Women’s Engineering Institute (WEI) at Embry-Riddle Aeronautical University

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Dr. Shafagh Jafer is an Assistant Professor of Software Engineering at Embry-Riddle Aeronautical University, FL. She received her Ph.D. Degree in Computer Engineering from Carleton University, Ottawa, Canada in 2011 where she was awarded the Senate Medal for Outstanding Academic Achievement for her doctoral thesis on large-scale parallel simulation. For the past eight years she has been conducting research on discrete-event modeling and simulation, distributed and parallel simulation, software engineering, and integrated modeling environments. Dr. Jafer has been previously involved in projects dealing with modeling and simulation of natural disasters as well as emergency response to natural fire. She is currently conducting research in disaster engineering, modeling and simulation in aviation, and large-scale NAS (National Airspace System) data analysis.

Dr. Jafer has served as committee member and organizer of the Annual Spring Simulation conference, and she is now the co-chair of the Annual Simulation Symposium (ANSS). She will be serving as the Proceedings Chair of the Spring Simulation 2015 conference. Dr. Jafer values and promotes women in Science and Technology and is an active member of the SWE and IEEE WIE. She is currently leading the Women’s Engineering Institute initiative at Embry-Riddle.
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Overview

Embry-Riddle Aeronautical University’s College of Engineering has initiated a Women’s Engineering Institute, which will be a center of excellence on the Daytona Beach Campus to recruit, retain and serve female engineering undergraduate and graduate students. Part of the College’s strategic plan, the WEI will support the College’s goal to increase female enrollment to a minimum of 20% female students by 2016. The University has already committed significant effort and resources to recruiting and retaining female engineering students. The Engineering Fundamentals Department initiated a 2+2 Women in Engineering Mentoring Program in fall 2006, which later became known as the FIRST Program (Female Initiatives: Reaching Success Together). The FIRST program has been a success and the university’s female retention numbers are increasing. But the College of Engineering numbers are stagnant and further assistance, mentoring and academic and social programming is needed to attract more female students to engineering.

Tackling such challenges, WEI will provide female students with unique mentorship and networking opportunities and connect them with industry partners looking to hire new female graduates. WEI will be the first place that new incoming female students go when they join the Embry-Riddle Aeronautical University engineering community and will serve as a hub for female engineering students to network, socialize and engage in clubs, competitions and projects. It will become the “go-to” place for female students by offering advising, mentorship, tutoring, counseling and sisterhood opportunities. Participation will also be encouraged in the Women’s Ambassador Program, which has a team of women students working with the Admissions Department to provide outreach services and offer guidance and information to females exploring an education at Embry-Riddle. At least 25% of scholarships, graduate student assistantships and graduate research assistantships will also be designated for female engineering students. Moreover, increasing the number of female engineering faculty will be supported with plans to create hiring process guidelines for chairs and committees with a goal of hiring six additional female tenure-track faculty by 2016. The institute would also provide a central space for research opportunities, career/internship/co-op positions and professional conferences and competitions across the engineering departments. WEI will establish connections and exchange opportunities with other professional and academic organizations, like the Institute of Electrical and Electronics Engineers (IEEE) and Society of Women Engineers (SWE). The center would also host workshops, guest lecturers, conferences, research presentations and poster sessions, plus encourage and financially support on-campus women’s engineering clubs and teams. STEM outreach to local elementary, middle and high school female students would also be a major priority for the institute. Female engineering students at Embry-Riddle Aeronautical University can partner with local elementary, middle school, and high schools to create female STEM competition teams and mentor girls who are interested in the STEM fields. Using the above strategies, the WEI will enhance and maintain our female engineering student body through exciting and encouraging activities to prepare highly qualified and exceptional young women for a career in engineering or to continue their studies in graduate school.
This paper describes the WEI initiative and provides the goals, objectives, and activities of the center. The information provided in this article will guide other universities in establishing similar centers to address diversity and minority challenges particularly facing STEM fields and STEM granting colleges.

**Services Offered by WEI**

Research shows that offering networking, mentoring, tutoring and other support activities has the largest impact on retention for all students, but especially females [1]. The Women’s Engineering Institute will provide academic, career, social and extracurricular activities, plus research and professional development opportunities for women in engineering. The center will not only focus on recruitment and retention, but also on providing excellent financial and professional development opportunities to all female engineering students at Embry-Riddle. A number of other universities have already established similar centers of excellence that have greatly benefitted their female students and faculties, e.g., the WiSE program at the University of Washington [2] and University of Iowa [3], the Advance initiative at Lehigh University [4]. Embry-Riddle Aeronautical University has already made considerable strides in recruiting and maintaining female students in engineering degrees. Research has shown women in STEM fields are better retained when they are involved in academic and professional activities [5, 6]. The institute will also help women engineering students to recognize their abilities and nourish their social and intellectual skills through offerings of conference and workshop attendance, technical and social presentations, as well as research and outreach activities. Additionally, the institute will increase the visibility and recognition of female engineering students and faculty members and tie their activities to other national and international professional women organizations.

Embry-Riddle Aeronautical University’s current efforts to recruit and maintain female students in engineering degrees are supported by ongoing campus programs. The Women’s Engineering Institute will connect our female engineering students with a wide range of existing campus support services and related entities such as:

- Career and counseling services
- Industry expo events
- Undergraduate and graduate research grants to support project expenses and conference/competition attendance
- Institute of Electrical and Electronics Engineers (IEEE), American Society of Mechanical Engineers (ASME), American Institute of Aeronautics and Astronautics (AIAA), American Society of Civil Engineers (ASCE), and the Society of Women Engineers (SWE) chapters at Embry-Riddle Aeronautical University
- The FIRST Program (Female Initiatives: Reaching Success Together)
- Women’s sports teams
- Women’s Baja Team
WEI Organizational Structure

Embry-Riddle Aeronautical University consists of five engineering programs: Aerospace Engineering (AE); Engineering Fundamentals (EF); Civil Engineering (CivilE); Electrical, Computer, Software, and Systems Engineering (EE/CE/SE/SysE); and Mechanical Engineering (ME). WEI will encapsulate all women activities supported by these five engineering departments. Figure 1 provides the organizational chart of WEI.

![WEI Organizational Chart]

Figure 1. WEI Organizational Chart

Implementation Plan and Schedule

The director of Women’s Engineering Institute at Embry-Riddle, Dr. Embry-Riddle Aeronautical University, has started the effort to initiate the proposed center. The activities under development are divided between Fall/Spring terms. It is projected that the Women’s Engineering Institute will officially open in Spring 2016. Below is the detailed implementation plan and event/program schedules.

Spring 2015 (January – May)
- Conduct meetings and invite representative faculty across engineering programs to present the center’s goals and activities
- Define organizational structure and guidelines for the institute
- Develop the WEI webpage
- Identify women-related activities, clubs, competitions, services available across the campus and outline them under various categories on the WEI webpage
- Identify female faculty advisors and mentors from every engineering department to join the Faculty body of the institute
- Organizing computing and other engineering summer camps for middle school and high school girls

Summer 2015 (June – August)
- Locate office space in one of the buildings at the college of engineering
- Provide guidelines and support to hire female faculty
- Implement two summer camps: Animation and Computer Science for middle school girls, Robotics, Web Development, Mobile App, and Virtual Reality (one week residential camp) for high school girls
- Identify workshops and hands-on sessions (both technical and social topics)
- Outreach activities: public presentations, visits to local middle and high schools

Fall 2015 (September – December)
- Recruit female students (volunteer/hourly paid) to initiate the effort and join the institute
- Advertising and publicity for the institute (within Embry-Riddle, local newspapers, on the web, sending emails to local high schools and regional colleges/universities)
- Invite guest lecturers and speakers for talk-nights events
- Communication with industry partners to provide internship and coop opportunities targeting undergraduate/graduate female students
- Identify scholarships for female students through industry and private donors

WEI Estimated Expenses

The office of the Dean of Engineering at Embry-Riddle Aeronautical University will be providing $10,000 to support the following activities:

- Designate an office/meeting space for the Women’s Engineering Institute
- Provide a salary for student assistants working at the WEI
- Provide funding to assist female engineering students attend conferences in their field
- Sponsor guest lectures, social gatherings, information sessions, research and presentation events, technical and communication workshops, etc.
- Provide funding to assist female engineering students with membership fees to international and national engineering organizations
- Allocate $5,000 additional merit scholarship for every qualified female applicant

The additional funding have been already requested from two external agencies (pending results) to help cover the following costs:

- Travel: $2,500 to assist students attending conferences to present their research
- Student Salary: $2,000 for student assistants working at the WEI
- Scholarships: $2,500 to fund five scholarships ($500 each) for women engineering students with high academic achievement and financial need
- Workshop: $2,000 to host technical or soft skills workshop on-campus
- Outreach activities: $1,000
Evaluation Plan

Assessment of the Women’s Engineering Institute will be made by monitoring the retention and enrollment numbers of female engineering students. The Admissions Office will provide statistical data to reflect the impact of the institute on retention and recruitment. The Student Records office will also provide reports to analyze academic performance of female students prior to and after joining the institute. The number of female students who were granted scholarships, internship opportunities, and job placements will also indicate the success of the institute.

Furthermore, as one of the goals of the institute, the number of female faculty hired throughout the year will also be analyzed. The number of summer camps attendees will demonstrate the effectiveness of the institute’s existence and its publicity on the local population. To get feedback from female students, surveys will be conducted at the end of each semester with multiple choice questions asking participants to evaluate the institute’s activities and provide insights about further activities that can be undertaken by the institute.

Sustainability Plan

Once officially opened, the Women’s Engineering Institute will continue its operation by serving our female undergraduate and graduate students and faculty members across the college of engineering. Thanks to the support from the Dean of Engineering and the Industry Advisory Board, we are expecting a year-by-year growth of the center’s activities and accomplishments. The institute’s webpage will provide an excellent outreach environment to let outsiders be aware of its activities and attract the public’s attention. We plan to apply for NSF STEM and ADVANCE grants to further support the WEI.

Conclusion

The Women’s Engineering Institute initiative at Embry-Riddle Aeronautical University aims at providing a center of excellence to all female students and faculty in the all engineering disciplines offered on campus. This paper provided a short overview of this initiative by highlighting the mission, goals, services offered, estimated budget, and planned activities of the WEI. Once the institute as officially opened, we will be publishing more details about its events and activities on the institute’s publicly available website. We hope that this paper and future documents will provide guidance to other academic institutions to in initiating and operating similar centers to support the female academic population in the engineering discipline.

References:


[3] WiSE at University of Iowa, Available at: http://www.uiowa.edu/wise/

[4] Advance at Lehigh University, Available at: https://advance.cc.lehigh.edu/
