the regional, state, and national levels,

therby contributing to the needs of professions and society.

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 undergraduate programs in Computer Science, Mechanical Engineering, and Electrical and Computer Engineering with strong enrollment. These programs will provide a steady stream of future students for the proposed MS Engineering program. Through President Saunders' Next Big Initiative, a collaborative effort between the departments of Mechanical Engineering, Electrical and Computer Engineering, and the UWF Innovation Institute culminated in the creation of Center for Advanced Manufacturing, an area of emphasis within the proposed program.

There is a great potential for collaboration between the proposed program and existing programs and entities at UWF and beyond. With the hiring of new faculty members in cyber-physical security in the ECE department and at UWF's Center for Cybersecurity, there is great potential, for example, for research collaboration in the area of smart grid protection.

UWF faculty and students are active in a variety of research activities related to the areas of emphasis within the proposed program: power, robotics, and advanced materials. A few highlights are:

- 2nd place in the IEEE SoutheastCon Hardware Competition held in Tampa, FL in April 2018 by UWF's Robotics student team, and
- Numerous faculty research projects involving undergraduate students that culminate in publications in highly selective journals.

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.

The seed for the MS Engineering degree program was sown during the university's 2011-2012 academic visioning process when input from internal and external stakeholders strongly recommended the establishment of graduate programs in engineering. For the proposed program, the preliminary planning phase took place in the summer of 2015. Throughout the planning phase, feedback from members of the Engineering Advisory Council (EAC) was requested regarding local need and demand and areas of concentration. An MS Committee composed of faculty from the ECE and ME departments was formed to work on the curriculum and identify the resources needed for the program. Details are presented in Tables 2 and 3 below.

Table 2. *Planning Process*

Date	Participants	Planning Activity
Summer 2015	Representatives from Provost's Office, Dean's Office, and Engineering departments	Initial discussion about responding to need for more engineering programs at UWF expressed by internal and external stakeholders during the

		university's 2011-2012 academic visioning process
Fall 2015	HMCSE Dean, Engineering faculty, EAC members	Initial discussion of local need/demand for graduates with an MS degree in engineering; initial discussion of curriculum's highlights and areas of concentration
Spring 2016 and Fall 2016	MS Committee	MS Committee formed to produce a draft of the curriculum and determine personnel and other resources needed for the new program
Fall 2016	Engineering faculty, HMCSE Dean, MS Committee	Refine curriculum and concentration areas; draft a list of resources needed; draft a budget
Fall 2016	HMCSE Dean, Engineering faculty, EAC members	Discuss recommendations of the MS Committee with EAC members
Spring 2017	HMCSE Dean, ECE Chair, ME Chair	Preparing the Request to Explore and the CAVP document
Fall 2017	Engineering faculty, MS Committee	Finalize program curriculum, list of resources needed
Spring 2018	HMCSE Dean, ECE Chair, ME Chair	Finalize drafts of budget and hiring plan
Summer 2018	ECE Chair, Engineering faculty	Submit program and course CCR's
Fall 2018	EAC members, ECE Chair, ME Chair	Update EAC members on program progress
Fall 2018	ECE Chair	Prepare Request to Offer document

Table 3. *Events Leading to Implementation*

Date	Implementation Activity
Summer 2015	Discuss data gathered from local stakeholders regarding the need/demand for an MS program in Engineering.
Spring 2016-Fall 2016	Form a faculty committee to propose curriculum and areas of concentration for the program
Fall 2016	Discuss proposed program with EAC members
Fall 2016	Preparing the Request to Explore and the CAVP proposal
Spring 2017	Presentation to CAVP, no concerns
Fall 2017	Finalize program curriculum, list of resources needed
Spring 2018	Finalize budget and hiring plan
Summer 2018	Submit program and course CCR's
Fall 2018	Prepare Request to Offer document
Spring 2019 (anticipated)	Submission of Request to Offer a New Degree Program to the UWF BOT
Spring 2019 (anticipated)	Submission of Request to Offer a New Degree Program to the Florida Board of Governors

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.

The Department of Electrical and Computer Engineering currently has earned ABET accreditation for its undergraduate degrees in Computer Engineering and Electrical Engineering. Both programs were reviewed for accreditation affirmation in fall 2018.

The new (fall, 2016) Department of Mechanical Engineering houses the Bachelor's degree program in Mechanical Engineering which will go through the ABET review in the 2018-19 academic year.

MS programs in various engineering fields can seek ABET accreditation; however, only a small percentage do so. The vast majority of employers (including US government) rely on the undergraduate ABET accreditation as a program quality indicator. Among the SUS MS programs in engineering, only one has pursued ABET accreditation (MS in Industrial Hygiene at University of South Florida).

<http://main.abet.org/aps/Accreditedprogramsearch.aspx>

As such, UWF currently has no plan of seeking ABET accreditation for the proposed MS Engineering degree program.

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 Academic Learning Plan and Curriculum Map.

Graduates with a Master of Science in Engineering degree should be able to do the following:

Content

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Critical Thinking

- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Communication

- Communicate effectively verbally and in writing with a range of audiences.

Integrity/Values

- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Project Management

- Apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

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

Admission and graduation requirements are available from the University of West Florida Catalog (Appendix E; University of West Florida. (2018). *2018-2019 University Catalog*. Retrieved from <http://catalog.uwf.edu>).

In addition to the university graduate admission requirements described above, 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)
- Miller Analogies Test (MAT)
- Bachelor's degree from an ABET accredited program in electrical, computer or mechanical engineering (or closely related field)
- Undergraduate cumulative GPA

The graduate admission test requirement may be waived for applicants with a 3.0 GPA or better. Students who are admitted to the program, but do not have a sufficient background for their chosen concentration area, may be required to complete additional coursework. All other students can only be admitted by approval of the Graduate Committee. These students will likely have to complete additional coursework as recommended by the Graduate Committee.

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 MS Engineering degree program requires the completion of 30 graduate semester credit hours (SCH). There will be three concentration areas within this program: Robotics and Controls, Power Systems, and Advanced Materials. Students will take the following courses depending on their chosen concentration area.

Common required course for all concentration areas:**3 SCH**

- EGN 6XXX Principles of Engineering Analysis

Concentration area required courses:**9 SCH**

Students must take a set of three courses from one of the following areas of concentration.

- Robotics & Controls
 - EEL 5XXX Introduction to Autonomous Systems
 - EEL 5XXX Advanced Control Systems
 - EEL 6XXX Engineering Foundation to Robotics
- Power Systems
 - EEL 5XXX Power System Operation and Control
 - EEL 5XXX Smart Distribution Systems
 - EEL 6XXX Power Electronics and Utility Applications
- Advanced Materials
 - EML 5XXX Composite Materials
 - EML 5XXX Principles of Fracture Mechanics
 - EML 6XXX Advanced Solid Mechanics

Technical Electives:**12 SCH**

Students can choose any 12 semester credit hours (SCH) of any combination of 5000 and 6000 technical electives offered at either the Electrical and Computer Engineering department or the Mechanical Engineering department. At least three credits must be 6000 level.

Thesis or Project**6 SCH**

Students must choose between completing a thesis or a project.

- EGN 6XX1 Thesis, OR
- EGN 6XX2 Project

Total Hours Required 30 SCH

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

Table 4. *Sequenced Course of Study for the MS Engineering Program*

Semester 1	SCH	Semester 2	SCH
First 5000-level required course in concentration area	3	Second 5000-level required course in concentration area	3
Technical elective	3	Advanced Engineering Analysis	3
Technical elective	3	6000-level required course in concentration area	3
Total	9	Total	9

Semester 3	SCH	Semester 4	SCH
Technical elective	3	Technical elective	3
Thesis or project	3	Thesis or project	3
Total	6	Total	6
Total Semester Credit Hours:			30

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

Required Courses

EEL 5XXX Introduction to Autonomous Systems

This course is focused on mobile robotics with emphasis on robot control, navigation, and motion planning using kinematics and dynamics. Also, it deals with topics such as mobile robot sensors, sensor data processing, Kalman filtering, mobile robot localization, basic concepts of mapping, path planning and obstacle avoidance, and intelligent control architecture.

EEL 5XXX Advanced Control Systems

This course is focused on analysis, modeling, and design of advanced control systems in time and frequency domains. Implementation of control systems using continuous and digital techniques will also be covered.

EEL 6XXX Engineering Foundation to Robotics

This course is focused on robot modeling and it covers robot kinematics such as forward kinematics, inverse kinematics, and differential kinematics. In addition, it deals with robot dynamics, trajectory generation, and tracking. Advanced topics on high-level control such as admittance and impedance control will also be covered.

EEL 5XXX Power System Operation and Control

An overview of modern power system operational and control problems and solution techniques, including the current and advanced technologies and trends in development that will shape future electrical power systems.

EEL 5XXX Smart Distribution Systems

Theory and practical application methods available in the industry for the protection of distribution systems and includes smart grid applications for protection and control. Covering a broad range of topics related to developments and trends in smart distribution technologies including automatic restoration, data management, cybersecurity, interoperability and standards, and future vision, this course will be taught as a multidisciplinary course and emphasis is placed on the importance of strong collaboration between academia, utility and industry.

EEL 6XXX Power Electronics and Utility Applications

Function of power electronics as an interface, listing of utility applications requiring power electronics interface, power device capabilities and the resulting structures of power electronic interfaces to exploit them, importance and the role of power electronic interfaces in various applications, and discussion of power electronics interface in appropriate detail.

EGN 6XXX Principles of Engineering Analysis

Topics in advanced engineering analysis, including linear algebra, partial differential equations, Fourier series, complex variables, vector calculus with numerical techniques.

EML 5XXX Composite Materials

Introduction to composite materials and their applications. Properties and microstructure of high-strength fiber materials (glass, carbon, polymer, ceramic fibers) and matrix materials (polymer, metal, ceramic, and carbon matrices). Specific strength and stiffness of high-performance composites. Design of composite structures and components. Manufacturing processes.

EML 5XXX Principles of Fracture Mechanics

Brittle and ductile fracture. Linear elastic fracture mechanics and determination of stress intensity. Elastic-plastic fracture, J-integral, and fatigue failure.

EML 6XXX Advanced Solid Mechanics

Topics in stress analysis; including unsymmetrical bending, three-dimensional stress-strain; torsion; rotational stress; thin walled pressure vessels; beams on elastic foundations; and stress concentrations.

EGN 6XX1 Thesis

Design, research, and presentation of a master's thesis under the direction of a faculty committee.

EGN 6XX2 Project

Capstone course for Masters of Engineering students who do not elect the thesis option. Students will define and carry out a project that shows mastery of some topic in Engineering and produces a final product.

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

The departments of Electrical and Computer Engineering and Mechanical Engineering have formed an Engineering Advisory Council (EAC) that includes representatives from local businesses and institutions. The EAC meets once or twice per year with engineering faculty to provide feedback on regional workforce needs, industry-driven competencies, program goals, curriculum changes, and performance evaluation of employees who graduated from the

engineering programs at UWF. EAC members are chosen to represent the widest possible range of local industries and institutions and various engineering and management backgrounds (Table 5).

At every stage of the development of this degree program, the EAC was updated on the progress and their feedback was sought regarding the regional need and demand for the program. EAC members showed great enthusiasm for the proposed program, indicated the local need for it, and their willingness to support it.

Table 5. *Current Membership of the Engineering Advisory Council (EAC)*

Name	Title/Affiliation	Background
Brett Luebke	Manager, Gulf Power	Electrical Engineering (EE)/Computer Engineering (CE)
David Lamar	Lead Engineer, David Lamar Civil Engineering	Civil Engineering (CV)
Maurice Bobbitt	Civil Servant, Eglin AFB	EE/CE
Sean Sylvester	Civil Servant, Eglin AFB	EE/CE
Kaitlin Fair	Research Engineer at AFRL Munitions Directorate Integrated Sensing and Processing Sciences Branch	EE/CE
Scott Hand	Director of New Product Development, QMotion	Mechanical Engineering (ME)
Jimmy Touma	Researcher, Air Force Research Laboratory	Physics/ME
Mary “Missy” Ward	Assistant Division Mgr Emerald Coast Division Applied Research Associates (ARA)	Management
Scott Marshall	Consulting Material and Corrosion Engineer McSwain Engineering	ME
Larry S. Shemetulskis	Account Manager and Sales Coordinator, Tektronix	EE/CE/ME
Chris Fountain	Environmental Engineer and Contract Manager Ascend Performance Materials	ME

Jason Gilmore	Chief Operating Officer MANOWN Engineering	ME
Peggy Milz	Quality Manager BAE Systems	ME
Egas “EJ” Gomes	Project Developer Energy Services, Gulf Power	CV
Daniel Corliss	Project Manager ECUA	CV
Erica Jernigan, P.E.	Senior Project Manager DRMP Inc.	CV
Heath Jenkins, P.E	Senior Project Manager Mott MacDonald	CV
Cory Snyder	Project Manager Municipal Engineering Services, Inc.	CV
Milo Kral, PhD	Consulting Engineer McSwain Engineering	Materials Science
William Sawarynski	Executive-Manufacturing Wind GE Renewable Energy	EE

- 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.**

MS programs in engineering fields can seek ABET accreditation; however, only a very small percentage do so. The majority of employers (including U.S. government) rely on the undergraduate ABET accreditation as a program quality indicator. Among the MS programs in engineering disciplines that are offered throughout the SUS, only one is ABET accredited (MS in Industrial Hygiene at University of South Florida).

At this time, the university has no plan to seek ABET accreditation for the proposed MS Engineering 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 proposed degree program will be offered on UWF's Pensacola campus. The content will be delivered using a blended face to face and online format with a synchronous distance learning option available to students at the Fort Walton Beach instructional site. The number of classrooms with DL capabilities will be increased to accommodate the anticipated demand by the new MS program (See Section III.B. and Appendix A Table 2 line 14).

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).

The following UWF faculty are shown in Appendix A Table 4:

- Mohamed Khabou
- Michael Reynolds
- Oscar Chuy
- Bhuvaneswari Ramachandran

- 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.

Faculty costs are those associated with the teaching of required courses, technical electives, mentoring projects and theses, and the administration of the degree program.

As shown in Appendix A Tables 2 – 4, Faculty funding figures for Year 1:

- \$149,267 a portion of the salary and fringe for four full-time faculty on existing lines to be reallocated from the departments to Electrical and Computer Engineering and Mechanical Engineering and one new hire on an existing vacant line.
- \$7,000 OPS expense for two adjunct faculty

Faculty funding figures for Year 5:

- \$453,554 Continuing Base salary and fringe for the Year 1 (fall 2019) faculty plus two new hires reallocated from existing lines to come aboard in fall 2020 and fall 2021.

- \$14,000 OPS expense for four adjunct faculty

All faculty costs associated with the proposed degree program will come from E&G.

- 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:

- Mohamed Khabou
- Michael Reynolds
- Oscar Chuy
- Bhuvaneswari Ramachandran

- 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.**

Faculty from the departments of Electrical and Computer Engineering and Mechanical Engineering in HMCSE are highly productive in teaching, research, and service activities.

Teaching Productivity

The combined number of student credit hours (SCH) generated by the departments of Electrical and Computer Engineering and Mechanical Engineering has been increasing steadily (Table 6). Combined, these two departments have 14 full-time faculty members, four of whom will teach in the new MS Engineering degree program. The fall 2018 figures show a very healthy teaching productivity of about 307 SCH per faculty.

Table 6. *Fall SCH Generated by the ECE and ME Departments from 2014 to 2018*

Department	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018
Electrical and Computer Engineering	2846	2884	3544	2820	2563
Mechanical Engineering*	-	-	-	1266	1758
Total	2846	2884	3544	4086	4321

* Mechanical Engineering (program start date fall 2016) department created in fall 2017, split from ECE Department.

In addition to high teaching productivity, the engineering faculty have been recognized for their dedication and high quality teaching (Table 7).

Table 7. *Examples of Recent Teaching Awards in the Departments of Electrical and Computer Engineering and Mechanical Engineering*

Excellence in Teaching Award	SGA Award	ISEE Student Chapter Award	Excellence in Advising Award
Mohamed Khabou 2013	Tom Gilbar 2017	Mohamed Khabou	Tom Gilbar 2014
Tom Gilbar 2014			
Andreas Fuchs 2015			

Research Productivity

Despite the fact that the engineering programs at UWF are undergraduate only and faculty do not have access to graduate students in the major to help with their research agenda, the two engineering departments have been very productive in the research area. With a combined ten full-time faculty members with research expectations (instructors do not have a research component/expectation), the two departments have a great combined publication record.

For example, during the 2017-2018 academic year, the faculty in both department produced a total of:

- Two book chapters,
- Ten refereed journal papers, and
- Ten refereed conference papers.

In addition, the faculty mentored numerous capstone and Summer Undergraduate Research Projects (SURP). Some of these projects resulted in:

- Patent application (e.g. patent US 15/131,689, “Slip mitigation control for electric ground vehicles”) and
- Won national competitions against much bigger engineering schools
 - e.g. 2nd place in 2018 IEEE SoutheastCon Hardware Competition.

In addition, the engineering faculty applied for numerous external funding opportunities and received close to \$168,000 in external funding during the 2017-2018 academic year (Table 8).

Table 8. *Sample of grant activity for engineering faculty during 2017-2018 academic year.*

Faculty	Grant Name	Grant Amount
Oscar Chuy	Development of Robotic Mobility Aid	\$24,600
Brad Regez	Instrumentation Evaluation for Siemens	\$60,000
Lakshmi Prayaga Oscar Chuy	Florida Center for Cybersecurity Cyber Jedi in Smart Cities	\$83,000

This research and grant productivity is truly distinguished given the undergraduate-only nature of the engineering programs and the number of faculty involved.

Service Productivity

The engineering faculty have been involved in numerous service activities at the department, college, university, local community levels, and the engineering profession at large. For example, the faculty stationed at the Fort Walton Beach instructional site have been crucial to the expansion of the engineering programs there. Their outreach and recruiting activities are too numerous to list and their efforts have been appreciated and recognized by the university (e.g. Dr. Tom Gilbar, received UWF's 2015 Distinguished Service Award.)

The engineering faculty have also been very supportive of HMCSE activities including:

- Organization of the BEST Robotics Competition,
- Science Fair,
- Science Olympiad, and
- Being part of the STEM advancement initiative.

The engineering faculty have also been involved in campus wide initiatives including:

- The university's 2011-2012 academic visioning process,
- Tenure, Promotion, and Evaluation Task Force,
- Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) task force.

In addition, the engineering faculty have been very active in professional organizations such as the Institute of Electrical and Electronics Engineers, American Society of Mechanical Engineers, American Society for Engineering Education, and Society of Women Engineers, etc., where they have assumed leadership positions. The engineering faculty have also chaired/led numerous professional activities in their fields of expertise.

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.**

UWF currently offers a BS in Computer Engineering program, a BS in Electrical Engineering program, and a BS in Mechanical Engineering program. In support of the MS Engineering degree program, the library is equipped to provide similar resources and services.

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 for general engineering, electrical engineering, mechanical engineering, and materials science indicates that UWF holds over 16,000 books. The library also provides access to over 1,800 peer-reviewed e-journals in engineering, as well as titles that support the interdisciplinary nature of the M.S.E.

Specialized indexing, abstracting, and full-text databases relevant to engineering are the ACM Digital Library, Applied Science & Technology Source, Engineering Collection (ProQuest), Engineering Village, Inspec, IEEE Xplore, and MathSciNet. More general databases supporting engineering are Web of Science, Science Direct, and Wiley Online Library. Full-text dissertations and theses are available through ProQuest Dissertations and Theses. Using their Argonet accounts, students and faculty may access electronic resources anytime from any place. Current library resources available to implement the proposed MS Engineering through year 5 include:

Databases

- ACM Digital Library
- Applied Science & Technology Source
- Business Source Complete
- Computer Science Collection (ProQuest)
- Engineering Collection (ProQuest)
- Engineering Village
- IEEE Xplore
- Inspec
- MathSciNet
- SciFinder
- Dissertations and Theses (ProQuest)
- Science Full Text Select
- Wiley Online
- ScienceDirect
- Web of Science

Major Journals (Peer-Reviewed)

Consist of but are not limited to:

- IEEE Transactions (Entire collection available through IEE/IET Electronic Library)
- ACM Transactions (Entire collection available through ACM Digital Library)
- International Journal of Robotics Research (Full-text 1999-present through SAGE Journals)
- Nonlinear Dynamics (Full-text 1997-present through Springer Nature Journals)
- Advanced Materials (Full-text 1997-present through Wiley Online Library)
- Journal of Applied Engineering Sciences (Full-text 2013-present through Applied Science and Technology Source)
- Journal of Engineering Education (Full-text 1997-present through Wiley Online Library)
- Journal of Systems and Software (Full text 1995-present through ScienceDirect)
- Advances in Electrical and Computer Engineering (Full-text 2007-present through DOAJ)
- Journal of Materials Science (Full-text 1997-present through Springer Nature Journals)
- Materials Science and Engineering: R: Reports (Full-text 1995-present through ScienceDirect)
- Materials & Design (Full-text 2015-present through ScienceDirect)

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 if you 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 MS Engineering through Year 5. Furthermore, UWF Libraries' current holdings are competitive when compared to the resources available at other institutions with similar programs.

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 Departments of Electrical and Computer Engineering and Mechanical Engineering have presence on the Pensacola campus and the Fort Walton Beach instructional site. On the Pensacola campus, the programs are housed in Building 4, where classrooms, teaching labs, research labs, and office space for faculty and staff are located. At the Fort Walton Beach instructional site, faculty and staff offices are located in Buildings 1 and 2; classrooms, teaching and research labs are located in buildings 4, 6, and 7.

A majority of the engineering courses are taught using one of the three distance learning (DL) classrooms on the Pensacola campus paired with three similar rooms at the Fort Walton Beach instructional site. All six rooms are equipped with DL equipment to deliver lectures in a synchronous manner. These DL classrooms that allow one faculty member to deliver education to students in two separate places will support the proposed MS Engineering program.

In addition, the ECE and ME programs currently have access to a variety of teaching and research lab spaces to support the proposed MS Engineering degree program both on the Pensacola campus and at the Fort Walton Beach instructional site including:

- Unmanned Systems Lab
- Mechatronics and Robotics Lab
- Artificial Intelligence and Projects Lab
- Power Lab
- Capstone Projects Lab
- Enterprise Projects Open Space
- Controls, Communication and Microprocessors Lab
- Circuits and Electronics Lab

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.

Office space for the new faculty hires will be allocated in Building 4 on the Pensacola campus.

The proposed program will utilize existing classroom equipment and laboratory space, to implement and support the program through Year 5. Research space for the MS Engineering degree program will be allocated in Building 4 from the laboratory space currently being used by the Physics Department. This space will be vacated in Fall 2019 when Physics will move into the newly constructed Building 58C. The vacated space in Building 4 will be adequate and will not need any remodeling. This research and laboratory space is sufficient to maintain the 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.

The budget for the proposed MS Engineering degree program includes \$190,000 to increase the Distance Learning (DL) capabilities (Refer to Section III.B and Appendix A Table 2 column 4). The one-time expense, to come from Operating Capital Outlay E&G funding, is based on the cost of a recent DL conversion made by the university. The addition of DL capability to a pair of existing classrooms (one on the Pensacola campus paired with another one at the Fort Walton Beach instructional site) should be adequate to accommodate the anticipated student growth in the program through Year

The balance of \$110,000 from the \$300,000 Operating Capital Outlay of E&G funding will serve to support the anticipated need for new equipment to support additional research and student projects through Year 5. The new equipment will be housed in existing laboratory space on the

Pensacola campus in Building 4.

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

The ECE and ME Departments currently have access to a variety of laboratory equipment that can be used to support and sustain the proposed MS Engineering program through Year 5. The list includes:

- WAM Barrett manipulator
- KUKA manipulator
- Custom built robotic walker/wheelchair
- Custom built Autonomous Ground Vehicle
- Vicon motion capture system (housed in the Department of Exercise Science)
- Bridgeport “J head” Milling Machine
- Clausing 5904 Lathe
- 12 Ton Bottle Jack press
- Rockwell/Delta Vertical Band saw
- Rockwell/Delta Drill Press
- Rockwell/Delta Table Saw

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.

The equipment needs described in Section X. D-E will be sufficient to implement and sustain the MS Engineering 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.

The university does not anticipate the need for any additional resources, other than those described in Section X.D-E, to implement and sustain the 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.

Year 1 budget includes \$39,000 to provide graduate assistantships and tuition waivers for three students (Appendix A Table 2 Column 3). With anticipated growth in enrollment, the program has budgeted \$104,000 in Year 5 (Appendix A Table 2 Column 9) to provide graduate assistantships and tuition waivers for eight students. These graduate assistantships will serve to attract more students, support the research agenda of both students and faculty, and hone the teaching skills of the graduate assistants as they will be expected to teach an undergraduate laboratory section as part of their assistance package.

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 ECE and ME departments currently place more than 20 undergraduate students per year in various internship opportunities with local and national entities including:

- Gulf Power,
- Avalex,
- McSwain Engineering,
- Institute for Human and Machine Cognition,
- Boeing, and
- Air Force Research Laboratory.

We anticipate that the proposed program will provide similar opportunities for the graduate students as the concentration areas offered within the program match the needs of many of our existing partners. For example, students choosing the program's Power concentration will find opportunities at Gulf Power; those interested in Robotics will find opportunities at the Institute for Human and Machine Cognition and the Air Force Research Laboratory; and those interested in Advanced Materials will find opportunities at McSwain Engineering.

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 Engineering)

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)	8	4.4	10	5.5	10	5.5	12	6.6	14	7.7
Students who transfer from other graduate programs within the university**	2	1.1	4	2.2	4	2.2	4	2.2	4	2.2
Individuals who have recently graduated from preceding degree programs at this university	8	4.4	10	5.5	12	6.6	13	7.15	14	7.7
Individuals who graduated from preceding degree programs at other Florida public universities	2	1.1	4	2.2	6	3.3	8	4.4	8	4.4
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	2	1.1	2	1.1	2	1.1	2	1.1
Additional in-state residents***	4	2.2	6	3.3	8	4.4	10	5.5	10	5.5
Additional out-of-state residents***	0	0	2	1.1	4	2.2	9	4.95	10	5.5
Additional foreign residents***	1	0.55	2	1.1	2	1.1	4	2.2	4	2.2
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	25	13.75	40	22	48	26.4	62	34.1	66	36.3

* 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	149,267	0	0	0	0	0	0	\$149,267	453,554	0	0	0	0	0	\$453,554
A & P Salaries and Benefits	6,300	0	0	20,000	0	0	0	\$26,300	63,000	0	0	0	0	0	\$63,000
USPS Salaries and Benefits	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
Other Personal Services	0	0	7,000	0	0	0	0	\$7,000	14,000	0	0	0	0	0	\$14,000
Assistantships & Fellowships	0	0	39,000	0	0	0	0	\$39,000	104,000	0	0	0	0	0	\$104,000
Library	0	0	0	0	0	0	0	\$0	0	0	0	0	0	0	\$0
Expenses	0	0	20,000	0	0	0	0	\$20,000	30,000	0	0	0	0	0	\$30,000
Operating Capital Outlay	0	0	0	300,000	0	0	0	\$300,000	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	\$155,567	\$0	\$66,000	\$320,000	\$0	\$0	\$0	\$541,567	\$664,554	\$0	\$0	\$0	\$0	\$0	\$664,554

*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)	0.90	2.40
A & P (FTE)	0.1	1
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	\$541,567	\$664,554
Annual Student FTE	13.75	36.3
E&G Cost per FTE	\$39,387	\$18,307

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.
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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.

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
Reallocation of expenses from the Departments of Electrical and Computer Engineering and the Department of Mechanical Engineering			
Faculty Salaries and Fringe	149,267	149,267	
Administrative Salary and Fringe	6,300	6,300	
Totals	\$155,567	\$155,567	\$0

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

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	Mohamed Khabou, PhD	Professor	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
	Electrical and Computer Engineering											
A	Michael Reynolds, PhD	Associate	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
	Mechanical Engineering	Professor										
A	Oscar Chuy, PhD	Assistant	Tenure-	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
	Electrical & Computer Engineering	Professor	earning									
A	Bhuvaneswari Ramachandran, Ph.D	Associate	Tenured	Fall 2019	9	0.75	0.05	0.04	9	0.75	0.05	0.04
	Electrical & Computer Engineering	Professor										
B	New Hire, PhD	Assistant	Tenure-	Fall 2019	9	0.75	1.00	0.75	9	0.75	1.00	0.75
	Electrical & Computer Engineering	Professor	earning									
B	New Hire, PhD	Assistant	Tenure-	Fall 2020	9	0.00	0.00	0.00	9	0.75	1.00	0.75
	Electrical & Computer Engineering	Professor	earning									
B	New Hire, PhD	Assistant	Tenure-	Fall 2021	9	0.00	0.00	0.00	9	0.75	1.00	0.75
	Mechanical Engineering	Professor	earning									
	Total Person-Years (PY)							0.90				2.40

Faculty Code		Source of Funding	PY Workload by Budget Classification		
			Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	0.15		0.90
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.75		1.50
C	New faculty to be hired on a new line	New Education & General Revenue	0.00		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	0.90	Year 5 2.40

Appendix B

Signatures

Please include the signature of the Equal Opportunity Officer and the Dean of University Libraries.

Kim LeDuff, PhD
Equal Opportunity Officer/ Vice President
Division of Academic Engagement

Date

Stephanie Clark
Interim Dean of University Libraries

Date

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, the Dean and AVP of University College has reviewed sections on General Education III. D., V. A. and VIII. B. & D. 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.

Melanie Haveard
Chief Technology Officer

Date

Appendix C

Academic Learning Plan and Student Learning Outcomes

UNIVERSITY of WEST FLORIDA

ACADEMIC LEARNING PLAN

MASTERS OF SCIENCE IN ENGINEERING

MISSION STATEMENT

The mission of the Electrical and Computer Engineering Department is to offer undergraduate and graduate programs of excellence in engineering that serve the needs of the West Florida region, the state, and the nation. The goal of these programs is to prepare students for a successful professional career in their respective chosen discipline of study. All programs shall be revised continuously to improve quality and respond to current workforce needs.

STUDENT LEARNING OUTCOMES

Graduates with a Master of Engineering degree should be able to do the following:

Content

Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Critical Thinking

Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Communication

Communicate effectively verbally and in writing with a range of audiences.

Integrity/Values

Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Project Management

Apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

ASSESSMENT OF STUDENT LEARNING OUTCOMES

Program SLOs will be assessed using selected student work in the required course of Principles of Engineering Analysis (EML 6XXX) and in the Thesis/Project.

JOB PROSPECTS

With a Master of Engineering degree, you can pursue jobs in a variety of fields where specialization and/or extra knowledge are needed. With this degree, you can advance up the ranks and/or become the lead engineer in your unit/organization. Some of the opportunities a Master of Engineering degree holder enjoys include:

- Senior/Lead electrical engineer
- Senior/Lead mechanical engineer
- Senior/Lead computer engineer
- Senior/Lead systems engineer
- Engineering project manager
- Processing engineering manager
- Construction project manager
- Design engineer
- Product engineer

Appendix D

Curriculum Vitarum

MOHAMED A. KHABOU

Professor and Chair
 Electrical and Computer Engineering Department
 University of West Florida
 11000 University Pkwy, Pensacola, FL 32514
 (850) 857-6031 mkhabou@uwf.edu

EDUCATION

- 1 Ph.D., Electrical Engineering, University of Missouri-Columbia, 1999
 Dissertation Title: Improving Shared-Weight Neural Network Generalization Using Regularization Theory and Entropy Maximization
- 2 MSEE, Electrical Engineering, University of Missouri-Columbia, 1993
- 3 BSEE, Electrical Engineering, University of Missouri-Columbia, 1990

PROFESSIONAL EXPERIENCE

- 4 Interim Director, PhD in Intelligent Systems and Robotics, University of West Florida, (4/2018-Present)
- 5 Chair, Electrical and Computer Engineering Dept., University of West Florida (January 2014-Present)
- 6 Professor, Electrical and Computer Engineering Dept., University of West Florida (2015-Present)
- 7 STEM Fellow, Center for University Teaching, Learning and Assessment (2013-2014)
- 8 Associate Professor, Electrical and Computer Engineering Dept., University of West Florida (2009-2015)
- 9 Assistant Professor, Electrical and Computer Engineering Dept., University of West Florida (2002-2009)
- 10 Visiting Assistant Professor, Physics Computer Science and Engineering Dept., Christopher Newport University. (1999-2002)
- A. Research Assistant, Computer Engineering and Computer Science (CECS) Dept., University of Missouri-Columbia (1991-1999)
- Teaching Assistant, Math Dept., University of Missouri-Columbia (1993-1999)

TEACHING EXPERIENCE

- 11 At University of West Florida
 - EGS 1006 Introduction to Engineering
 - EEL 3135 Discrete Time Signals and Systems
 - EEL 3211 Electrical Energy Engineering
 - EGN 3203 Engineering Software Tools
 - EGM 4313 Intermediate Engineering Analysis
 - EEL 3111L Circuits I Lab
 - EEL 3701 Digital Logic & Computer Systems (Lecture + Lab)
 - EEL 4712 Digital Design (Lecture + Lab)
 - EEL 4713 Digital Computer Architecture (Lecture + Lab)
 - EEL 4744 Microprocessor Applications (Lecture + Lab)
 - EEL 4759 Digital Image Processing
 - EEL 4822 Pattern Recognition
 - EEL 4834 Programming For Engineers
 - EEL 4930 Unmanned Systems Lab
 - EEL 4914C Electrical Engineering Design
 - EEL 4949 Co-Op Work Experience
- 12 At Christopher Newport University
 - CPEN 414 Computer Architecture
 - CPSC 205 Introduction to Computer Science
 - CPSC 230 Introduction to Computers and Programming in C++
 - CPSC 330 Computer Organization
 - CPSC 642 Pattern Recognition
 - ENGR 213 Discrete Mathematics

RESEARCH EXPERIENCE

- Using Smart Device Technology to Improve Quality of Life for Older Adults (2015-Present)
Sponsor: Health Alliance Professorship
Cooperating with Dr. Reichherzer from the Computer Science Department and Dr. Rodney Guttman the Director of the Center on Aging to combine off-the-shelf devices with novel computer algorithms to build a SMILE (Smart Independent Living for Elders) home in which older adults and their families can monitor and improve their daily lives.
- Processing and Classification of Actigraphy Signals (2012-2013)
Cooperated/consulted with Actigraph Company on the design of features and classifiers to automatically process actigraphy signals.
- Effect of Distance Learning on Student Learning Outcomes (2008-Present)
Cooperate with ECE Department colleagues and Dr. Claudia Stanny from the Center for University Teaching, Learning, and Assessment (CUTLA) on studying the effect of distance learning on the student performance in class and instructor evaluation.
- Eigenvalues and Shapes (2007-2010)
Sponsor: Sultan Qaboos University Postgraduate Studies and Research
Cooperate with Dr Lotfi Hermi of University of Arizona and Dr Mohamed B. H. Rhouma of Sultan Qaboos University on the use of Laplacian-based features in pattern recognition
- System for Indexing and Retrieving Historical Documents (2006-Present)
Sponsor: UWF Summer Research Award and collaboration with researchers at Ecole Nationale d'Ingénieurs de Sfax (ENIS), Tunisia
Design and test a system to process, index, and retrieve images of historic documents and artifacts
- Human Face Detection Using Morphological Neural Nets (2005-2006)
Sponsor: UWF 2005 Faculty Scholarly and Creative Activity Award
Design and test of a reliable human face detector using a morphological shared-weight neural network.
- Automatic Detection of Human Faces in Visual Scenes (2003)
Sponsor: UWF Summer Research Grant
Design and test a neural network-based system to detect human faces in visual scenes
- Remote Acquisition Storage System (2000)
Sponsor: NASA-Langley Research Center (LaRC)
Designed and tested autonomous microphones to detect and transmit sound waves of military airplanes flying over residential areas. The project was part of an effort to redesign the shape of airplane wings to reduce noise levels.
- Mine Detection and Neutralization (1997-1999)
Sponsor: Army Research Office
Helped in the design and testing of a landmine detection system that uses ground penetrating radar and neural networks to detect buried metal and plastic landmines. The system was able to detect 98% of the landmines. The system was selected among 6 competing designs proposed by top universities including MIT
- Application of Fuzzy Logic to Automatic Target Recognition (1996-19998)
Sponsor: Office of Naval Research
Helped in the design and testing of an automatic detection system that detects tanks in laser radar images. The system used a combination of neural networks and fuzzy logic to detect more than 97% of the tanks.
- Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles (1995-1997)
Sponsor: Eglin AFB
Helped in the design and testing of an automatic detection system that detects tanks and armored personnel carriers in synthetic aperture radar images. The system used a combination of neural networks and fuzzy logic to detect more than 90% of the targets.
- Pattern Recognition via Fuzzy Morphological Networks (1993-1994)
Sponsor: MU Research Board
Helped in the design of a new type of neural networks called shared-weight morphological neural networks. They proved to be superior to other networks in detecting particular patterns and shapes.

- Handwriting Recognition (1991-1993)
Sponsor: ERIM
Designed a system to recognize handwritten zip codes on mail pieces. The system was able to correctly recognize more than 96% of the handwritten numerals.

PUBLICATIONS

Book Chapters

- [1] M. Ben Haj Rhouma, M.A. Khabou, and L. Hermi, "Shape Recognition Based on Eigenvalues of the Laplacian," chapter in *Advances in Imaging and Electron Physics* vol. 167, pp 183-252, P. W. Hawks (Ed): Elsevier (2011)
- [2] W. Maghrebi, A. Borchani, M. A. Khabou, and A. M. Alimi, "A System for Historic Document Image Indexing and Retrieval Based on XML Database Conforming to MPEG7 Standard," chapter in *LNCS* vol. 5046, pp 114-125, W. Liu, J. Lladós, and J.-M. Olgier (Eds.): Springer-Verlag Berlin Heidelberg (2008)
- [3] W. Maghrebi, L. Baccour, M.A. Khabou, and A.M. Alimi, "An Indexing and Retrieval System of Historic Art Images Based on Fuzzy Shape Similarity," chapter in *MICAI 2007: Advances in Artificial Intelligence*, pp. 623–633, A. Gelbukh and A.F. Kuri Morales (Eds.): Springer-Verlag Berlin Heidelberg (2007)
- [4] P. D. Gader, B. N. Nelson, A. K. Hocaoglu, S. Auephanwiriyakul, and M. A. Khabou, "Neural Vs. Heuristic Development of Choquet Fuzzy Integral Fusion Algorithms for Land Mine Detection," chapter in *Neuro-fuzzy Pattern Recognition*, H. Bunke, A. Kandel (Eds): World Scientific Publishing Co., (2000)

Refereed Journal Papers

- [1] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Texture and Fuzzy Color Features to Index Roman Mosaic Images," *Int. J. of Intelligent Systems Technologies and Applications*, Vol. 15, No. 3, pp. 203-217 (2016)
- [2] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "FMIRS: A Fuzzy indexing and retrieval system of mosaic-image database," *Electronic Letters on Computer Vision and Image Analysis*, Vol. 13, No. 3, pp. 81-96, (2014)
- [3] W. Maghrebi, M. A. Khabou, A. B. Ammar, and A. M. Alimi, "An Intelligent Multi-object Retrieval System for Historical Mosaics," *Int'l Journal of Advanced Computer Science and Applications*, Vol. 4, No. 4, pp. 103-110, (2013)
- [4] T. M. Hamdani, M. A. Khabou, A. M. Alimi, and F. Karray, "An Intelligent Decision-Making System Based on Multiple Classifiers Updated using Confidence Rates and Stress Parameters", *Control and Intelligent Systems*, Vol. 39, No. 4, pp. 213-223, (2011)
- [5] T. M. Hamdani, A. M. Alimi, and M. A. Khabou, "An Iterative Method for Deciding SVM and Single Layer Neural Network Structures," *Neural Processing Letters*, Vol. 33, pp. 171-186, (2011)
- [6] B. Shaer, M.A. Khabou, and A. Fuchs, "Effect of Student Location on Assessment of Instruction and Grade Assignment," *Distance Learning*, Vol. 6, No. 4, pp. 21-29, (2009)
- [7] M. A. Khabou, L. Hermi, and M. B. H. Rhouma, "Shape Recognition Using Eigenvalues of the Dirichlet Laplacian," *Pattern Recognition*, Vol. 40, pp. 141–153, (2007)
- [8] P. D. Gader, M. A. Khabou, and A. Koldobsky, "Morphological Regularization Networks," *Pattern Recognition, Special Issue on Mathematical Morphology and Its Application*, Vol. 33, No. 6, pp. 935-944, (2000)
- [9] M. A. Khabou, P. D. Gader, and J. M. Keller, "LADAR Target Detection Using Morphological Shared-Weight Neural Networks," *Machine Vision and Applications*, Vol. 11, No. 6, pp. 300-305, (2000)
- [10] M. A. Khabou and P. D. Gader, "Automatic Target Detection Using Entropy-Optimized Shared-Weight Neural Networks," *IEEE Trans. Neural Networks*, Vol. 11, No. 1, pp. 186-194, (2000)
- [11] M. A. Khabou, P. D. Gader, and H. Shi, "Entropy Optimized Morphological Shared-Weight Neural Networks," *Optical Engineering*, Vol. 38, No. 2, pp. 263-273, (1999)
- [12] P. D. Gader and M. A. Khabou, "Automatic Feature Generation for Handwritten Digit Recognition," *IEEE Trans. Pattern Analysis Machine Intelligence*, Vol. 18, No. 12, pp. 1256-1262, (1996)

Refereed Conference Papers

- [1] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Texture Features to Index and Retrieve Roman Mosaic Images," *Proc. Int'l Conference on Automation, Control Engineering and Computer Science (ACECS)*, Hammamet, Tunisia, (2016)

- [2] M. A. Khabou and M. B. H. Rhouma, "Ratios of Eigenvalues for the Dirichlet Laplacian and Hu's Moments," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2014)
- [3] B. Shaer and M. A. Khabou, "The Development of Interactive Distance-Learning Laboratory for Teaching Digital Design in Electrical and Computer Engineering," Proc. Int'l Conference on Frontiers in Education: Computer Science and Computer Engineering, Las Vegas, NV, (2014)
- [4] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "A Fuzzy Metadata to Index and Retrieve Images of Roman Mosaics," Int'l Conference on Fuzzy Computation Theory and Applications, Vilamoura, Portugal (2013)
- [5] M. A. Khabou and M. V. Parlato, "Classification and Feature Analysis of Actigraphy Signals," IEEE Southeast Conference, Jacksonville, FL (2013)
- [6] M. A. Khabou and M. V. Parlato, "Feature Selection for Actigraphy Signal Processing and Recognition," Int'l Conference on Ambulatory Monitoring of Physical Activity and Movement, Amherst, MA, (2013)
- [7] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Extraction of knowledge from Tunisian historical mosaics using fuzzy logic and semantic concepts similarity measure to create a fuzzy metadata," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 489-495, Las Vegas, NV, (2012)
- [8] T.M. Hamdani, M.A. Khabou, and A.M. Alimi, "Conflict Negotiation Process with Stress Parameters Control for New Classifier Decision Fusion Scheme," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2010)
- [9] M.B.H. Rhouma, L. Hermi, and M.A. Khabou, "Laplacian and Bilaplacian Based Features for Shape Classification," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 615-619, Las Vegas, NV, (2009)
- [10] W. Maghrebi, M.A. Khabou, and A.M. Alimi, "Extraction of Fuzzy Spatial Relationships for Multi Objects Indexing of Historic Mosaic Images," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, pp. 326-330, Las Vegas, NV, (2009)
- [11] M. A. Khabou, M. B. H. Rhouma, and L. Hermi, "Performance Comparison of Laplacian-Based Features," Proc. Int'l Conference on Image Processing, Computer Vision, and Pattern Recognition, Las Vegas, NV, (2008)
- [12] E. M. El-Sheikh, B. A. Swain, and M A. Khabou, "A Comparison of Neural Network Architectures for Handwritten Digit Recognition," Proc. Int'l Conference on Artificial Intelligence, Las Vegas, NV, (2008)
- [13] T. Ayadi, T. M. Hamdani, A. M. Alimi, and M. A. Khabou, "2IBGSOM: Interior and Irregular Boundaries Growing Self-Organizing Maps," Int'l Conference on Machine Learning and Applications, Cincinnati, OH, (2007)
- [14] M. A. Khabou, M. B. H. Rhouma, and L. Hermi, "Feature Generation Using the Laplacian Operator with Neumann Boundary Condition," Proc. IEEE Southeast Conference, pp. 766-771, Richmond, VA, (2007)
- [15] M. A. Khabou and L. F. Solari, "A Morphological Neural Network-Based System for Face Detection and Recognition," IEEE Southeast Conference, Memphis, (2006)
- [16] W. Maghrebi, M. A. Khabou, and A. M. Alimi, "A System for Indexing and Retrieving Historical Arabic Documents Based on Fourier Descriptors," International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems, Tozeur, Tunisia, (2005)
- [17] M. A. Khabou and S. G. Kleiner, "Face Detection: Combining Classifiers to Improve Performance," International Conference on Computing, Communication and Control Technologies, Austin, TX, (2004)
- [18] M. A. Khabou, "Application of Morphological Shared-Weight Neural Networks to Landmine Detection," International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems, Monastir, Tunisia, (2000)
- [19] M. A. Khabou, P. D. Gader, and J. M. Keller, "Morphological Shared-Weight Neural Networks: A General Tool for Automatic Target Recognition Beyond the Visible Spectrum," Proceedings of the IEEE Workshop on Computer Vision Beyond the Visible Spectrum: Methods and Applications (part of the Conference on Computer Vision and Pattern Recognition), pp. 101-110, Ft. Collins, Colorado, (1999)
- [20] N. Theera-Umpon, M. A. Khabou, P. D. Gader, J. M. Keller, H. Shi and H. Li, "Detection and Classification of MSTAR Objects Via Morphological Shared-Weight Neural Networks," Proceedings SPIE, Vol. 3370, pp. 530-540, (1998)
- [21] M. A. Khabou and P. D. Gader, "Erosion and Dilation as Solutions to Regularization Problem," Proceedings SPIE, Vol. 3026, pp. 106-111, (1997)

- [22] P. D. Gader, Y. Won and M. A. Khabou, "Image Algebra Network for Pattern Recognition," SPIE Proceedings, Vol. 2300, pp. 157-168, (1994)
- [23] P. D. Gader and M. A. Khabou, "Automated Feature Generation for Handwritten Digit Recognition by Neural Networks," Third International Workshop on Frontiers in Handwriting Recognition, (1993)

Poster Papers

- [1] A. Al-Selwadi, S. Lewis, and O. Nguyen, "IEEE SoutheastCon Hardware Competition", University of West Florida Student Scholars Symposium (2018)
- [2] K. R. Latourelle, N. M. Latourelle, and D. E. Radcliffe, "Design of and Electronic Apiary Unit", University of West Florida Student Scholars Symposium (2015)
- [3] W. Posey, B. Sherrell, and C. Cohron, "Design of an Integrated Circuit Storage and Retrieval System", University of West Florida Student Scholars Symposium (2015)
- [4] B. Rhodes, M. Shipps, H. Hardy and J. Kocher, "Design of a smart Cooler System", University of West Florida Student Scholars Symposium (2015)
- [5] J. Spitznagel, L. Vunkannon, A. Scanlon, G. Dossantos, and M. K. Khabou, "Design of an Electronic Home Control System", University of West Florida Student Scholars Symposium (2014)--Project won ECE Department Award
- [6] C. Mason, P. Rappold, and R. Hope, "Design of an Unmanned Proximity Tracking Device", Student Scholars Symposium, University of West Florida, (2013)
- [7] J. Davis, M. Starr, B. Walker, A. Yaresko, A. Fuchs, and M. Khabou, "iRobot Create: Traffic Simulations," Student Scholars Symposium, University of West Florida, (2011)
- [8] A. Yaresko, A. Keyhani, and M. Khabou, "Autonomous Research Surface Vessel," Student Scholars Symposium, University of West Florida, (2011)
- [9] B. Walker, M. Starr, and M. Khabou, "Hardware/Software Interfacing of an Indoor Navigation System: Auto-pilot Reconnaissance Quad-Copter," Student Scholars Symposium, University of West Florida, (2011)
- [10] W. Maghrebi, M.A. Khabou, A. Ben Ammar, and A.M. Alimi, "A Fuzzy Indexing and Retrieval System of Historic Mosaics," Workshop on Intelligent Machines: Theory & Applications, Mahdia, Tunisia (2010)
- [11] W. Seaman and M.A. Khabou, "Design of a Remote Automation Controller with the CAN 2.0B Standard," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2010)—Paper won the Electrical and Computer Engineering Department Award.
- [12] N.A. Chan and M.A. Khabou, "Alarm-Triggered Web-connected Video Surveillance System," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2009)—Paper won the Electrical and Computer Engineering Department Award.
- [13] B. Swain, E. El-Sheikh, and M. A. Khabou, "Recognize This! A Neural Network-based Recognizer of Handwritten Digits," Scholars of Engineering, Applied Sciences and Technology Annual Research Symposium (SEASTARS), University of West Florida, (2008)—Paper won the Computer Science Award" sponsored by Prompt Technologies.

Technical Reports

- [1] M. A. Khabou, "Automatic Detection of Human in Visual Scenes", Technical Report, UWF Summer Research Grant, (2003)
- [2] J. Hereford, R. Selim, and M. A. Khabou, "Remote Acquisition Storage System," Technical Report, NASA-Langley Research Center, (2001)
- [3] P. D. Gader, J. M. Keller, H. Shi, and M. A. Khabou, "Extension of Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles," Technical Report, Eglin AFB, (1997)
- [4] P. D. Gader, J. M. Keller, and M. A. Khabou, "Image Algebra-Based Local Feature Extraction and Detection of Occluded Vehicles," Technical Report, Eglin AFB, (1996)

Mentored Projects

- [1] A. Al-Selwadi, S. Lewis, and O. Nguyen, "IEEE SoutheastCon Hardware Competition", (2018). This project won **Best Project Award**
- [2] T. Whalen, E. Petsinger, A. Moore, W. Riley, K. Torre, and S. Lash, "Computerized Autonomous Robotic Transportation (CART)", (2017). This project won **Best Project Award**.
- [3] R. Plenkens and J. Kerr, "Design of an Underwater Acoustic Pinger locator", (2017)

- [4] W. Newton, A. Alzurqui, and S. Pennant, "Design of a DC-DC Converter Fed Motor Drive", (2017)
- [5] B. Hagar, W. Hill, S. Miller, R. Ramirez, and J. Winberly, "Design of a Remotely Operated Power Line Inspection Tool", (2017). This project won **Best Project Award**.
- [6] D. Gilmore, D. Hull, J. Smith, J. Belitsos, J. Wuest, and S. Simpler, "Design of a Solar-Powered Vehicle", (2016)
- [7] E. Jones, A. Rassoul, and A. Alanazi, "Design of and Automatic Ampule Sealer," (2016)
- [8] M. Harshberger and W. Bielenda, "Design of a Parking Space Monitoring System", (2016)
- [9] C. Currier, K. Fitzgerald, W. McCarthy, C. McDaniel, and J. Seames, "2016 IEEE Hardware Competition Design", (2016)
- [10] B. Liles, B. Sellers, G. Johnson, and W. Stillman, "Redesigning the Photo Electric Erosion Pin", (2016)
- [11] A. Huuda, A. Alwazzan, A. Alnajjar, and M. Almasoud, "Design of a Vehicle Avoidance System", (2015)
- [12] K. R. Latourelle, N. M. Latourelle, and D. E. Radcliffe, "Design of and Electronic Apiary Unit", (2015)
- [13] William Posey, Branden Sherrell, and Colby Cohron, "Design of an Integrated Circuit Storage and Retrieval System", (2015)
- [14] Bryan Rhodes, Mark Shipps, Hunter Hardy and Jimmy Kocher, "Design of a smart Cooler System", (2015)
- [15] C. T. Harwell, J. R. Harwell, and N. Gann, "Design of an autonomous Field Painter", (2014)
- [16] Sean Miller, Kelly Godwin, and Jonathan Hosey, "Design of a self-Automated Programmable Foil Dispenser", (2014)
- [17] Daniel Irizarry and Brian Dickens, "Design of Autonomous Beacon Finding with Obstacle Avoidance in Conjunction with 3D Mapping", (2014)
- [18] John Spitznagel, Laura Vunkannon, Alexander Scanlon, and Geversson Dossantos, "Design of an Electronic Home Control System", (2014)
- [19] M. D. Robinson Jr., J. S. Simpson, and C. J. Ritchie, "Design of a Brail Tablet Reader", (2013)
- [20] Michael Vasek, Bradley Klimek, Laura Strickland, and Marienel Finkley, "Design of an Electromagnetic Lock with Fingerprint Identification", (2013)
- [21] Michael Parlato and William Mackie, "Design of a Machine Learning System for Sign Language Recognition", (2013)
- [22] Christopher Mason, Peter Rappold, and Ryan Hope, "Design of an Unmanned Proximity Tracking Device", (2013)
- [23] David Swick and Tyler Bowman, "Design of a Solar Tracker Utilizing an Embedded Monitoring System", (2013)
- [24] Michael Carbaugh, Steven Lyons, and David Duncan, "Design of an Automated Spectrum Equalizer for Audio Signals", (2012)
- [25] Alberto Sigala, Daniel Tuller, and Miles Hammac, "Camera Stabilization System", (2012)
- [26] Linzy Franks, Noah Larsen, and Alex Martinez, "Design and Implementation of Affordable Sight Technology for the Blind", (2012) (*Team applied for US patent based on their project*)
- [27] Curtis Scott and John Law, "Design of a Stability Controlled Bicopter", (2012)
- [28] Anton Yaresko and Alexander Keyhani, "Design of Autonomous Research Surface Vessel", (2011)
- [29] Bradly Faulk, Jack Gilgore, and Jose Poggiolo, "MOBILCOM: Design of a Morse-Binary-Light Communication System", (2011)
- [30] Michel Starr and Brandon Walker, "Design and Application of an Autonomous Quad-copter for Indoor Search Missions," (2011)
- [31] Khoa Chu, John Negrido, and Joshua Davis, "Parking Space Availability System Using Wirteless Camera and Image Processing Embedded System," (2011)
- [32] Samir Ibrahim, Leary Tomlin Jr., and David Oshana, "Internet Controlled Refrigeration Systems (ICRS)," (2011) (*Team applied for US patent based on their project*)
- [33] David White, "DC-DC Modular Smart Power Board", (2010)
- [34] Josh Davis, Michel Starr, Brandon Walker, and Anton Yaresko, "iRobot Create: Traffic Simulations", (co-mentored with Dr. Andreas Fuchs), (2010)
- [35] Thomas Cantin and Aubrey Coleman, "Design of a Self-Navigating Robot", (2010)
- [36] William Seaman, "Design of a Web-based Remote Automation System with the CAN 2.0B Standard", (2009)
- [37] Stephen Keith, "PCB Power Supply", (2009)
- [38] Nicholas Chan, "Alarm Triggered Video Surveillance System", (2008)
- [39] Jarrod Brown, David Bryan, Kyle Simpson, and Scott Walker, "Autonomous GPS Robot", (2008)

- [40] David Moeller and Pamela Prater, “Image Processing and Gimbal”, (2008)
- [41] Bryan Payne and Michael Welch, “Power Audio Amplifier”, (2008)
- [42] Raymond Anderson, Rachel Knodel, and Manuel Rosario, “The GRUNT Team”, (2008)
- [43] Alexander Evans, “Motor Control for Autonomous Underwater Vehicle”, (2008)
- [44] Trevor Gehman, “Automatic Loader for External CD/DVD Burner”, (2008)
- [45] Mark Goley, Charles Bardgett, Matthew Dupont, and Robert Worrell, “The AVRaL Robot Team”, (2008)
- [46] Jesse Rosal and Joshua Walker, “Automated Drink Mixer Machine”, (2007)
- [47] Eli Wilson, “Designing an MP3 Music Player”, (2007)
- [48] Anthony Burkett, “The Sudoku Solver”, (2007)
- [49] James Hereford, “Design of a Programmable Appliance Timer”, (2006)
- [50] Christopher Doss and Shelby Romine, “Submarine Navigational System”, (2006)
- [51] Adam Chow, “Card Dealing Robot”, (2006)
- [52] Laura Solari, “Algorithm for Face Detection and Recognition”, (2005)
- [53] Thomas Owens, “Voice Frequency Analyzer”, (2005)
- [54] Nate Matzer, “Multi-source Vision System for Unmanned Underwater Vehicles”, (2005)
- [55] Lobesky Johnson and David Musgrove, “MJ2005: The Autonomous Vehicle”, (2005)
- [56] Mathew Howell, “The PostalPro: Automated email Notification Device”, (2005)
- [57] Kris Stringer, “Tracking System”, (2004)
- [58] Christian Hughes and Lurie Walton, “Control Unit for Residential Heat Pump Upgrades”, (2003)
- [59] Timber Wolfe, “GPS-Controlled Robot”, (2003)
- [60] Jason Mamaloukas and Scott Parrott, “Voice Recognition TV Remote Control”, (2002)

AWARDS

- B. *Faculty Excellence in Teaching Award*, University of West Florida, 2013
- C. *Electrical and Computer Engineering Award*, Student Scholars Symposium, University of West Florida, 2014
- D. *Teacher of the Year Award*, IEEE Student chapter, University of West Florida, 2004-2005
- E. *Computer Science Paper Award*, SEASTARS Conference, University of West Florida, 2008
- F. *Electrical and Computer Engineering Paper Award*, SEASTARS Conference, University of West Florida, 2009
- G. *Electrical and Computer Engineering Paper Award*, SEASTARS Conference, University of West Florida, 2010
- H. *Full National Merit Scholarship*, USAID/Tunisian Government, 1986-1993

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

- I. *Vice Chair*, IEEE North West Florida region (2004)
- J. *Senior Member*, IEEE
- K. *Member*, HKN Honors Society
- L. *Faculty Advisor*, IEEE student chapter, University of West Florida
- M. *Faculty Advisor*, Florida Engineering Society student chapter, University of West Florida
- N. *Advisory Committee*, Int’l Conference on Advanced Technologies for Signal and Image Processing (2014)
- O. *Program Committee*, Int’l Conference on Neural Computation Theory and Applications (2013)
- P. *Organizing Committee Member*, IEEE International Conference on Fuzzy Systems (2004)
- Q. *Organizing Committee Member*, International Conference on Intelligent Technologies (2003)
- R. *Organizing Committee Member*, International Conference on Artificial and Computational Intelligence for Control, Automation and Decision in Engineering and Industrial Systems (ACIDCA2000)
- S. *Session Chair*, Intelligent Pattern Analysis III, the International Conference on Machine Intelligence (ICMI2005)
- T. *Reviewer for*:
 - Neural Computing and Applications
 - Information Sciences Journal
 - IEEE Transactions on Fuzzy Systems
 - IEEE Transactions on Geoscience and Remote Sensing
 - Journal of Optics Communications
 - Journal of Electronic Imaging

Journal of Fuzzy Sets and Systems
 Journal of Optical Engineering
 IEEE International Conference on Neural Networks
 IEEE International Conference on Fuzzy Systems
 IEEE Southeast Conference
 SPIE Conference on Image Algebra and Morphological Image Processing
 International Conference on Artificial and Computational Intelligence for Control, Automation and
 Decision in Engineering and Industrial Systems
 International Conference on Machine Intelligence
 International Conference on Education and Information Systems, Technologies and Applications
 International Conference on Intelligent Technologies
 International Conference on Neural Computation Theory and Applications
 International Conference on Pattern Recognition Applications and Methods
 Journal of Computers and Electronics in Agriculture

COMMITTEE MEMBERSHIPS

- U. *Member*, BEST Robotics Steering Committee
- V. *Member*, Tenure, Promotion, and Evaluation Task Force
- W. *Member*, Strategic Academic Visioning and Empowerment (SAVE) team
- X. *Chair*, Internal Stakeholders Subcommittee, SAVE
- Y. *Member*, STEM Steering Committee
- Z. *Member*, STRIDE Committee
- AA. *Chair/Member*, Faculty Search Committees
- BB. *Member*, Department Curriculum Committee
- CC. *Member*, ABET Accreditation Committee
- DD. *Chair*, Outcome Assessments and Retention Committee
- EE. *Chair*, Bylaws Revision Committee
- FF. *Coordinator*, with the Computer Science Department
- GG. *Member*, FWB Expansion Committee
- HH. *Member*, College of Arts and Science Council (Fall 2003)

Michael C. Reynolds

Contact Information

University of West Florida
 11000 University Parkway
 Pensacola, FL 32514-5750
 Office Phone: (850) 474-2977
 Email: mreynolds2@uwf.edu

Education

- | | |
|-----------|---|
| 8/99-8/04 | Doctor of Philosophy in Mechanical Engineering, Purdue University, West Lafayette, Indiana.
Thesis: <i>"The Application of Command Shaping to the Tracking Problem"</i>
Advisor: Dr. Peter H. Meckl
Specializations: Automatic Control, Command Shaping, Input Shaping, Optimization, Vibration. |
| 8/96-5/99 | Master of Science in Mechanical Engineering, Purdue University, West Lafayette, Indiana.
Thesis: <i>"Solving and Benchmarking the Time-Optimal Control of Flexible Systems"</i>
Advisor: Dr. Peter H. Meckl |
| 8/92-5/96 | Bachelor of Science in Mechanical Engineering, Marquette University, Milwaukee, Wisconsin. <i>Cum Laude Graduate.</i> |
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Professional Experience

- | | |
|----------------|--|
| 8/15 – present | <p>Associate Professor and Chair, Mechanical Engineering, College of Science and Engineering, University of West Florida.</p> <p>Founding chair of new Mechanical Engineering program. Designed curriculum, setup laboratories, recruiting students and preparing the processes necessary for ABET accreditation.</p> |
| 8/07 – 8/15 | <p>Head, Engineering Department, College of Science, Technology, Engineering, and Mathematics, University of Arkansas - Fort Smith.</p> <p>First level of administration for electrical and mechanical engineering programs. Oversaw and approve budgets, directed recruiting, retention, and assessment initiatives. Evaluated faculty and directed departmental strategic</p> |

activities.

- 4/10 – 7/15 **Associate Professor**, Mechanical Engineering, College of Science, Technology, Engineering, and Mathematics, University of Arkansas - Fort Smith.
- 1/04 – 4/10 **Assistant Professor**, Mechanical Engineering, College of Science, Technology, Engineering, and Mathematics, University of Arkansas - Fort Smith.
- Taught various freshman and sophomore classes in Mechanical Engineering. Advise and recruit students along with various projects and committees. Lead student recruiting efforts.
- 8/06 – 7/15 **Adjunct Associate Professor**, University of Arkansas – Fayetteville (was Adjunct Assistant Professor 8/06-4/10)
Worked with University of Arkansas in administration and teaching Bachelor of Science in Mechanical Engineering degree.
- 4/10 – 7/15 **Adjunct Associate Professor**, University of Arkansas – Little Rock
Served on PhD committee and do collaborative research with faculty at UA-Little Rock.
- 8/03-12/03 **Visiting Assistant Professor**, School of Mechanical Engineering, Purdue University.
- Taught junior level course in systems modeling and control.
- 8/98-5/03 **Head Teaching Assistant**, School of Mechanical Engineering, Purdue University.
- Taught and directed TAs of ME 475, a senior level controls lab. Designed and implemented new controller design projects using modular experimental equipment with a MATLAB/Simulink interface.
- 1/97-8/98 **Teaching Assistant**, School of Mechanical Engineering, Purdue University.
- Taught labs and tutorial sections for: ME 475, Automatic Control Systems, ME 365, Systems and Measurements, ME 263, Introduction to Mechanical Engineering Design, ME 352, Machine Design I.
- 8/94-5/96 **Teaching Assistant**, Physics Department, Marquette University.
Rewrote entire lab manual. Taught students from all grade levels, including non-engineers.

Honors and Awards

- 7/15 **\$28,524 - Collaborative Research Program – Arkansas Space Grant Consortium**, “Command Controlled Weather Balloons for Extended Endurance High Altitude Experiments” (PI). With Dr. Adam Huang, University of Arkansas – Fayetteville (Co-PI).
- 3/14 **\$2,000 Women’s Foundation of Arkansas Grant** for a Girl’s Engineering Camp at UAFS. Camp was conducted in June 2014.
- 12/12 **\$20,000 - EPSCoR NASA RID**, Arkansas Space Grant Consortium, “A Broadband Energy Harvester for Wireless Sensor System in Spacecraft Structure Monitoring” (Co-PI), with Dr. Guoliang Huang, University of Arkansas – Little Rock (PI).
- 12/11 **\$20,000 - EPSCoR NASA RID**, Arkansas Space Grant Consortium, “A Broadband Flying-Wing Design” (PI), with Dr. Guoliang Huang, University of Arkansas – Little Rock. (2nd year of funding on this project).
- 12/10 **\$20,000 - EPSCoR NASA RID**, Arkansas Space Grant Consortium, “A Broadband Flying-Wing Design” (PI), with Dr. Guoliang Huang, University of Arkansas – Little Rock. (Co-PI).
- 7/10-6/11 **President**, Arkansas Chapter of the American Society of Mechanical Engineers.
- 9/09 Named **Editor-in-Chief**, Journal of Online Engineering Education.
- 6/09 **\$500 EEES Grant** for the development and implementation of programs to attract more women to engineering.
- 9/08 **2nd place, Best Conference Paper**, 2008 ASEE Midwest Regional Conference.
- 6/08 **\$2400 Engineering Equity Extension Service Grant** for the development and implementation of programs to attract more women to engineering.
- 3/08 **\$10,000 Arkansas Space Grant for Research**, Arkansas Space Grant Consortium, “Pre and Post Spaceflight Neuromuscular Characterization and Rehabilitation Device: Design and Analysis,” (Co-PI) with Dr. David Paulus, University of Arkansas - Fort Smith (PI).
- 3/07 **\$10,000 Arkansas Space Grant for Research**, Arkansas Space Grant Consortium, “Interactive Variable Resistance Countermeasure to Adverse Physiological Adaptations Associated with Exposure to Microgravity,” (Co-PI) with Dr. David Paulus, University of Arkansas - Fort Smith (PI).

12/06	\$500 Diversity Grant , ASME.
6/03	Best paper in session , 2003 American Control Conference.
2001, 2002, 2003	Magoon Award for Excellence in Teaching at Purdue University.
11/02	ASME travel grant for the 2002 International Mechanical Engineering Congress and Exposition.
6/01	Best paper in session , 2001 American Control Conference.
6/01	Purdue Graduate Student Association travel grant for the 2001 American Control Conference.
5/96	Marquette University award for Outstanding Contributions to Spiritual Growth and Development .

Peer Reviewed Publications

Reynolds, M.C., “The Development of a Completely Online General Engineering Degree,” *E-Learn 2014 – World Conference on E-learning*, New Orleans, LA, Oct. 27-29, 2014.

Reynolds, M.C., “Rethinking Engineering Education – Results of a Regional and National Survey,” *2014 Midwest Section Conference of the American Society for Engineering Education*, Fort Smith, AR, Sept. 24-26, 2014.

Reynolds, M.C., “Teaching Engineering Content to First-Year Students: Does it Impact Success in Future Coursework?” *2013 Midwest Section Conference of the American Society for Engineering Education*, Salina, KS, Sept. 18-20, 2013.

Zhu, R., **Reynolds, M.**, Huang, G.L., “An Elastic Metamaterial Beam for Broadband Vibration Suppression,” *Proc. SPIE 8695, Health Monitoring of Structural and Biological Systems 2013*, April 17, 2013.

Reynolds, M.C., “A Comparison of Student Performance in an Online, Hybrid, and Traditionally Delivered Numerical Methods Course,” *2012 Midwest Section Conference of the American Society for Engineering Education*, Rolla, MO, Sept. 19-22, 2012.

Zhu, R., **Reynolds, M.C.**, Huang, G.L., “Numerical Effective Formulation for Guided Wave Propagation in a Metamaterial Plate with Anisotropic Mass Density,” *Proc. SPIE. 8348, Health Monitoring of Structural and Biological Systems 2012*, April 26, 2012.

Reynolds, M.C., “The Rapidly Changing Online Learning Landscape,” Foreword in *Journal of Online Engineering Education*, Vol. 2, No. 2, Dec. 2011.

Reynolds, M.C., Huisman, N., “An Analysis of Online Master’s Programs in Engineering,” *Proceedings of the 2011 Midwest Section Conference of the American Society for Engineering Education*, Russellville, AR , Sept. 28-30th, 2011.

Reynolds, M.C., “The Emergence of the Online Master’s Degree” Foreword in *Journal of Online Engineering Education*, Vol. 2, No. 1, Jun. 2011.

Liu, X.N., **Reynolds, M.C.**, Huang, G.L., “Wave Propagation and Vibration Analysis in Two-Dimensional Elastic Chiral Metacomposite,” *Proc. SPIE 7984, Health Monitoring of Structural and Biological Systems 2011*, March 31, 2011.

Reynolds, M.C., “The Opportunity of Hybrid Learning,” Foreword in *Journal of Online Engineering Education*, Vol. 1, No. 2, Dec. 2010.

Reynolds, M.C., “The Future of Engineering Education,” Foreword in *Journal of Online Engineering Education*, Vol. 1, No. 1, Jun. 2010.

Paulus, D.C., **Reynolds, M.C.**, Schilling, B.K., “Ground Reaction Force Comparison of Controlled Resistance Methods to Isoinertial Loading,” *Biomedical Sciences Instrumentation*, Vol. 46, pp. 293-298, 2010.

Reynolds, M.C., Paulus, D.C., “The Best of Both Worlds: Hybrid Learning,” *2009 ASEE Midwest Regional Conference*, Lincoln, NE, Sept. 16-18th, 2009.

Reynolds, M.C., Paulus, D.C., “Optimal Load Trajectories for Resistance Exercise,” *2009 ASME Early Career Technical Conference*, Arlington, TX, April 17-18th, 2009.

Paulus, D.C., **Reynolds, M.C.**, & Schilling, B.K., “Validity and Reliability of a Controlled Pneumatic Resistance Exercise Device,” *Biomedical Sciences Instrumentation*, Vol. 44, pp. 53-58, 2008.

Reynolds, M.C., “Increasing Engineering Retention Using Only Incoming Data,” *2008 ASEE Midwest Regional Conference*, Tulsa, OK, Sept. 18-19th, 2008.

Reynolds, M.C., and Paulus, D.C., “Comparison of Control Strategies for Resistance and Rehabilitation,” *2008 IEEE Multi-Conference on Systems and Control*, San Antonio, TX, Sept. 3-5th, 2008.

Reynolds, M.C., and Meckl, P.H., “The Application of Command Shaping to the Tracking Problem,” *ASME Journal of Dynamic Systems, Measurement, and*

Control, Vol. 130, No. 3, 2008.

Paulus, D.C., **Reynolds, M.C.**, Schulte, M.B., "Validity and Reliability of a Controlled Pneumatic Resistance Exercise Device," *Proceedings of the Rocky Mountain Bioengineering Symposium*, Copper Mountain, CO, Apr. 4-6, 2008.

Lewelling, K, Woolverton, K., **Reynolds, M.C.**, "Integration of Management Principles in an Open-Ended Community Service Project," *Proceedings of the Midwest Section Conference of the American Society for Engineering Education*, Wichita, KS, Sept. 2007.

Paulus, D.C., **Reynolds, M.C.**, "Controlled Variable Resistance Squat Device System Response," *Proceedings of the Mid-South Area Engineering & Sciences Conference*, May 2007, Oxford, MS.

Reynolds, M.C., Meckl, P.H., and Yao, B., "The Educational Impact of a Gantry Crane Project in an Undergraduate Controls Class," *International Journal of Engineering Education*, Vol. 20, No. 2, 2004.

Reynolds, M.C., and Meckl, P.H., "The Application of Command Shaping to the Tracking Problem," *Proceedings of the 2003 American Control Conference*, June 2003, Denver, CO.

Reynolds, M.C., Meckl, P.H., and Yao, B., "The Educational Impact of a Gantry Crane Project in an Undergraduate Controls Class," *Proceedings of the 2002 International Mechanical Engineering Congress and Exposition*, Nov. 2002, New Orleans, LA.

Reynolds, M.C., and Meckl, P.H., "Composite Optimization Scheme for Time-Optimal Control," *ALAA Journal of Guidance, Control, and Dynamics*, Vol. 25, No. 5, September-October 2002, pp. 987-989.

Reynolds, M.C., and Meckl, P.H., "Benchmarking Time-Optimal Control Inputs for Flexible Systems," *ALAA Journal of Guidance, Control, and Dynamics*, Vol. 25, No. 2, March-April 2002, pp. 215-221.

Reynolds, M.C., and Meckl, P.H., "Hybrid Optimization Scheme for Time-Optimal Control," *Proceedings of the 2001 American Control Conference*, June 2001, Arlington, VA.

Reynolds, M.C., and Meckl, P.H., "Benchmarking Time-Optimal Control Strategies for Flexible Systems," *Proceedings of the IEEE Conference on Control Applications*, Kohala Coast, Hawaii, August, 1999, pp. 707-712.

Peer Reviewed Presentations

Reynolds, M.C. "Implementing ASME Vision 2030 in a New Mechanical Engineering Program", *2018 American Society for Engineering Education Southeastern Section Conference*, Daytona Beach, FL, March 4-6, 2018.

Barbosa R.M., and **Reynolds, M.C.** "Using Reinforcement Learning for Balancing an Inverted Pendulum", *2017 Summer Undergraduate Research Symposium*, University of West Florida, Pensacola, FL, Aug 8th, 2017.

Paulus, D.C., and **Reynolds, M.C.**, "Perceived Satisfaction and Demonstration of Learning Using Online Assessment with Traditional Undergraduate and Online Graduate Students," *2016 Southeast Section Conference of the American Society for Engineering Education*, Tuscaloosa, AL, Mar. 13-15, 2016.

Reynolds, M.C., "The Development of a Completely Online General Engineering Degree," *E-Learn 2014 – World Conference on E-learning*, New Orleans, LA, Oct. 27-29, 2014.

Reynolds, M.C., "Rethinking Engineering Education – Results of a Regional and National Survey," *2014 Midwest Section Conference of the American Society for Engineering Education*, Fort Smith, AR, Sept. 24-26, 2014.

Reynolds, M.C., "Online Engineering Education: Where are we? Where are we going?" *Plenary lecture at the 2014 Gulf Southwest Section Conference of the American Society for Engineering Education*, New Orleans, LA, April 2-4, 2014.

Reynolds, M.C., "Teaching Engineering Content to First-Year Students: Does it Impact Success in Future Coursework?" *2013 Midwest Section Conference of the American Society for Engineering Education*, Salina, KS, Sept. 18-20, 2013.

Reynolds, M.C., "A Comparison of Student Performance in an Online, Hybrid, and Traditionally Delivered Numerical Methods Course," *2012 Midwest Section Conference of the American Society for Engineering Education*, Rolla, MO, Sept. 19-22, 2012.

Reynolds, M.C., Huisman, N., "An Analysis of Online Master's Programs in Engineering," *Proceedings of the 2011 Midwest Section Conference of the American Society for Engineering Education*, Russellville, AR, Sept. 28-30th, 2011.

Reynolds, M.C., Paulus, D.C., "The Best of Both Worlds: Hybrid Learning," *2009 ASEE Midwest Regional Conference*, Lincoln, NE, Sept. 16-18th, 2009.

Reynolds, M.C., Paulus, D.C., "Optimal Load Trajectories for Resistance Exercise," *2009 ASME Early Career Technical Conference*, Arlington, TX, April

17-18th, 2009.

Reynolds, M.C., “Increasing Engineering Retention Using Only Incoming Data,” *2008 ASEE Midwest Regional Conference*, Tulsa, OK, Sept. 18-19th, 2008.

Reynolds, M.C., and Paulus, D.C., “Comparison of Control Strategies for Resistance and Rehabilitation,” *2008 IEEE Multi-Conference on Systems and Control*, San Antonio, TX, Sept. 3-5th, 2008.

Lewelling, K, Woolverton, K., **Reynolds, M.C.**, “Integration of Management Principles in an Open-Ended Community Service Project,” *Proceedings of the Midwest Section Conference of the American Society for Engineering Education*, Wichita, KS, Sept. 2007.

Reynolds, M.C., and Meckl, P.H., “The Application of Command Shaping to the Tracking Problem,” *Proceedings of the 2003 American Control Conference*, June 2003, Denver, CO.

Reynolds, M.C., Meckl, P.H., and Yao, B., “The Educational Impact of a Gantry Crane Project in an Undergraduate Controls Class,” *Proceedings of the 2002 International Mechanical Engineering Congress and Exposition*, Nov. 2002, New Orleans, LA.

Reynolds, M.C., and Meckl, P.H., “Hybrid Optimization Scheme for Time-Optimal Control,” *Proceedings of the 2001 American Control Conference*, June 2001, Arlington, VA.

Reynolds, M.C., and Meckl, P.H., “Benchmarking Time-Optimal Control Strategies for Flexible Systems,” *Proceedings of the IEEE Conference on Control Applications*, Kohala Coast, Hawaii, August, 1999, pp. 707-712.

Service

9/14	Director , 2014 Midwest Section Conference of the American Society for Engineering Education.
6/14 – present	ABET Program Evaluator . Was selected and trained as a program evaluator for ABET, the premier accreditor for engineering and engineering technology programs.
8/04 – 7/15	Director of recruiting for engineering, University of Arkansas - Fort Smith. Developed and implemented a recruiting plan for engineering that raised the median ACT of incoming students from 22 to 26.

1/04 – 7/15	Director of engineering assessment, University of Arkansas - Fort Smith. Developed and implemented an assessment plan for both university and ABET requirements.
8/08 – 7/15	Chair of University Student Life committee. Advise and assist University Office of Student Life in programs, planning and assessment.
8/05 – 8/09	Served on university faculty Curriculum Committee . Review and approve campus-wide curriculum.
8/07 – 7/15	Established a student section of the Society of Women Engineers on the UA Fort Smith campus. Served as the advisor to SWE .
8/05 – 7/15	Established a student section of the American Society of Mechanical Engineers on the UA Fort Smith campus. Served as the advisor to ASME .
06,07,13,15	Served on search committees for university provost, dean of the college of business, dean of the college of STEM, and head of the biology department.
5/05 – 5/07	Designed and implemented an engineering camp for the recruitment of high school students into engineering. Served as the director of the week long, residential camp for 15 high school students each summer.
8/98 – 5/03	Developed and organized various workshops designed to improve the communication skills of our graduate teaching assistants at Purdue University. Worked to establish a community amongst the teaching assistants through these workshops.
8/99 – 5/02	Served on the faculty Communications Committee as the Teaching Assistant Representative at Purdue University. Helped to improve the communication skills of students through curriculum assessment and development.

Professional Memberships

ASEE American Society for Engineering Education
 ASME American Society of Mechanical Engineers

Research Interests

Engineering Education, Acoustic Metamaterials, Biomechanics / Exercise Science, Optimal Control, Vibration Control, Command Shaping.

Teaching Interests

Automatic Control: Classical and Modern Control, Digital Control, LQR, QFT, Optimal Control, Mechatronics, and Control of Robotic Systems.
System Modeling: System Modeling, Mechanical Vibrations, Bond Graphs.
Mechanics: Statics, Dynamics.
General Engineering: Introduction to Engineering, Thermodynamics, Numerical Methods.

Oscar Y. Chuy Jr.

Assistant Professor
Department of Electrical and Computer Engineering
University of West Florida
Bldg 4/ Rm. 132
11000 University Pkwy.
Pensacola, Florida 32514
Phone: (850)-474-3317
E-mail: ochuy@uwf.edu

Research Interest

Human Robot Physical Interaction and Cooperation, Motion Planning and Control, Control of Robotic Assistive Devices, and Control of Autonomous Vehicles.

Professional Preparation

Postdoctoral Research Associate (2007-2010)

Department of Mechanical Engineering
Florida State University
Tallahassee, FL USA
Supervisor: Prof. Emmanuel Collins

Ph.D., Bioengineering and Robotics (2006)

Tohoku University, Sendai Japan
Supervisor: Prof. Kazuhiro Kosuge

M.S., Electrical Engineering (Major: Instrumentation and Controls) (2001)

University of the Philippines, Dilliman, Quezon City, Philippines

B.S., Electrical Engineering (1996)

Mindanao State University - Iligan Institute of Technology, Philippines

B.S., Electronics and Communication Engineering (1994)

Mindanao State University - Iligan Institute of Technology, Philippines

Professional Experience

Assistant Professor (2015-Present)

Department of Electrical and Computer Engineering

University of West Florida
Pensacola, FL USA
Research Faculty I (2013-2015)
Department of Mechanical Engineering
FAMU-FSU College of Engineering
Florida State University
Tallahassee, FL USA

Assistant Scholar/Scientist (2010-2013)
Department of Mechanical Engineering
FAMU-FSU College of Engineering
Florida State University
Tallahassee, FL USA

Research Associate (2006-2007)
System Robotics Laboratory
Department of Bioengineering and Robotics
Tohoku University, Sendai Japan

Graduate Research Assistant (2002-2006)
System Robotics Laboratory
Department of Bioengineering and Robotics
Tohoku University, Sendai Japan

Graduate Research Assistant (1998-2000)
Department of Electrical and Electronics Engineering
University of the Philippines, Philippines

Instructor (1995-1997 and 2000-2002)
Department of Electronics and Electrical Engineering
Mindanao State University - Iligan Institute of Technology, Philippines

Contracts and Grants

Chuy, Oscar (PI), NRI:FND: Understanding the Physical Interaction of Human and Mobile Co-Robots for Effective Collaboration, February 2018, Submitted to the National Science Foundation.

Prayaga, Lakshmi (PI) and **Chuy, Oscar (Co-PI)**, Cyber Jedi in Smart Cities (CJSC), February 2018, Florida Center for Cyber Security, (Funded: \$83,000)

Prayaga, Lakshmi (PI), **Chuy, Oscar (Co-PI)**, and Schwuttke, Ursula. NSF RET Site: Robotics to Promote Computational Thinking Skills, October 2017, Submitted to the National Science Foundation.

Chuy, Oscar (PI), BSI Analysis of Breathing Sensor System, Breathing System Incorporated, August 2017- December 2017, (Funded: \$6,200)

Chuy, Oscar (PI), Development of a Robotic Mobility Aid, UWF (Internal Grant), May 2017- April 2018, (Funded: \$24,600)

Collins, Emmanuel (PI) & **Chuy, Oscar (Co-PI)**. NRI: Control and Planning for Slip Mitigation in Manned and Unmanned Electric Ground Vehicles. Submitted to National Science Foundation (not funded).

Collins, Emmanuel (PI) & **Chuy, Oscar (Senior Personnel)**. Momentum Based Motion Planning for Manipulators with Heavy Loads, NSF, CMMI-1130286, September 1 , 2011 - August 31, 2014.

Collins, Emmanuel (PI) & **Chuy, Oscar (Senior Personnel)**. Modeling and Motion Planning for Skid Steered Vehicles, NSF, CMMI-0927040, August 15, 2009 - July 31, 2012.

Collins, Emmanuel (Co-PI) & **Chuy, Oscar (Senior Personnel)**. Motion Planning and Control of Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), August 15, 2009 - July 31, 2014.

Patent

Collins, E. and Chuy, O., Slip mitigation control for electric ground vehicles, Patent Application US 15/131,689.

Research Project

Stability of Human Robot Physical Interaction, 2016 – Present

Human CoG State Estimation (Collaboration with Smart Design Lab, Tohoku University, Japan), 2017 – Present

Fast Motion Planning Using Experience (Collaboration with Florida State University), 2015 – Present

Momentum Based Motion Planning for Manipulators with Heavy Loads, NSF CMMI-1130286, (9/2011-9/2014).

Modeling and Motion Planning for Skid Steered Vehicles, NSF, CMMI-0927040, (8/2009 – 7/2012)

Electric Powered Wheelchair Self- Balancing Mode, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2013-7/2014.

Slip Control for Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2012-7/2013.

Real-time Control of Electric Power Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2011-7/2012.

Motion Planning using Dynamic Model for a Manipulator on an Electric Powered Wheelchair, (subcontract from University of Pittsburgh and Carnegie Mellon University, A National Science Foundation Engineering Research Center for Quality of Life Technologies), 8/2009-7/2011.

Dynamic and Power Modeling of Skid Steered Vehicle, Department of Mechanical Engineering, Florida State University, 4/2007- 8/2009.

Control of Robotic Walking Support Systems, Tohoku University, 4/2003-3/2007.

Teaching

Department of Electrical and Computer Engineering, Hal Marcus College of Science and Engineering, University of West Florida:

Autonomous Systems (Introduction to Mobile Robotics) EEL4990
Elements of Robotics EEL4663
Discrete Time Signals and Systems EEL3135
Linear Control Systems EEL4657
Mechatronic Systems EML4804

Electronics Laboratory EEL4308L
Linear Control Systems Laboratory EEL4657L
Mechatronic Systems Laboratory EML4804L

Department of Mechanical Engineering, FAMU-FSU College of Engineering:

Mechatronics I (EML3811), Fall 2010 – Spring 2015
Introduction to Mobile Robotics (EML5831, graduate)
Introduction to Mobile Robotics (EML4830, undergraduate)

Mindanao State University-Iligan Institute of Technology, Philippines

Introduction to Electronics: Circuits and Devices
Feedback Control System

Supervision of Student Research and Projects

Research Project

Adam Moore, Stabilization of Attendant Wheelchair Based on User's Pose, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.

Jonathan Herrero, Control Evaluation of Attendant Wheelchair, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2017.

Lash, S., Role of Arm Configuration to the Stability of Human-Robot Physical Interaction, Summer Undergraduate Research Program (SURP), Hal Marcus College of Science and Engineering, University of West Florida, 2016.

Petsigner, E., Electric Powered Wheelchair Control Addressing User and Terrain Interaction, Summer Undergraduate Research Program (SURP), College of Science and Engineering, University of West Florida, 2016.

Reyes, R., Inertial Parameters Identification of a 2 DOF Manipulator, Undergraduate Honors Thesis, FSU, 2014.

Krichman, B., Development of a Wheel Force/Torque Sensor for Autonomous Ground Vehicle, National Science Foundation Research Experience for Undergraduate (NSF-REU), FSU, May–Aug 2014.

Brown, J., Dynamic Modeling and Control of a Quadrotor, NSF-REU, FSU, May–Aug 2013.

Bucken, D., Development and Control of a 2 DF Manipulator, NSF, CMMI-1130286, Jan–Dec 2012.

Miller, K., Modeling and Simulation of Skid Steer Vehicle on Rough Terrain, NSF-REU, FSU, May–Jul 2012.

Lenoff, J., Development and Control of a Robotic Walker, FSU, May 2011–Apr 2012.

Senior Design

T. Boynton, L. Montenegro, and N. Files, Design of an Autonomous Returning Baseball, Department of Electrical and Computer Engineering, University of West Florida, Spring 2017 – Fall 2017.

C. Baker, D. Lamar, G. Cagle, and C. Levis, Twin Robot Hauler, Department of Electrical and Computer Engineering, University of West Florida, Spring 2017 – Fall 2017.

E. Flagg and N. Tibenko, Design of an RFID/VAL(Voice Authentication Lock), Department of Electrical and Computer Engineering, University of West Florida, Fall 2016 – Spring 2017.

B. Underwood, G. Underwood, and J. Duran, Design of a Smart Coffee Maker, Department of Electrical and Computer Engineering, University of West Florida, Fall 2016 – Spring 2017.

G. Henshaw and W. Gifford, Design of a Standalone Data Acquisition System, Department of Electrical and Computer Engineering, University of West Florida, Fall 2016 – Spring 2017.

K. Stanton, B. Campbell, and D. Lewis, Design of a Voice Password Locking Mechanism, Department of Electrical and Computer Engineering, University of West Florida, Fall 2016 – Spring 2017.

M. Humes, B. Avellone, and S. Taylor, Autonomous Navigating Robot, Department of Electrical and Computer Engineering, University of West Florida, Fall 2015 – Spring 2016.

J. Davis, K. Dang, and K. Tan, Development of Unmanned Ground Vehicle (Competition), Department of Electrical and Computer Engineering, University of West Florida, Fall 2015 – Spring 2016.

M. Peters, A. Vignolo, and J. Broman, Design of an Autonomous Quadrotor, Department of Electrical and Computer Engineering, University of West Florida, Spring 2016 – Fall 2016.

M. Pekarek and M. Cherry, Design of an Android Jeopardy Game Using Google Chromecast and Bluetooth Controllers, Department of Electrical and Computer Engineering, University of West Florida, Spring 2016 – Fall 2016.

Team 1, Eglin/AFRL: Indoor Quadrotor Control, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2013 –Apr 2014.

Team 10, Autonomous All-Terrain Vehicle, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2013 –Apr 2014.

Team 10, Modeling and Instrumentation of an Autonomous Ground Vehicle, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2012 –Apr 2013.

Team 17, Design and Control of Outdoor Robotic Walker, Dept. of Mechanical Engineering, FAMU-FSU College of Engineering, Senior Design, Aug 2011 –Apr 2012.

Refereed Journal Articles

Chuy, O.Y. and Hanks, A., Stability Analysis and Evaluation of Human - Mobile Corobot Physical Interaction, (To be submitted to IEEE Transactions on Systems Man and Cybernetics)

Chuy, O.Y., Herrero, J., Al-Selwadi, A., Mooer, A., Control and Evaluation of a Motorized Attendant Wheelchair with Haptic Interface, *ASME Journal of Medical Devices*, doi:10.1115/1.4041336

Chuy, O. Y., Collins, E., Sharma, A., & Kopinsky, R., Using Dynamics to Consider Torque Constraints in Manipulators Planning with Heavy Loads, *ASME Journal of Dynamic Systems, Measurement and Control*, Vol. 139, No. 5, May 2017, doi: 10.1115/1.4035168.

Ordonez, C., **Chuy, O. Y.**, Liu, X., & Collins, E. (2011). A Laser Based Rut Detection and Following System for Autonomous Ground Vehicles. *Journal of Field Robotics*, 28, p. 158-179.

Yu, W., **Chuy, O. Y.**, Collins, E., & Hollis, P. (2010). Analysis and Experimental Verification for Dynamic Modeling of a Skid-Steered Wheeled Vehicle. *IEEE Transactions on Robotics*, p. 340-353.

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2007). A Control Approach Based on Passive Behavior to Enhance User Interaction. *IEEE Transactions on Robotics*, p 899-908.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2006). A New Control Approach for a Robotics Walking Support System in Adapting User Characteristics. *IEEE Transactions on Systems Man and Cybernetics*, p. 725-733.

Invited Book Chapters

Dunlap, D., Caldwell, C., Collins, E., & **Chuy, O. Y.** (2011). Motion Planning for Mobile Robots Via Sampling-Based Model Perspective Optimization - Mobile Robots. In *Recent Advances in Mobile Robotics* (pp. 1-23). InTech.

Yu, W., Collins, E., & **Chuy, O. Y.** (2011). Dynamic Modeling and Power Modeling of Robotic Skid-Steered Wheeled Vehicles - Mobile Robots - Current Trends. In *Mobile Robots - Current Trends*. InTech.

Refereed Book Chapters

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (2013). Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function. In *Experimental Robotics* (pp. 651-666). Springer.

Refereed Proceedings

Chuy, O. Y., Collins, E., Ordonez, C., Candiotti, J., Wang, H., & Cooper, R. (2014). Slip Mitigation Control for an Electric Powered Wheelchair. In *2014 IEEE International Conference on Robotics and Automation*, (pp. 333-338). Hong Kong.

Francis, G., Collins, E., **Chuy, O. Y.**, & Sharma, A. (2013). Sampling-Based Trajectory Generation for Autonomous Spacecraft Rendezvous and Docking. In *AIAA Guidance, Navigation, and Control (GNC) Conference*. AIAA.

Ordonez, C., Gupta, N., **Chuy, O. Y.**, & Collins, E. (2013). Momentum Based Traversal of Mobility Challenges for Autonomous Ground Vehicles. In *2013 IEEE International Conference on Robotics and Automation*, (pp. 752-759). Karlsruhe, Germany.

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (2012). Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function. In *13th International Symposium on Experimental Robotics*. Quebec, Canada, 2012.

Ordonez, C., Gupta, N., **Chuy, O. Y.**, & Collins, E. (2012). Modeling of Skid-Steered Wheeled Robotic Vehicles on Sloped Terrains. In *Proceedings of the ASME Dynamic Systems and Control Conference*, (pp. 91-99). Fort Lauderdale, FL, 2012.

Ordonez, C., **Chuy, O. Y.**, Collins, E., & Liu, X. (2009). Rut detection and following for autonomous ground vehicles. In *In Proceedings of Robotics: Science and Systems*. Seattle, WA.

Chuy, O. Y., Collins, E., Yu, W., & Ordonez, C. (2009). Power Modeling of a Skid Steered Wheeled Robotic Ground Vehicle. In *2009 IEEE International Conference on Robotics and Automation*, (pp. 4118 – 4123), Kobe, Japan.

Chuy, O. Y., Kumar, V., Holt, F., Collins, E., & Alvi, F. (2009). Microjet-based Separation Control Using a Virtual Sensor for Degree of Separation. In *Florida Center for Advanced Aero-Propulsion (FCAAP) Annual Technical Symposium*. Orlando, FL.

Ordonez, C., **Chuy, O. Y.**, Collins, E., & Liu, X. (2009). Rut Tracking and Steering Control for An Autonomous Rut Following. In *Proceedings of the 2009 IEEE International Conference on Systems, Man, and Cybernetics*, (pp. 2775-2781), San Antonio, TX, USA.

Yu, W., **Chuy, O. Y.**, Collins, E., & Hollis, P. (2009). Dynamic Modeling of a Skid-Steered Wheeled Vehicle with Experimental Verification. In *2009 IEEE/RSJ International Conference on Intelligent Robots and System*, (pp. 4212-4219). St. Louis, MO.

Zhang, K., Collins, E., Shi, D., Liu, X., & **Chuy, O. Y.** (2008). A Stochastic Clustering Auction for Centralized and Distributed Task Allocation in Multi-Agent Teams. In *Distributed*

Autonomous Robotic Systems (pp. 345-354). Tsukuba, Ibaraki, Japan.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2007). Active Type Robotic Mobility Aid Control Based on Passive Behavior. In *2007 IEEE/RSJ International Conference on Intelligent Robots and System* (pp. 165-170). San Diego, CA.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2007). Environmental Feedback for Robotic Walking Support System Control. In *2007 IEEE International Conference on Robotics and Automation*, (pp. 3633-3638). Rome, Italy.

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2006). Approach in Assisting a Sit-to-Stand Movement Using a Robotic Walking Support System. In *2006 IEEE/RSJ International Conference on Intelligent Robots and System* (pp. 4343-4348). Beijing, China.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2005). An Online Approach in Adapting User Characteristic for Robotic Walker Control. In *IEEE 9th International Conference on Rehabilitation Robotics* (pp. 139- 142). Chicago, USA.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2005). Augmented Variable Center of Rotation in Controlling a Robotic Walker to Adapt User Characteristics. In *2005 IEEE/RSJ International Conference on Intelligent Robots and System* (pp. 1779–1784). Edmonton, Canada.

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (2005). Motion Control Algorithms for a New Intelligent Robotic Walker in Emulating Ambulatory Device Function. In *IEEE International Conference on Mechatronics and Automation* (pp. 1509 - 1514). Canada.

Hirata, Y., **Chuy, O. Y.,** Hara, A., & Kosuge, K. (2005). Human-adaptive Motion Control of Active and Passive type Walking Support System. In *2005 IEEE Workshop on Advanced Robotics and its Social Impacts* (pp. 139-144). Japan.

Chuy, O. Y., Hirata, Y., & Kosuge, K. (2004). Control of Walking Support System Based on Variable Center of Rotation. In *2004 IEEE/RSJ International Conference on Intelligent Robots and System* (pp. 2289-2294). Sendai, Japan.

Non-Refereed Proceedings

Al-Selwadi A., Mooers, A, & **Chuy, O. Y.** (2018). Evaluation of Admittance Control for Effective Human-Robot Collaboration *Florida Conference on Recent Advances in Robotics*. Orlando, Florida, May 10-11, 2018.

Chuy, O. Y., Al-Selwadi A., & Herrero J. (2017). Development and Control of a Robotic Attendant Wheelchair. *Florida Conference on Recent Advances in Robotics*. Boca Raton,

Florida, May 11-12, 2017.

Lui, Y., Orodnez, C., Gupta, N., **Chuy, O.**, Mard, C., & Collins, E. (2015). Jumping Behavior for Wheeled Robotic Vehicles, *Florida Conference on Recent Advances in Robotics*. Melbourne, Florida. May 2015.

International Conference Presentation

Chuy, O. Y., Collins, E., Ordonez, C., Candiotti, J., Wang, H., & Cooper, R. (presented 2014, May). *Slip Mitigation Control for an Electric Powered Wheelchair*. Paper presented at 2014 IEEE International Conference on Robotics and Automation, IEEE. (International)

Francis, G., Collins, E., **Chuy, O. Y.**, & Sharma, A. (presented 2013, August). *Sampling-Based Trajectory Generation for Autonomous Spacecraft Rendezvous and Docking*. Paper presented at AIAA Guidance, Navigation, and Control (GNC) Conference, AIAA. (International)

Ordonez, C., Gupta, N., **Chuy, O. Y.**, & Collins, E. (presented 2013, May). *Momentum Based Traversal of Mobility Challenges for Autonomous Ground Vehicles*. Paper presented at 2013 IEEE International Conference on Robotics and Automation, IEEE. (International)

Chuy, O. Y., Collins, E., Dunlap, D., & Sharma, A. (presented 2012, June). *Sampling-Based Direct Trajectory Generation Using the Minimum Time Cost Function*. Paper presented at 13th International Symposium on Experimental Robotics, International Foundation of Robotics Research, Quebec, Canada. (International)

Ordonez, C., Gupta, N., **Chuy, O. Y.**, & Collins, E. (presented 2012). *Modeling of Skid-Steered Wheeled Robotic Vehicles on Sloped Terrains*. Paper presented at Proceedings of the ASME Dynamic Systems and Control Conference, ASME, Fort Lauderdale, FL. (International)

Chuy, O. Y., Collins, E., Yu, W., & Ordonez, C. (presented 2009). *Power Modeling of a Skid Steered Wheeled Robotics Ground Vehicle*. Paper presented at 2009 IEEE International Conference on Robotics and Automation, IEEE, Kobe Japan. (International)

Ordonez, C., **Chuy, O. Y.**, Collins, E., & Liu, X. (presented 2009). *Rut Detection and Following for Autonomous Ground Vehicles*. Paper presented at In Proceedings of Robotics: Science and Systems, Science and Systems, Seattle, WA. (International)

Ordonez, C., **Chuy, O. Y.**, Collins, E., & Liu, X. (presented 2009). *Rut Tracking and Steering Control for An Autonomous Rut Following*. Paper presented at 2009 IEEE International Conference on Systems, Man, and Cybernetics, Systems, Man, and Cybernetics, San Antonio, TX. (International)

Yu, W., **Chuy, O. Y.**, Collins, E., & Hollis, P. (presented 2009). *Dynamic Modeling of a Skid-*

Steered Wheeled Vehicle with Experimental Verification. Paper presented at IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/ RSJ, St. Louis, MO. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2007). *Active Type Robotic Mobility Aid Control Based on Passive Behavior*. Paper presented at 2007 IEEE International Conference on Robotics and Automation, IEEE, San Diego, CA. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2007). *Environment Feedback for Robotic Walking Support System Control*. Paper presented at 2007 IEEE International Conference on Robotics and Automation, IEEE, Rome, Italy. (International)

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (presented 2006). *Approach in Assisting a Sit-to-Stand Movement Using a Robotic Walking Support System*. Paper presented at 2006 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Beijing, China. (International)

Chuy, O. Y., Hirata, Y., Wang, Z., & Kosuge, K. (presented 2005). *Motion Control Algorithms for a New Intelligent Robotic Walker in Emulating Ambulatory Device Function*. Paper presented at IEEE International Conference on Mechatronics and Automation, IEEE, Canada. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2005). *Augmented Variable Center of Rotation in Controlling a Robotic Walker to Adapt User Characteristics*. Paper presented at 2005 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Edmonton, Canada. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2005). *Online Approach in Adapting User Characteristic for Robotic Walker Control*. Paper presented at IEEE 9th International Conference on Rehabilitation Robotics, ICORR/ IEEE, Chicago. (International)

Hirata, Y., **Chuy, O. Y.**, Hara, A., & Kosuge, K. (presented 2005). *Human-adaptive Motion Control of Active and Passive type Walking Support System*. Paper presented at IEEE Workshop on Advanced Robotics and its Social Impacts, IEEE, Japan. (International)

Chuy, O. Y., Hirata, Y., & Kosuge, K. (presented 2004). *Control of Walking Support System Based on Variable Center of Rotation*. Paper presented at 2004 IEEE/RSJ International Conference on Intelligent Robots and System, IEEE/RSJ, Sendai, Japan. (International)

Society Memberships

Institute of Electrical and Electronics Engineers (IEEE)
Robotics and Automation Society, Member (2004- Present)

Service and Outreach

Associate Editor: 2018 IEEE Int. Conf. on Intelligent Robots and Systems (IROS)

Reviewer:

IEEE Robotics and Automation Letters (April 2017)
Journal of Advanced Robotics
IEEE Robotics and Automation Magazine (2007)
IEEE Int. Conf. on Robotics and Automation (ICRA)
IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)

Session Chair:

IEEE Int. Conf. on Robotics and Automation, 2009
IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, 2010

Program Committee (International Conference):

7th IEEE International Conference on Humanoid, Nanotechnology, Information
Technology, Communication and Control, Environment, and Management 2014
2012 IEEE International Conference on Robotics and Biomimetics

E-media chair(International Conference):

2016 IEEE/SICE International Symposium on System Integration
2011 IEEE International Conference on Robotics and Biomimetics

Service to other Universities:

Project Leader, *Development of Mobile Robot Research Platform*, De La Salle
University, Philippines (2010).

Service to Community:

Mentor, For Inspiration in Recognition of Science and Technology (FIRST)
completion, Panhandle Pirates (2009–2010).
Mentor, Robotics Program, R. Frank NIMS Middle School, Tallahassee, Florida
(2008–2010).

Technical Skills

- Realtime Operating System: QNX, Vxworks, and Linux (RTAI)

- Realtime Control/Programming: C/C++, Matlab RT, and Labview RT
- Device Driver Development Experience: QNX and Linux (RTAI)
- Research Platform Development: Ability to develop and control robotic platform from mechanical design, electronic instrumentation, and control programming.
- Electronic design: analog and digital

BHUVANESWARI RAMACHANDRAN, Ph.D., MIEEE

Associate Professor,
Department of Electrical and Computer Engineering,
University of West Florida
Pensacola, FL 32514, USA
Email: br@uwf.edu

Thesis Topic:

“Development of Indices for Voltage Stability Assessment for Large Scale Power Systems”

B.E., Electrical Engineering, Annamalai University, India 1992

Professional Profile

Teaching

More than 24 years of teaching undergraduate and graduate students in Power and Energy Engineering

Designed and developed experiments in student laboratories for 24 years.

Has developed course material for 7 undergraduate courses.

Introduced a specialization in “Sustainable Energy Systems” at UWF.

Experienced in teaching graduate courses in Power System Engineering and undergraduate courses in Electrical Engineering.

Research

Published more than 60 research papers in refereed journals and conferences.

Supervised 15 graduate students with 1 Ph.D. student.

More than 18 years of experience in Power, Energy and Smart Grid research.

Served as researcher for 3 years in Office of Naval Research projects and designed shipboard power systems for the US Navy.

Won several internal and external grants at UWF to teach and to pursue research involving undergraduate students.

Mentored more than 25 students in undergraduate research in Power Systems.

Supervised more than 100 capstone design projects for undergraduate students in electrical engineering

Service

Served as a judge for several local student design competitions and science fairs at UWF

Serving as Faculty Advisor for Society for Women Engineers at UWF

Reviewer for:

IEEE Transactions on Power Delivery
 International Journal of Electrical Power and Energy Systems
 IEEE Transactions on Magnetics.
 IEEE Transactions on Power Systems
 Energy Conversion and Management
 Expert Systems with Applications
 IEEE-IAS Power System Engineering Committee.
 International Journal of Energy Technology and Policy
 Book Chapters for Springer Publishers.

Other

Member of IEEE, PES and SWE.

Listed in Who's Who in Asia, Who's Who in Science and Engineering, Who's Who in Women in Engineering for several years

Employment History

Associate Professor (Tenured), University of West Florida	(8/27/2017-)
Assistant Professor, University of West Florida	(08/2012- 8/2017)
Adjunct Assistant Professor, College of Engineering, FSU	(08/2011-07/2012)
Assistant Scholar Scientist, Center for Advanced Power System, FSU	(08/2010-07/2012)
Associate Professor, Annamalai University, India	(05/2009-06/2010)
Postdoctoral Research Assistant, Center for Advanced Power System, FSU	(05/2009-7/2010)
Assistant Professor, Annamalai University, India	(07/2007-04/2009)
Lecturer, Annamalai University, India	(02/1994-06/2007))
Part Time Lecturer, Srinivasa Subburaya Polytechnic	(9/1992 - 01/1994)

Expertise

Teaching

Graduate courses at Annamalai University, India
 Power System Economics and Control
 Power System Dynamics and Stability
 Power System State Estimation
 Graduate Course at Florida State University, USA
 Design and Analysis of Control Systems- EML-4312/531
 Undergraduate courses at Annamalai University, India
 Linear and Non-linear Control Systems
 Advanced Control Systems
 Fundamentals of Power Systems
 Computer Aided Power System Analysis

Advanced Computer Aided Power System Analysis
Power System Protection
Electrical Machinery
Advanced Electric Machinery
Undergraduate course at Florida State University
Fundamentals of Power EEL-3216, Fall'11
Undergraduate courses at University of West Florida
Electric Energy Engineering EEL 3211
Electric Energy Engineering Laboratory EEL3211L
Circuits-II EEL 3112
Electric Circuits Laboratory EEL 3117L
Electric Energy Systems-1 EEL 4213
Linear Control Systems- EEL 4657

Continuing education courses for Gulf Power Engineers

Distribution Power Quality
Distribution Voltage Regulation
Electric Motors
Fundamentals of Power Distribution
Three Phase Power
Basic Power System Protection

Research

Application of statistical forecasting techniques for power and energy management in a smart grid.
Power system restructuring and electricity market
Smart Grid, Micro grid, and grid integration of PHEVs and other technologies
Distributed generation and renewable energy sources integration in power systems o Power systems modeling and simulation
Reliability/security of power systems
State estimation and placement of phasor measurement units in power systems o Operation, control and energy management of electric shipboard power system.

Scholarly Activities

Refereed Journal Articles

- 1 S.Subramanian and R.Bhuvaneswari, "Review on design of induction motor", Electrical Review, vol. XII, No5, May 2005, pp. 22-27.
- 2 R.Bhuvaneswari and S.Subramanian, "Optimization of three phase induction motor design using simulated annealing algorithm", Electric Power Components and Systems, Vol. 33,

No.9, Sept. 2005, pp. 947-956.

3 S.Subramanian and R.Bhuvaneswari, "Multiobjective optimal design of three-phase induction motor using simulated annealing technique", The International Journal of Computation and Mathematics in Electrical and Electronics Engineering- COMPEL, Vol.24, No.4, Nov 2005, pp 1415-1427.

4 S.Subramanian and R.Bhuvaneswari, "Optimization of single-phase induction motor design using evolutionary programming", Journal of Systems Science and Engineering-PARITANTRA, Nov/Dec 2005, pp 30-37.

5 S.Subramanian and R.Bhuvaneswari, "Comparison of modern optimization techniques with applications to single-phase induction motor design", Electric Power Components and Systems, Vol.34, No. 5, May 2006, pp 497-507.

6 S.Subramanian and R.Bhuvaneswari, "Evolutionary programming based determination of induction motor efficiency", Electric Power Components and Systems, Vol. 34, No.5, May 2006, pp 565-576.

7 S.Subramanian and R.Bhuvaneswari, "Improved fast evolutionary program for optimum design of power transformer", The International Journal of Computation and Mathematics in Electrical and Electronics Engineering- COMPEL, Vol.25, No.4, Nov 2006, pp. 995-1006 .

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- 22 Bhuvaneswari Ramachandran and Michael Vasek, “Feasibility for the Development of Campus Micro-grid at the University of West Florida”, 2013 Florida Energy Summit, Orlando, Oct 14-15, 2013.
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- 24 Xiaojun Geng, Pramod Khargonekar, and Bhuvaneswari Ramachandran, “Receding Horizon Power Management for Electrical Vehicle Charging”, Clemson University Power Systems Conference, Clemson, March 11-14, 2014.
- 25 Bhuvaneswari Ramachandran and Alamelu Ramanathan, “Decentralized Demand Side

Management and Control of PEVs Connected to a Smart Grid”, Clemson University Power Systems Conference, March 10-13, 2015.

26 Jessica Whitten, Bhuvana Ramachandran, “Modeling of Uncertainties in Electric Vehicle Charging and its Impact on the Electric Grid”, International Symposium on Advances in Power and Energy Systems, APES 2015, October 26 – 27, 2015, Marina del Rey, USA.

27 Fernanda Rabelo Souza and Bhuvana Ramachandran, “Dissolved Gas Analysis to Identify Faults and Improve Reliability in Transformers using Support Vector Machines”, Accepted for presentation at Power Systems Conference, Clemson State University, March 8-11, 2016.

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29 Armand Keyhani and Bhuvaneswari Ramachandran, "Real-time Simulation of Demand Side Management and Vehicle to Grid Power Flow in a Smart Distribution Grid", Electro Information Technology, Nebraska, May 14-17, 2017.

30 Eric Collins and Bhuvaneswari Ramachandran, " Power management in a microgrid using teaching learning based optimization algorithm", IEEE SoutheastCon 2017 held in Charlotte during March 30- April 2, 2017.

31 Eric Collins and Bhuvaneswari Ramachandran, "The implication of renewables, BES and EVs in a sustainable power system", IEEE SoutheastCon 2017 ,Charlotte during March 30-April 2, 2017.

32 Zach Pannell, Dr.Bhuvaneswari Ramachandran and Dr.Dallas Snider, “Machine Learning Approach to Solving the Transient Stability Assessment Problem”, Presented at Texas Power and Energy Conference , University of Texas, Austin during , Feb 8-9, 2018.

33 Tyler Stevens, Dr.Bhuvaneswari Ramachandran and Dr. Achraf Cohen, “ Economic Dispatch of a Smart Grid Considering Uncertainties Associated with Renewable Energy Sources and Loads”, Accepted for Presentation at National Conference on Undergraduate Research to be held in at the University of Central Oklahoma from April 4-7, 2018 in Edmond, OK.

34 Tyler Stevens, Dr.Bhuvaneswari Ramachandran and Dr. Achraf Cohen, “ Economic Dispatch of a Micro Grid Considering Uncertainties Associated with Renewable Energy Sources and Loads”, Accepted for Presentation at IEEE SouthEastCon to be held in Tampa during 19 Apr - 22 Apr 2018.

35 Alex Brock, Bhuvana Ramachandran, Caroline John and Ezhil Kalaimannan, “Cybersecurity of a Power System under Simultaneous Attacks”. Southeast Symposium on Contemporary Engineering Topics" (SSCET) on Aug 3, 2018 at UAH, Huntsville, AL. Book Chapter Published

1) Bhuvaneswari Ramachandran and Xiaojun Geng “Smart Coordination Approach for Power Management and Loss Minimization in Distribution Networks with PEV Penetration Based on Real Time Pricing” in the Book ‘Plug In Electric Vehicles in Smart Grids” by Springer Publishers, 2015.

Accomplishments, Awards and Honors

1. Awarded BOYSCAST (Better Opportunities for Young Scientists in Chosen Areas of Science & Technology) fellowship for the year 2009-2010 by the Department of Science & Technology (DST), Government of India to visit institutions abroad, interact with scientists/technologists there, get trained in latest research techniques and conduct R&D in

specially chosen frontline areas of science & technology.

2. Students I mentored were awarded Second Prize in Maximum Altitude category in the 2013-2014 NASA Hybrid Rocket Competition held in Bunnell, FL in April 2014. Please see the website below.

<http://news.uwf.edu/index.php/2014/05/uwf-engineering-students-earn-place-nasa-hybrid-rocket-competition/>

The same students along with few more students participated again in the 2014-15 NASA-Hybrid Rocket competition held in Bunnell, FL in April 2015 and won 3rd prize in Maximum altitude category and 2nd prize in closest to 2000 ft category. Please refer to

<http://floridaspacegrant.org/programs/hybrid-motor-rocket-competition/>.

In 2015-16, the students I mentored won the First place in both categories of “Max altitude” and “Closest to 2000 ft.” at the NASA Hybrid Rocket Competition.

3. Initiated a collaborative research and study abroad partnership between UWF and INSA, Lyon, France. Responsible for striking up a conversation between the two universities for bilateral agreement and had the opportunity to visit INSA, Lyon, France for a site visit during summer 2014. The bilateral agreement was signed in Dec 2014 and students from UWF have travelled to France for 1 year of studies before graduating from UWF.

Professional Affiliations

Institute of Electrical and Electronic Engineers (IEEE)

Power Engineering Society

3POWERGLOBE

IEEE Industrial Electronics Society

Electric Ship Research Development Consortium (ESRDC)

Society of Women Engineers- Faculty Advisor

Past Thesis and Dissertation Supervision Dissertation Topics completed

V.P.Sakthivel, Ph.D.Candidate: “Design and parameter estimation of Electrical machines using new heuristic optimization techniques” Dec 2011.

Graduate Thesis Completed

L.Hemalatha, “Fuzzy Logic Based Design Optimization of Single Phase Induction Motor” 2003.

J. Margaret Jennifer, “Simulate Annealing Based Design of Efficient Induction Motor”, 2003.

S.S.Jeyanthi, “Economic Load Dispatch Combined With a Modified Distributed Power Flow Analysis” 2006.

S.S.Jeyanthi, “A Novel Power Flow Analysis Technique Combined With Economic Load Dispatch”, 2006.

R.Beula, “Particle Swarm Optimization Based Constrained Economic Load Dispatch”, 2006.

R.Beula, “Improved Particle Swarm Optimization Based Constrained Economic Load Dispatch”, 2006.

B.Arulmadhu, “A Novel State Estimation Based on Minimum Errors Between Measurements Using Ant Colony Optimization Technique”, 2006.

B.Arulmadhu, “Bad Data Analysis for ANT Colony Optimization Based State Estimation”,

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A.Sudha, “Fast Method For Transient Stability Assessment of Multi-Machine Power System Using Total Energy Concept”, 2007.

A.Sudha, “A Back- Propagation Artificial Neural Network with Enhanced Feature Selection For Power System Transient Stability Assessment”, 2008.

R.Geetha, “Artificial Immunization Algorithm for Solving Economic Load Dispatch”, 2008.

R.Geetha, “Artificial Immune System Based Combined Economic and Emission Dispatch”, 2008.

R.Jeyapriyadharshini, “Optimal Meter Placement Using Particle Swarm Optimization to Maintain Network Observability”, 2008.

R.Jeyapriyadharshini, “Optimal meter placement using particle swarm optimization to maintain network observability against contingencies”, 2009.

Qunying Shen, “A Distributed Control Approach for Power and Energy Management in a Notional Shipboard Power System”. FSU, 2012.

Internal and External Grants Pursued and Received

Office of Undergraduate Research Awards	Awarded	Yes	\$2000.00
Scholarly and Creative Activities Committee Award	Awarded	Yes	\$2000.00
NSF- International Research Experience for Students (IRES)		Yes	\$249,323.00
NSA Hybrid Rocket Competition-2014	Awarded	Yes	\$1200.00
RAC Funding 2013	Awarded	No	\$1245.00
FESC Education Grant	Awarded	No	\$92,169
RAC Funding 2014	Awarded	No	\$1692.00
Faculty Internationalization Grant	Awarded	No	\$4000.00
NASA Hybrid Rocket Competition- 2015	Awarded	Yes	\$1000.00
Instructional Technology Enhancement Project	Awarded	No	\$57,656.00
FLDOE-MSP	Applied as Co-PI	No	\$1, 249,501
SEL- Equipment Proposal	Awarded	No	\$18,000.00
CSEH-Faculty Catalyst Initiative Award	Awarded	Yes	\$2880.00
NASA Hybrid Rocket Competition -2016	Awarded	Yes	\$1250
CSEH- 2015 Summer Research Fellowship Program	Awarded	Yes	\$7500.00
HMCSE SURP 2016	Awarded	Yes	\$7500
NSF-EPCN 2016	Applied as PI	No	\$303, 610
HMCSE SURP 2017	Awarded	Yes	\$7500
NSF-EPCN 2017	Applied as PI	No	\$239,647
Total Awarded			\$207,592

Appendix E

University of West Florida Graduate Admissions and Graduation Requirements

UNIVERSITY OF WEST FLORIDA GRADUATE 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 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.