



## **Women and minority faculty in science, technology, engineering and mathematics (STEM)**



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**A project to increase the number of women and minority faculty in science, technology, engineering and mathematics (STEM) is detailed here by the Office to Advance Women, Equity & Diversity (AWED)**

Florida International University (FIU) is a Hispanic- and Minority-serving public university in Miami, Florida, that in 2016 launched FIU ADVANCE, an innovative project intended to increase the number of women and minority faculty in science, technology, engineering and mathematics (STEM). FIU, founded in 1965, serves 56,000 students, 61% of whom are Hispanic and 20% that are from other underrepresented groups. But similar to other universities, that diversity is not always reflected at the faculty level, especially in STEM fields.

FIU ADVANCE is supported by a five-year \$3.2 million Institutional Transformation grant awarded by the [National Science Foundation](#) (NSF) for FIU to develop innovative organisational change strategies to produce comprehensive change within an academic institution across all STEM disciplines. It is aimed specifically at developing strategies to increase the number of women and minority professors in STEM and the social and behavioural sciences at the University.

FIU ADVANCE follows FIU's successful implementation of the NSF-Partnership for Adaptation, Implementation and Dissemination (PAID) grant: Awareness of, Commitment to and Empowerment (ACE) of Women Scientists at FIU from 2011-2016. In partnership with the University of Michigan, ACE was designed to facilitate the hiring, retention and promotion of women in

science and mathematics. Suzanna Rose, Associate Provost, Office to Advance Women, Equity & Diversity and Yesim Darici, Assistant Provost, STEM, Director of Women's and Gender Studies and physics professor, saw a need for programmes that fostered a sense of community among women faculty members and addressed implicit bias when dealing with diversity and inclusion.

The ACE five-year intervention project was very successful. FIU increased the number of tenure-line women faculty in STEM from 11% in 2011 to 17% by 2016. Additionally, several programmes became institutionalised at FIU, such as STRIDE (Strategies and Tactics for Recruiting to Improve Diversity and Excellence) workshops, which educate faculty about best practices for hiring faculty, and the Women Faculty Leadership Institute, an annual one day event that provides strategies for career development and confidence-building techniques to empower women. After the grant ended, there was an increasing recognition among FIU's top administrators that having a qualified, diverse faculty would attract more women and underrepresented minorities to the STEM professoriate, have a positive impact on student success and better serve its diverse student body as well as the South Florida community.

Building upon the outcomes of the ACE project, FIU ADVANCE is guided by four objectives. First, to attract, recruit, retain and promote more women STEM faculty, particularly underrepresented minority (URM) women, to better reflect the demographics of the FIU student body. Second, to educate faculty about gender-by-ethnic biases and microclimates that affect the advancement of women. Third, to move faculty from insight to action to promote gender equity by developing and implementing an evidence-based intervention programme and a



university-wide diversity, inclusion and excellence plan. Fourth, to develop the ADVANCE Florida Network, a joint steering committee and seminar series for women STEM faculty and postdoctoral fellows comprised of the Florida metropolitan research universities of FIU, the University of Central Florida and the University of South Florida.

FIU ADVANCE's proposed activities are intended to create, through the process of intervention and subsequent diffusion, a faculty-based peer-social system that acts proactively to advance women faculty within STEM, as well as the larger FIU and Advance Florida Network communities.

Three innovative FIU ADVANCE projects focus on promoting behavioural change to create a more inclusive climate: the Microclimate project, the Bystander Leadership Program and AWED Theater. Engaging people in new behaviours may be influential in changing their attitudes. Having participants adopt new behaviours in a peer-group setting, even temporarily, creates a climate of change. If early adopters of the new behaviours are

enthusiastic, they further influence others to engage in the new behaviours. By engaging a significant percentage of key faculty to be adopters or "influencers," it is expected that the rate of adoption will accelerate.

The Microclimate project is designed as both an ADVANCE project and as a research project to explore the complexity of how a multiethnic cultural climate within FIU STEM departments affects the recruitment and advancement of women in STEM, particularly Hispanic-American and African-American women faculty. The term "microclimate" refers to local social climates within a department that may differ from the larger organisational climate. The Microclimate project explores how the demographics of specific departments might affect collegial friendship networks, departmental politics and hiring and retention of women.

The Microclimate project centres on intersectionality, which pertains to the interconnections of gender, race, class and cultural identity as they apply to a given individual or group and the





overlapping and interdependent systems of advantage or disadvantage, they create. An intersectional approach lends itself to the study of micro-inequities and biases that are so woven into the fabric of social life they have become invisible to most.

Much of what is known about intersectionality is based on the experience of URM women in STEM departments with a predominantly white men faculty. However, university departments are increasingly diverse and international in their faculty composition. The cultural diversity of STEM faculty is critical for innovation, creativity and discovery, but at the same time adds to the complexity of stereotypes and biases that women and underrepresented faculty experience. This means new approaches are required to educate a globally multicultural male faculty about bias and climate issues affecting STEM URM women.

The Microclimate project introduced an innovation to the study of intersectionality by shifting focus to the study of the intersectionalities of the dominant

(male) group. Understanding more about men's intersectional identities, such as those of Asian or Middle Eastern men in STEM, may be critical in developing effective strategies for advancing women of colour in STEM. For example, a foreign-born male professor may be disadvantaged by his out-group status relative to the predominantly U.S. born white professoriate at most universities but advantaged by his in-group status within a predominantly same-nationality department. This may lead to strong preferences to maintain one's same-nationality and gender as an in-group within the department.

The Microclimate project thus explored the intersectionality of men STEM faculty, specifically how nationality, gender and race stereotypes might make departmental microclimates chilly for American-born URM women. Through interviews and focus groups, personal stories were revealed to show patterns of connections, influence, information flow and the exchange of resources that hamper the advancement of women and URM women in STEM. These stories have a lot in common



with what previous research uncovered about the experience of women, but the familiar setting of them rings true to the participating FIU faculty. These personal stories were adapted as case studies that were used for the instructional content (case studies, theatre sketches and interactive scenarios) of the Bystander Leadership Program.

The Bystander Leadership Program is the signature programme of FIU ADVANCE, as well as the second behavioural change programme. It brings together elements of the Microclimate project findings, interactive theatre and behavioural skills training within an interactive one-day workshop for small groups of faculty members. The programme is facilitated by senior faculty members. Bystander's goal is to develop a social system at FIU that supports and institutionalises positive change among tenure-line faculty in three key areas: demonstrating greater appreciation for diversity and a reduction in prejudicial attitudes, greater knowledge of and confidence in using prosocial intervention skills and strategies and increasing diversity-affirming behaviours.

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The Bystander Leadership Program was specifically designed to address concerns that faculty expressed during the ACE project. Many faculty members who endorsed the grant's goals expressed frustration that their newfound awareness about gender and race bias did not prepare them to take action. They reported that they did not know what to do when faced with departmental practices or colleagues that inadvertently undervalued or marginalised women or URM faculty. This suggested that behavioural





skills training should be emphasised to provide both education and actual practice in implementing new responses to a variety of situations.

The Bystander Leadership Program, therefore, not only raises awareness about the interplay between power, privilege and bias often experienced by women and minorities but also provides practice in using a toolkit of intervention responses and actions in response to situations of bias. Faculty participants can thus move from “insight” to “action” when dealing with either observed or anticipated instances of gender and race bias and discrimination among faculty.

One of the first things addressed in the workshop is that implicit bias is not the same thing as explicit prejudice. In psychology, the old framework for discussing bias is that it is the result of conscious and deliberate thought. The new framework is that bias is a non-conscious and automatic reflection of cultural exposure. All cultures emphasise certain associations and those associations can become part of our psyche through repeated exposure,

whether we agree with them or not. Having unconscious biases does not mean someone is consciously prejudiced, but rather, that unconscious biases can affect our ability to evaluate others fairly or to notice and interpret situations that are unfavourable to women and minorities, even among people that overtly adhere to egalitarian beliefs.

Stephen Charman, Psychology Professor and Bystander Leadership Program Facilitator says that: “awareness of one’s own implicit biases is important because implicit biases affect even fair-minded, otherwise non-prejudiced people in ways that they simply don’t realise. This programme hopefully makes people aware of the existence of how these hidden biases may inadvertently affect the way that they evaluate and behave toward other people.”

Bystander attendees take an active role in intervention scenarios, allowing them to practice the skills taught during the workshop and develop the experience necessary to engage in real-world situations. For example, after a skit is performed,

faculty members must think about the best way to respond and take turns entering the skit as a participant in order to practice their chosen method. This practice is a critical part of the programme, according to Rose. "In order for people to intervene in situations where gender, racial or other biases may be occurring, they must have the skill set and confidence that comes with experience," she says. "The Bystander Leadership Program places participants in different scenarios and experiments with different types of interventions so that they can be more effective at improving the climate in their department."

Early reports show the Bystander Leadership Program has been successful. The majority of participants whom complete surveys report that the workshop increased their confidence about using prosocial intervention skills and strategies and say they are more likely to intervene in similar situations of bias based on participation in the workshop.

FIU ADVANCE's third behavioural change project, AWED Theater, supports ADVANCE's unique and impactful approach to leadership education, departmental climate change and bias interventions through the development and presentation of research-based interactive theatre. AWED Theater, like the Bystander Leadership Program, also utilised Microclimate project results to develop new sketches focusing on culturally biased gender and race stereotypes that would be relevant to an international faculty body.

AWED Theater draws on principles of performance and research to explore bystander dynamics and mediation strategies in the context of micro (individual) and macro (departmental) communication, policies and processes. This sustainable, interactive, educational theatre programme is geared towards addressing the multicultural intersectional identities that are characteristic of FIU, Hispanic-serving institutions and the region as a whole.

The creative director of AWED Theater, Jeffrey Allen Steiger, was the founding director of the University of Michigan CRLT players, who pioneered the use of interactive theatre to illustrate gender dynamics in STEM for ADVANCE programmes. Steiger

developed three new performances that address the multicultural, gender and other biases identified from the Microclimate project. He directed an FIU-branded theatre performance at the American Society for Engineering Education for over two hundred engineering deans in 2018, which helped promote ADVANCE activities and raise awareness of diversity and inclusion issues in general. As a result, AWED Theater has been asked to perform for various institutions nationally, such as West Virginia University, FAMU-FSU College of Engineering and Oregon State University.

FIU ADVANCE has been effective in its first three years. To date, the number of tenure-line women in STEM at FIU has increased from 17% in 2016 to 29% in 2019, representing almost a doubling of women in STEM since the NSF programmes began in 2011. Furthermore, hundreds of faculty members have been engaged in the Bystander Leadership Program, STRIDE and other FIU ADVANCE programmes that reduce implicit bias, encourage the use of best practices in hiring and promotion and address departmental climate issues.

Why is FIU ADVANCE so important and such a necessary programme? Rose says, "It's simple. A diversity of perspectives enriches the sciences, mathematics and engineering and it makes these professionals more responsive to global needs. At a time when engineering and science are increasingly important to our economy and competitiveness, we need a diverse pool of science and engineering faculty - including women and minorities - to fuel our future." ■

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FIU ADVANCE is overseen by the Office to Advance Women, Equity & Diversity (AWED), which was established in 2016 to achieve and sustain faculty equity and diversity as an essential element of FIU's academic excellence. AWED develops and manages a wide range of programmes to promote faculty equity, diversity and inclusion, including workshops and training to improve faculty hiring and promotion processes, faculty mentoring and interdisciplinary networking. Other activities include strategic planning for salary equity, policy analysis and development and other initiatives that support faculty diversity.



Suzanna Rose is Founding Associate Provost for the Office to Advance Women, Equity & Diversity and Professor of Psychology and Women's and Gender Studies at Florida International University and Lead Investigator for FIU's NSF ADVANCE Institutional Transformation grant. She has published extensively on issues related to gender, race and sexual orientation and has consulted with universities both nationally and internationally on strategies for recruiting and retaining women faculty in science and engineering.

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