

May 23, 2011

**First Annual Report for NSF ADVANCE Program, October 1, 2010 to August 31, 2011**

**Lehigh ADVANCE: Building Community Beyond Academic Departments**

**Overarching Goals:**

- ✚ To transform Lehigh through improved recruitment, retention, career satisfaction, and leadership development of women faculty in the Sciences, Technology, Engineering, and Mathematics (STEM).
- ✚ To contribute to national discussion and social science scholarship by testing whether or not interdisciplinary organization can help to create a critical mass and more equitable work environments for women STEM faculty if facilitated by vigorous search strategies, proactive evaluation policies, and mentoring and networking programs geared specifically to interdisciplinary research and teaching.

**I. Significant Accomplishments: Project Activities**

**A. Leadership and Retention Interviews**

During February and March 2011, four members of the Lehigh ADVANCE grant team (ADVANCE Chairs Mooi Choo Chuah and Susan Szczepanski; Co-PIs Sibel Pamukcu and Jeff Sands) conducted Leadership and Retention Interviews. All tenured and pre-tenure women faculty in the natural sciences, engineering, and mathematics were invited to participate and almost all accepted. The interview questions and format were constructed with the guidance of the two social scientist Co-PIs (Diane Hyland and Jackie Krasas), who spent substantial time in consultation with and in the training of the interviewers and participated in coalescing and analyzing the results of the interviews. The one-hour interviews were held either in the faculty member's office or in the ADVANCE program office suite, at the preference of each interviewee. All interviewees were asked general questions about their perspectives on the landscape for women STEM faculty at Lehigh, specific current issues, opportunities and challenges moving forward, and insights they have gained from their own personal experiences at various stages of their careers. The overall results of the interviews will be used to help shape upcoming events, such as leadership development workshops, training for faculty mentors and evaluators such as promotion and tenure committees regarding interdisciplinary research and teaching, and continuing discussions of university policies and procedures. See the Appendix for a summary of the interview findings.

**B. Social Science Research: Gender and Interdisciplinarity**

The Social Science Research Team headed by Jackie Krasas and Diane Hyland has made significant progress on three initiatives. They received IRB approval to conduct focus groups with STEM faculty to expand on themes identified in the initial Leadership and Retention

Interviews. Four focus groups were conducted, each group with homogeneous participants: pre-tenure women in Natural Sciences and Engineering; tenured women in Natural Sciences and Engineering; pre-tenure and tenured women in Social and Behavioral Sciences; and pre-tenure (and recently promoted) men in Natural Sciences and Engineering. The group sessions were held during the week of May 9; they were recorded and will be transcribed. A preliminary summary of the findings is included in the Appendix. As in the case of the interviews, the results of these focus groups will be used to help shape upcoming events such as leadership development series, training for faculty mentors and evaluators, and continuing review/revision of university policies and procedures.

The Social Science Research Team also worked with M. Jean Russo, the Internal Evaluator, to design a combined survey instrument that included baseline climate measures as well as measures of interdisciplinary and collaborative research. IRB approval was received and the survey was distributed to all STEM faculty at Lehigh. The launch of the survey was preceded by a message from the Provost encouraging participation. The Social Science Research Team is currently using several channels to send reminder emails to increase participation: emails will be directly sent to all participants encouraging completion of the survey if they have not already done so; the Provost will send another message encouraging participation; and Department Chairs have been asked to reach out to department faculty and encourage participation. This survey instrument is included in the Appendix. Results from the survey will be used as a baseline and also to shape upcoming events such as leadership development series, training for faculty mentors and evaluators, and continuing review/revision of university policies and procedures. The Social Science Research Team will use the data in their research on gender and interdisciplinarity.

A parallel survey that focuses on interdisciplinary and collaborative research was also finalized for use with STEM faculty from nine peer institutions. IRB approval was obtained and the survey was sent to all women STEM faculty and a matched group of men STEM faculty at each of the nine institutions. Two reminder emails (about a week to 10 days apart) will be directly sent to all participants encouraging completion of the survey if they have not already done so.

### **C. Women's Studies Programs and Networking**

On February 25, 2011, Professor Susan Basow of Lafayette College presented a talk for women STEM faculty, department chairs, and members of promotion and tenure committees on Gender and Teaching Evaluations. Professor Basow's discussion of her research on the ways in which student perceptions and expectations result in differences in how they evaluate female and male STEM faculty generated a lively discussion among the twenty-one attendees. The Women's Studies Program followed up this event with a reading group luncheon discussion held on March 14, 2011, of Basow's book chapter, "Student Evaluations: The Role of Gender Bias and Teaching Styles." This reading group considered a number of ways to improve evaluation of teaching at Lehigh, including the recommendation to re-order the questions on student forms (place the global questions last so that students consider the various components of instruction before providing an overall assessment). The reading group also presented the opportunity for several ADVANCE Leadership Team (LT) members to discuss the broader goals of our program with non-STEM faculty, thus moving in the direction of institutional transformation.

#### **D. Women in Science and Engineering (WISE)**

The LU-WISE was formed and the first meeting took place as a luncheon on January 21, 2011. These luncheon meetings are planned to take place up to three times a semester, boasting the theme “Building Community by Sharing Research.” The first luncheon attracted eighteen out of thirty tenured, pre-tenure, and non-tenure track WISE faculty invited. It featured two speakers, icebreaker activities, and a feedback questionnaire. The feedback indicated that the meeting was successful in terms of getting STEM women faculty together to enjoy each other’s company while learning about their scholarship. They liked the luncheon and presentation setting, but would like a bit more time for questions and informal interaction. They also indicated that they would welcome postdoctoral fellows, and to a somewhat lesser degree, LVAIC STEM women faculty and women in industry.

We took this feedback into consideration for the second luncheon for Spring 2011 and planning for the next academic year. We will limit the first year (Spring and Fall 2011) WISE meetings to only LU-WISE and open them up gradually to external STEM women starting with the LVAIC faculty first, perhaps in Spring 2012. In order to nurture the community of WISE women at Lehigh and foster interdisciplinary collaboration across ranks, we have expanded the list of invitees to include women in postdoctoral and research scientist positions. The second LU-WISE luncheon, held on March 24, 2011, was attended by fourteen faculty and staff. The agenda included a research presentation by a member of the Computer Science and Engineering Department (consistent with our goal to promote collaboration) and an update on ADVANCE activities. This update provided an opportunity for feedback on several ideas including recruitment of male champions and composition of search committees. The group also considered the meaning of and metrics for institutional transformation.

Timing for the third luncheon meeting coincided with other activities of ADVANCE (i.e. leadership workshop) hence was not pursued for the month of May. Inevitably, there will be a long break of these gatherings in the summer months as most of the faculty will not be on campus. Finding new methods of keeping LU-WISE engaged during this first summer session may be challenging but the leadership team will explore the merits of electronic networking through a closed social network to keep exchange of ideas and communication continuing without a time break and to maintain the momentum and engagement of the faculty.

The Lehigh ADVANCE web site offers a clearly visible link to LU-WISE activities and resources, including the presentation slides of the LU-WISE luncheon speakers. Please see: <http://advance.cc.lehigh.edu/> .

Two members of LU-WISE participated in WIRES (Women's International Engineering Research Summit) and IWiN (Increasing Women in Neuroscience) in the months of March and April, both sponsored by NSF. The Rossin College of Engineering and Applied Science contributed \$3000 to leverage the NSF funding. The participants will be briefing the LU-WISE about the outcomes of these meetings and also make the various resources available at the web site.

### **E. Lehigh Open Access Database**

Co-PI Sibel Pamukcu, Project Manager Marci Levine, and Professor Tiffany Li (Electrical and Computer Engineering) have worked together in planning the collaborative WISE database. They are coordinating with the Office of Vice President and Associate Provost for Research and Graduate Studies to first launch Lehigh expert sites for women STEM faculty through the ADVANCE web site. It is anticipated that by having easy access to each others' expertise information the LU -WISE members will be encouraged to use the data base to search for collaborative opportunities. We envision that small collaborations may commence through sharing of laboratories and specialized equipment, by searching the data base by key words. The initial goal is to have a functioning database populated by the research profiles of LU-WISE women faculty on our website by September or October 2011.

Demonstrating the effectiveness of the Lehigh experts data base for connectivity and potential future collaborations provides an important opportunity for LU-WISE. We anticipate that if LU-WISE is able to demonstrate measurable activity through use of the database, it could constitute a model or best practice for the entire university and other institutions.

### **F. Leadership Development Series for Tenured Women STEM Faculty**

Since January 2011, Professor Tina Richardson, the Project Leader for the Leadership Series, has reviewed benchmarking research and national data related to faculty leadership development. This included reviewing information on ADVANCE Grant awardees in order to determine whether resources related to leadership initiatives at other institutions could inform the design and content of Lehigh's Leadership Series. The curricular components from national leadership programs such as Higher Education Resource Services (HERS), Executive Leadership for Academic Medicine (ELAM), Management and Leadership in Education (MLE) at Harvard, and American Council on Education Fellows Program was reviewed to determine if they could also inform the development of the Series. Additionally, the senior women STEM faculty members at Lehigh were surveyed regarding the leadership topics of interest that contribute significantly to their professional development.

Thus, data from multiple sources (i.e., research and faculty polls) was utilized to develop a preliminary framework and identify primary components of the Leadership Series which include a combination of lectures, workshops and provost projects related to strategic initiatives. A five year plan for the Leadership Series and an evaluative process for each of its components have been outlined in detail. An exciting opportunity exists to explore collaborations with the University of Wisconsin-Madison regarding ways in which some of the leadership sessions might be linked through technology to the benefit of both institutions. While coordinating the use of technology to collaborate on faculty development across institutions will create some challenges, we anticipate that it will also support and encourage interdisciplinary collaborations as well. Other challenges related to implementing the Series include coordinating events/activities with other ADVANCE campus activities and ensuring maximum participation for the moderate to small number of faculty being targeted for participation in the Series. In spite of these challenges, LU faculty members have invested in providing input regarding the planning process in anticipation of receiving professional development that will meet their needs.

The first event in the Series took place on May 18, 2011 with an afternoon workshop entitled “The Connective Leadership Styles of Faculty Leading Change.” The workshop was designed to help faculty gain insights into academic leadership, a range of achieving styles (leadership behaviors), and ways that individuals and institutions can develop effective leaders to transform the institution. Participant leadership aspirations and experiences alongside evaluative data were collected at the end of the session. Faculty support for the Leadership Series was strong and overall ratings of the session content and presenter effectiveness were very positive.

### **G. Recruitment Strategies**

We have initiated our grant program to provide funding for departments and interdisciplinary programs to bring women STEM postdoctoral scholars and advanced graduate students to campus to give a seminar about their research and network with Lehigh faculty with the goal of encouraging them to consider Lehigh when appropriate positions become available. We have recently expanded this program to permit departments/programs to bring in more senior STEM women faculty and researchers, as long as they are potential candidates for future Lehigh positions. This spring we provided funding to departments for three recruitment seminars.

PI Provost Patrick Farrell has appointed Dr. Henry Odi to serve as Vice Provost for Academic Diversity, whose primary duties include assisting departments to ensure that faculty search pools are diverse and to facilitate ongoing inclusive recruitment. Provost Farrell has also announced implementation of bridge funding for diverse and inclusive hiring, which will encourage departments to commit to year-round recruitment strategies that promise the greatest impact for increasing the numbers of faculty from under-represented groups, including women in science, mathematics, and engineering.

Jean Soderlund has begun working with Henry Odi to draft an online faculty recruitment toolkit for posting on the Lehigh ADVANCE website by early August, when the new recruiting season begins. They will use best practices from ADVANCE programs and other institutions, confer with members of the LT, and obtain feedback from key Lehigh constituencies. An important focus of the toolkit will be on interdisciplinary (or cluster) hiring. Henry Odi will attend our planned Leadership Team retreat on June 7, when we will build upon discussions with the Internal and External Advisory committees to develop strategies for working with search committees during the hiring cycle in AY 2011-12.

### **H. Interdisciplinary Networking Committees**

We will work with Deputy Provost for Faculty Affairs Vincent Munley to develop the interdisciplinary networking committees for new faculty entering August 2011. Their plan is to work with faculty to create the committees for new STEM faculty by mid-summer. Using data from the Leadership and Retention Interviews, focus groups, climate survey, and best practices from other ADVANCE programs, the LT will develop training programs for the interdisciplinary networking mentors. Marci Levine has conducted research on best practices, including available online toolkits. Susan Szczepanski and Diane Hyland are members of and thus can serve as liaisons with the University Faculty Mentoring Committee.

## **I. Review of Policy/ Guidelines on Evaluating Faculty involved in Interdisciplinary Research and Teaching**

While Lehigh recently revised its policies for faculty with formal joint appointments to align with academic best practices, changes should be considered for faculty with less formal interdisciplinary arrangements. Deputy Provost Munley has established and chairs the Interdisciplinary Policy/Guidelines Review Task Group, whose members include ADVANCE LT members Jeff Sands and Jean Soderlund as well as two tenured STEM women and several other faculty. The task group is examining the issues regarding faculty who participate in interdisciplinary research and teaching, whether with 1) a formal joint appointment (for which we have R&P); 2) a less formal interdisciplinary appointment that describes effort allocation in their appointment letter; or 3) appointment to a single department but participation in other programs or interdisciplinary work. The task group met with the department chairs at their May 2011 breakfast and held meetings with 1) pre-tenure and recently tenured faculty involved in interdisciplinary research and teaching and 2) center/program directors. ACE Fellow Elizabeth Hendrey completed a review of Lehigh's current policies in this area as well as practices at other institutions. Marci Levine followed up with further research on best practices. The task group will discuss its findings at a meeting this summer and make recommendations for policy/guidelines changes.

## **II. Project Management and Organization**

The Lehigh ADVANCE *Leadership Team (LT)* began meeting twice a month in August 2010, at the start of the Fall semester, when it became likely that we would receive the ADVANCE grant from the National Science Foundation and continued that schedule through the Fall semester. The LT initially included the PI, Provost Patrick Farrell; the four Co-PIs, Professors Diane Hyland, Jacqueline Krasas, Sibel Pamukcu, and Jeffrey Sands; project director Professor Jean Soderlund; internal evaluator M. Jean Russo; and Provost Office Administrative Director Patricia Mann. In November and December 2011 four additional members joined the group, creating a strong interdisciplinary team with significant relevant experience. Professor Tina Richardson of the College of Education leads our efforts in leadership development; Professors Susan Szczepanski of Mathematics and Mooi-Choo Chuah of Computer Science and Engineering serve as the ADVANCE Chairs for 2011; and Marci Levine, who holds a PhD in Nutritional Science from Purdue University and has six years experience working as staff scientist and project manager at the International Life Sciences Institute in Washington DC, was appointed as Project Manager.

In Spring 2011, the LT met approximately once a month in addition to the day-long EAC meeting and NSF site visit. We found biweekly group meetings less useful because each team member knew her or his specific responsibilities and was meeting in small task groups. We will hold a half-day retreat on June 7, 2011 (as suggested by the EAC) to assess accomplishments and challenges thus far, and to prepare activities and events for summer 2011 and AY 2011-12.

The *Social Science Research Team* is led by Co-PIs Diane Hyland and Jackie Krasas. Professor Tina Richardson, whose research has focused on underrepresentation of ethnic minorities in higher education, is collaborating with Hyland and Krasas. Wendy Abrantes joined Lehigh ADVANCE as a research scientist for the Social Science research in January 2011. She received her MA in Sociology from Lehigh University in 2007 and has served as evaluator for community organizations such as North Penn Legal Services and The Weller Health Center; as a research

assistant in Lehigh University's Center for Social Research; and as an adjunct instructor of Sociology and Anthropology for Northampton Community College.

We have reconstituted the *Internal Advisory Committee* to include only those members who are not also on the LT (Deans Anne Meltzer and S. David Wu; Vice President and Associate Provost for Research and Graduate Studies Alan Snyder; Deputy Provost for Faculty Affairs Vincent Munley; Professors Jennifer Swann and Tiffany Jing Li; Department Chairs D. Gary Harlow and Frank Pazzaglia). They met on May 11, 2011, when Tiffany Jing Li was selected as chair and Vincent Munley as secretary. They have agreed to meet twice a semester: once with IAC members only and once with the LT. They received our March 31, 2011 interim report in order to assess Lehigh ADVANCE progress and make recommendations to the LT prior to the June 7 retreat. The LT will share this Annual Report and results from our retreat with the IAC prior to our next joint meeting. Minutes from the May 11 IAC meeting are included in the Appendix.

The *External Advisory Committee* is chaired by Lehigh President Alice Gast and includes Susan Carlson, University of California; Jo Handelsman, Yale University; Jennifer Sheridan, University of Wisconsin; and Karen Thole, The Pennsylvania State University. All members were able to attend the January 28 meeting except for Professor Handelsman, who learned just prior to the meeting that she would receive a Presidential Award in mentoring. The EAC was very helpful in sharing their experience and providing advice in a wide variety of areas including this meeting's foci: designing workshops and recruitment. We are following their recommendation to hold a retreat in June 2011 to plan our activities for the AY 2011-12, and will look for ways to integrate Lehigh ADVANCE goals into current Lehigh activities. We will also keep their advice in mind as we develop the interdisciplinary networking committees for new faculty. The minutes of the January 28, 2011 EAC meeting are included in the Appendix.

The *Lehigh ADVANCE Administrative Team* focuses primarily on administrative, personnel, and budgetary issues for implementing the grant. The team includes project director Jean Soderlund; project manager Marci Levine; Robin Bodnar, who is the Assistant to the Provost for Budget Management; and Patricia Mann, Administrative Director of the Provost's Office.

In Fall 2010, Mann and Soderlund worked with Human Resources in conducting the search for the full-time project manager position and recruiting Marci Levine. Mann was instrumental in negotiating with Facilities Services for the Lehigh ADVANCE offices and with Levine has continued to work with Communications and Public Affairs on our various communications and branding needs. Bodnar has worked with Levine on purchasing equipment and supplies for the ADVANCE offices and helped Levine learn the various Lehigh budgetary processes. Bodnar, Levine, and Soderlund met with staff in the Office of Research and Sponsored Programs to clarify NSF and Lehigh requirements on cooperative agreement budgets. Lehigh ADVANCE benefitted greatly in start-up from the assistance of staff members in the Provost's Office. While Levine has assumed many of these responsibilities, she is a member of the Provost's Office staff and will continue to depend upon colleagues for information and negotiating with other University departments.

In Spring 2011, in addition to facilitating and contributing to the various project activities, events, and plans discussed above, Project Manager Marci Levine, in collaboration with Patricia

Mann and other LT members, has been active in a number of areas including: launching the fully operational website with additional main navigation and news/events features and continued maintenance (please see: <http://advance.cc.lehigh.edu/>); working with Human Resources to add ADVANCE awardee status to all Lehigh faculty openings announcements; deploying the logo on signage, correspondence, flyers, promotional items; branding the LU-WISE program through flyers and publicity; discussing communications planning with college and university communications staff; and drafting a communications plan.

The *Lehigh ADVANCE Program Offices* are located in Rooms 312, 314, and 316 of the new STEPS Building, which houses the Science, Technology, Environment, Policy, and Society Initiative; Earth and Environmental Sciences Department; Civil and Environmental Engineering Department; and undergraduate laboratories. We are very pleased with the space because Lehigh ADVANCE is thus situated at the heart of a major interdisciplinary initiative and in proximity to STEM faculty from both colleges. The location symbolizes Lehigh ADVANCE's role in institutional transformation. The rooms include project manager Marci Levine's office; a meeting room that accommodates small meetings, our resource library, and space for individual study; and the office of Wendy Abrantes, the social science research scientist.

### **Communications**

The Leadership Team worked with Lehigh's Office of Communications and Public Affairs to announce the NSF ADVANCE award early in October. The news release and web article resulted in follow-up interviews for front-page articles in the Lehigh Valley newspaper *Express-Times* and the Lehigh student newspaper *Brown & White*. Lehigh was also recognized by Harvard's Collaborative on Academic Careers in Higher Education as one of 32 colleges and universities "most friendly to junior faculty," as reported in the *Chronicle of Higher Education*.

We held our Kick-Off Luncheon with STEM women faculty, department chairs, and deans on Nov. 4, 2010, with attendance numbering thirty-one. Members of the Leadership Team made short presentations about the ADVANCE program and goals, then led small-group discussions at individual tables about challenges and strategies for transforming the institution. We received important feedback and were pleased with the attendance and enthusiasm of many participants.

Most recently the Lehigh Office of Communications and Public Affairs posted an article written by Marci Levine on Lehigh's home web page regarding Lehigh ADVANCE's progress and activities during the past six months with a link to our web site. Provost Farrell sent an email to all Lehigh faculty with a link to the article and encouraging STEM faculty to be involved in Lehigh ADVANCE. We received positive response from this communication, which was also closely timed with roll-out of the STEM faculty climate survey.

### **NSF ADVANCE Conference**

Five members of our Leadership Team—Patrick Farrell, Diane Hyland, Jackie Krasas, Sibel Pamukcu, and Jean Soderlund—attended the NSF ADVANCE AWIS Workshop in Alexandria Virginia on November 7-9, 2010. This was an excellent conference that gave us the opportunity to network, learn from the experience of other ADVANCE-IT programs, and hear discussions of topics as diverse as incivility in the classroom to peer mentoring. This meeting was very helpful as we implemented our programs.

## **Evaluation**

Please see Internal Evaluator M. Jean Russo's Annual Internal Evaluation Report in the Appendix.

## **Finances**

Lehigh ADVANCE expended \$78,580 through May 20, 2011, including costs for the May 18 leadership workshop that have not yet been posted. We expect to expend \$170,013 during the period May 21 to August 31, 2011, including salaries and benefits; commitment for adjunct salaries in Fall 2011; consultants; travel; office expenses and printing; food and room set-up for the June retreat and training workshops. The total estimated expenditures of \$248,593 as of August 31, 2011 constitute 82% of our direct costs budget for Year 1 (\$303,809). The primary reasons for this difference are the fact that Year 1 has been abbreviated by one month and we were not able to hire Marci Levine until late November 2010 and Wendy Abrantes until mid-January 2011 because our award was confirmed only ten days prior to the October 1, 2010 start date. If necessary we plan to request a no-cost extension at the end of the grant period.

## **Institutional Indicators Data Collection and Reporting**

Internal evaluator Jean Russo, project director Jean Soderlund, and project manager Marci Levine collaborated with the Provost's Office and Vice Provost for Institutional Research J. Gary Lutz to compile the required data for this first Annual Report. The institutional indicators data reported below provide a baseline for measuring progress in future years.

As recognized by NSF Program Director Kelly Mack in the First Year Site Visit Report: 1) at her suggestion we will not report on space allocation because of Lehigh's relatively small size; 2) at her suggestion we have included data on Psychology, Sociology/Anthropology, and Economics faculty as part of STEM; and 3) our data on faculty salaries are not disaggregated for cohorts of less than three.

As a result of #3, the Indicator 8 tables below do not present cross analyses of time in rank X gender X department. Thus differences in average salaries in the year in rank table may be explained by variation in salaries by field (in particular, lower average salaries in the social sciences than in the natural sciences and engineering). The differences in average salaries in the department table may be substantially explained by variation in rank and time in rank. The Provost and Deans have access to individual salary information and evaluate salary equity in regard to gender and other variables on an annual basis at the time faculty are reviewed and merit raises are determined.

# advance

ADVANCING WOMEN IN  
SCIENCE & ENGINEERING  
AT LEHIGH UNIVERSITY

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## Appendix A

## Institutional Indicators Tables

**Indicator 1: Tenured and Tenure Track Faculty**

<i>Academic Rank</i>	<b>Women</b>			<b>Men</b>			<b>Percent Women</b>		
	<i>Assistant</i>	<i>Associate</i>	<i>Professor</i>	<i>Assistant</i>	<i>Associate</i>	<i>Professor</i>	<i>Assistant</i>	<i>Associate</i>	<i>Professor</i>
<b>College of Arts &amp; Sciences</b>									
Biological Sciences	1	2	4	1	5	7	50.0%	28.6%	36.4%
Chemistry		1		4	3	5	0.0%	25.0%	0.0%
Earth & Environmental Sciences	1			2	4	7	33.3%	0.0%	0.0%
Mathematics		1		4	6	11	0.0%	14.3%	0.0%
Physics	1			1	2	13	50.0%	0.0%	0.0%
Psychology	3	2	3	2	3		60.0%	40.0%	100.0 %
Sociology & Anthropology	2	2	2	2	1	4	50.0%	66.7%	33.3%
<b>Rossin College of Engineering &amp; Applied Science</b>									
Chemical Engineering				4	1	10	0.0%	0.0%	0.0%
Civil & Environmental Engineering		1	1	2	3	7	0.0%	25.0%	12.5%
Computer Science & Engineering	1	1		3	6	6	25.0%	14.3%	0.0%
Elec & Comp Engr		3		3	3	9	0.0%	50.0%	0.0%
Industrial & Systems Engr		2		1	6	5	0.0%	25.0%	0.0%
Material Science & Engr	2		1		1	9	100.0 %	0.0%	10.0%
Mechanical Engr & Mechanics				2	6	16	0.0%	0.0%	0.0%
<b>College of Business &amp; Economics</b>									
Economics			3	3	1	7	0.0%	0.0%	30.0%

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## Institutional Indicators Tables

**Indicator 1a: Non-Tenure Track Faculty**

	<b>Women</b>	<b>Men</b>	<b>Percent Women</b>
<i>Academic Rank</i>	<i>Professors of Practice</i>		
<b>College of Arts &amp; Sciences</b>			
Biological Sciences			
Chemistry	1	1	50.0%
Earth & Environmental Sciences			
Mathematics			
Physics			
Psychology			
Sociology & Anthropology			
<b>Rossin College of Engineering &amp; Applied Science</b>			
Chemical Engineering	2		100.0%
Civil & Environmental Engineering	1		100.0%
Computer Science & Engineering	1		100.0%
Elec & Comp Engr		2	0.0%
Industrial & Systems Engr			
Material Science & Engr			
Mechanical Engr & Mechanics		3	0.0%
<b>College of Business &amp; Economics</b>			
Economics			

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## Institutional Indicators Tables

**Indicator 2: Tenure Outcomes; only departments with active cases are listed**

Department	Number submitted		Number granted	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
2007-2008				
Biological Sciences	1	0	0	0
Mathematics	0	1	0	1
Physics	0	1	0	1
Psychology	1	0	1	0
Soc/ Anthropology	1	0	1	0
Civil & Envirn. Eng.	0	1	0	1
Comp. Sci. & Eng.	0	1	0	0
Elect. & Comp Eng.	1	0	1	0

2008-2009				
Biological Sciences	1	1	1	1
Chemistry	0	1	0	1
Soc/ Anthropology	0	1	0	1
Comp. Sci. & Eng.	0	3	0	3
Elect. & Comp Eng.	2	2	2	2
Ind. & Syst. Eng.	0	1	0	1

2009-2010				
Biological Sciences	0	1	0	1
Earth & Env. Sci.	0	1	0	1
Mathematics	0	1	0	1
Physics	0	1	0	1
Chemical Eng.	0	1	0	1
Civil & Envirn. Eng.	1	0	1	0
Ind. & Syst. Eng.	1	1	1	1
Mech.Eng.&Mech.	0	1	0	1
Economics	0	1	0	0

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## Institutional Indicators Tables

**Indicator 3: Promotion from Assistant to Associate Professor; only departments with active cases are listed**

Department	Number submitted		Number successful	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
2007-2008				
Biological Sciences	1	0	0	0
Mathematics	0	1	0	1
Psychology	1	0	1	0
Soc/ Anthropology	1	0	1	0
Civil & Environ. Eng.	0	1	0	1
Comp. Sci. & Eng.	0	1	0	0
Elect. & Comp Eng.	1	0	1	0

2008-2009				
Biological Sciences	1	1	1	1
Chemistry	0	1	0	1
Soc/ Anthropology	0	1	0	1
Comp. Sci. & Eng.	0	3	0	3
Elect. & Comp Eng.	2	1	2	1
Ind. & Syst. Eng.	0	1	0	1

2009-2010				
Biological Sciences	0	1	0	1
Earth & Env. Sci.	0	1	0	1
Mathematics	0	1	0	1
Physics	0	1	0	1
Chemical Eng.	0	1	0	1
Civil & Environ. Eng.	1	0	1	0
Ind. & Syst. Eng.	1	1	1	1
Mech.Eng.&Mech.	0	1	0	1
Economics	0	1	0	0

## Appendix A

## Institutional Indicators Tables

**Indicator 3a: Promotion from Associate to Full Professor; only departments with active cases are listed**

Department	Number submitted		Number successful	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
2007-2008				
Biological Sciences	2	0	1	0
Physics	0	1	0	1
Chemical Eng.	0	1	0	1
2008-2009				
Psychology	1	0	1	0
Comp. Sci. & Eng.	0	2	0	1
Economics	1	1	1	1
2009-2010				
Biological Sciences	0	1	0	0
Physics	0	1	0	1
Comp. Sci. & Eng.	1	0	0	0
Materials Sci&Eng.	0	1	0	1
Economics	1	0	1	0

## Appendix A

## Institutional Indicators Tables

**Indicator 4: Tenured Associate Professors**

<i>Years in Rank</i>	<b>Women</b>						<b>Men</b>					
	<i>00 to 02</i>	<i>03 to 05</i>	<i>06 to 08</i>	<i>09 to 11</i>	<i>12 to 14</i>	<i>15 or more</i>	<i>00 to 02</i>	<i>03 to 05</i>	<i>06 to 08</i>	<i>09 to 11</i>	<i>12 to 14</i>	<i>15 or more</i>
<b>College of Arts &amp; Sciences</b>												
Biological Sciences	1					1	2	1	1			1
Chemistry						1	1					2
Earth & Environmental Sciences							1	1			1	1
Mathematics						1	1	1				4
Physics												1
Psychology		1				1			2			1
Sociology & Anthropology		1	1				1					
<b>Rossin College of Engineering &amp; Applied Science</b>												
Chemical Engineering							1					
Civil & Environmental Engineering	1							2				1
Computer Science & Engineering			1				3	2				1
Elec & Comp Engr	2	1					1					2
Industrial & Systems Engr	1						2	1				3
Material Science & Engr												
Mechanical Engr & Mechanics							1			1		3
<b>College of Business &amp; Economics</b>												
Economics												1

**Indicator 5: Voluntary non-retirement attrition; only departments with active cases are listed, AY 2009-2010\***

Department	Assistant Professor		Associate Professor	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
Biological Sciences	0	1	0	0
Earth & Env. Sci.	0	0	0	1
Psychology	1	0	0	0
Chemical Eng.	0	1	0	0
Civil & Environ. Eng.	0	0	0	1
Elect. & Comp Eng.	0	1	0	0

\*Except for retirements, no full professors departed from STEM departments during this period.

**Indicator 6: New hires who started during AY 2010-2011; only departments with active cases are listed\***

Department	Assistant Professor		Associate Professor	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
Biological Sciences	1	0	0	0
Mathematics	0	1	0	0
Psychology	1	0	0	0
Chemical Eng.	0	1	0	0
Civil & Environ. Eng.	0	1	0	0
Comp. Sci. & Eng.	0	1	0	0
Elect. & Comp Eng.	0	1	0	0
Ind. & Syst. Eng.	0	0	1	0
Mech.Eng. & Mech.	0	2	0	1

\*Except for one administrator, no full professors were hired to STEM departments during this period.

## Appendix A

## Institutional Indicators Tables

**Indicator 7: Faculty Leadership Positions, AY 2010-2011**

	All Faculty	No. of Women Faculty	
		All	STEM
Tenured Full Professors	205	38	14
STEM Department Chairs	15	3	3
Deans	4	1	1
Associate Deans	7	1	1
Center & Institute Directors	29	3	1
President, Provost, Vice Presidents, Vice Provosts	7	1	1
Endowed/Named Chairs	94	23	6
Promotion & Tenure Committees	32	5	3
Faculty Personnel Committee	5	1	0
Faculty Steering Committee	12	1	0
Educational Policy Committee	9	1	0
Graduate & Research Committee	12	3	1

**Indicator 8: Average Salary in STEM Fields by Year in Rank (YIR)**

YIR	Women		Men	
	<i>n</i>	<i>Average</i>	<i>n</i>	<i>Average</i>
00 to 02	13	\$94,085	36	\$91,222
03 to 05	10	\$85,670	34	\$94,544
06 to 08	7	\$103,157	21	\$138,152
09 to 11	2		12	\$134,717
12 to 14	2		9	\$107,656
15 or more	6	\$98,233	89	\$119,164

**Indicator 8a: Average Salary in STEM Fields by Department:**

	Women		Men	
	<i>n</i>	<i>Average</i>	<i>n</i>	<i>Average</i>
<b>College of Arts &amp; Sciences</b>				
Biological Sciences	7	\$93,200	13	96,223
Chemistry	1		12	104,075
Earth & Environmental Sciences	1		13	96,269
Mathematics	1		21	94,176
Physics	1		16	113,900
Psychology	8	\$84,413	5	73,320
Sociology & Anthropology	6	\$88,150	7	84,129
<b>Rossin College of Engineering &amp; Applied Science</b>				
Chemical Engineering			15	118,580
Civil & Environmental Engineering	2		12	123,809
Computer Science & Engineering	2		15	118,880
Elec & Comp Engr	3	\$104,800	15	130,693
Industrial & Systems Engr	2		12	116,725
Material Science & Engr	3	\$107,267	10	138,530
Mechanical Engr & Mechanics			24	123,433
<b>College of Business &amp; Economics</b>				
Economics	3	\$119,833	11	120,682

**ADVANCE: Advancing Women in Science and Engineering at Lehigh  
Internal Evaluation  
June 1, 2011**

**Overview**

On October 1, 2010, Lehigh University (LU) received a grant from the National Science Foundation to establish Lehigh ADVANCE: Building Community Beyond Academic Departments. The goals of the project are threefold: 1) To increase the numbers of women in STEM fields through improved recruitment and retention; 2) To support the advancement of women faculty in STEM fields to tenure, promotion, and leadership positions; 3) To institutionalize successful policies and programs developed by LU ADVANCE in collaboration with Lehigh faculty and administrators to ensure institutional transformation. The ADVANCE Social Science Research Team will examine the gendering of collaboration and interdisciplinary research.

**Organization**

The Principal Investigator is Dr. Patrick Farrell, Provost of Lehigh University. The co-PIs are Diane Hyland, Professor of Psychology and Associate Dean of the College of Arts and Sciences, Jacqueline Krasas, Associate Professor of Sociology/Anthropology and Director of Women's Studies, Sibel Pamukcu, Professor and Associate Chair of Civil and Environmental Engineering, and Jeffrey Sands, Professor of Biological Sciences. Jean Soderlund, Professor of History, serves as Project Director. The PI, co-PIs, project director, along with the internal evaluator, formed the original Leadership Team. Tina Richardson, Associate Professor of Counseling Psychology, joined the team to lead the faculty leadership initiative.

The Leadership Team met several times before the official notification from NSF, and continued to meet as needed when the proposal was funded. In the first months of the grant, the meetings tended to be every other week; however, additional meetings were scheduled if necessary. In the spring, the Leadership Team meetings tended to be monthly, since the members of the Leadership Team were now working on their various assignments. Dr. Farrell continues to oversee the entire project. Dr. Soderlund coordinated events with the Project Manager Marci Levine, prepared the interim reports, collected data, and prepared the annual report. Drs. Hyland, Krasas, Richardson, and the Internal Evaluator developed the baseline survey to Lehigh faculty and the surveys to be administered to faculty at peer institutions to explore the gendering of collaborative and interdisciplinary research. Dr. Krasas organized the first in a series of speakers supported by Women's Studies Program and LU ADVANCE. Drs. Pamukcu and Sands conducted the Leadership/Retention Interviews, and Dr. Pamukcu organized the LU WISE luncheons. Dr. Richardson formulated the initial plan for the leadership series. A brief overview of the ADVANCE activities is given below, close to the order in which they occurred.

**Activities**

- The award was announced on Lehigh's web page in early October, and related articles appeared in Lehigh's *Brown & White* newspaper as well as in a local newspaper.
- A temporary website was established that could be accessed through the Provost's website.

## Appendix B

## Internal Evaluation

- Kick-off luncheon was held on November 4, 2010. Attendees included 15 women STEM faculty members (65% of 23 women faculty members in STEM), seven department chairs, and the Leadership Team.
- Women STEM faculty members were informed that they could apply for two ADVANCE Faculty Chair positions, one representing the College of Arts and Sciences, and one representing the College of Engineering and Applied Sciences. Eight STEM women faculty members applied, four from each college. The Leadership Team selected the two chairs, who receive release time from one course annually and a stipend of \$10K per year. The appointment is for one year, and the ADVANCE Chairs serve as members of the Leadership Team. Two additional applicants were asked to serve on the Internal Advisory Committee.
- Marci Levine was hired as Project Manager and started on Nov. 22, 2010, at which time the project had moved into three offices on the third floor of Lehigh's newly constructed STEPS building.
- The Internal Advisory Committee met on December 17, 2010; the Leadership Team attended this session. A second meeting on May 11, 2011 did not include the Leadership Team; therefore, the committee will provide their comments and suggestions to the Provost and Project Director.
- Department Chairs were notified that they could apply for Seminar Grants, which provide an honorarium and travel expenses for STEM women who are potential candidates for faculty positions at Lehigh. Two requests were granted to Mechanical Engineering and Mechanics, which currently has no women faculty members. Another grant was made to Industrial and Systems Engineering.
- The Social Science Research Team developed the Leadership/Retention Interviews, in which tenured and pre-tenure women STEM faculty were interviewed by one of four STEM faculty members (two co-PIs, two ADVANCE chairs). Twenty Leadership/Retention Interviews took place in February and March, representing 87% of women STEM faculty members at LU.
- The External Advisory Committee met on January 28, 2011. Summaries of the meetings with the EAC, as well as the parting thoughts from the group, were distributed to and discussed by the Leadership Team. Following the committee's suggestion, the Leadership Team will be holding the first annual retreat on June 7 to plan for the activities in the coming year.
- A preliminary version of the ADVANCE website was launched on February 1, 2011, with the understanding that it would be expanded and advertised to the Lehigh community around April 1.
- LU WISE (Lehigh University Women in Science and Engineering) held two luncheons for women STEM faculty members. Three women who are faculty members in the Biological Sciences, Civil and Environmental Engineering, and Computer Science and Engineering presented their research. Sixteen women STEM faculty members attended the first luncheon on January 21, and 11 attended the second held on March 24, 2011.
- The NSF site visit with Dr. Kelly Mack was held on February 16. Following her advice, the Psychology, Sociology/Anthropology, and Economics departments were included in the pool of STEM faculty, and ADVANCE information was posted on the Faculty Openings page of the Lehigh website. Also, the initial baseline survey was expanded to collect additional information on the work environment in the STEM departments. The Social Science Research Team agreed to conduct focus groups with STEM faculty to obtain additional qualitative data.
- Outside speaker, Susan Basow, presented her research on gender bias in student course evaluations. Nineteen attended the luncheon on February 25, 2011; ten were women STEM

## Internal Evaluation

faculty members; four men STEM faculty attended, three of whom were department chairs. The rest of the attendees were from the ADVANCE Leadership Team.

- Brown bag lunches, held in the ADVANCE offices, were advertised on Lehigh's Faculty/Staff home page. Women STEM faculty members and post docs are invited to bring their lunches on Tuesdays or Thursdays for camaraderie and to browse reading materials. Four women attended; three were STEM faculty members and one was a post doc.
- The expanded ADVANCE website was publicized to the Lehigh community through an article on the *Inside Lehigh* web page on May 2 and through a campus-wide email from the Provost's office on May 1, 2011. The email provided an update on ADVANCE activities, contained a link to the ADVANCE website, and outlined various activities and other resources that are available through the ADVANCE website.
- After the NSF site visit on February 16, 2011, the Social Science Research Team and the Internal Evaluator conferred and decided it would be best to administer one survey to collect data on both the research on gendering of collaborative and interdisciplinary research as well as the baseline data required for the internal evaluation. The ADVANCE Faculty Survey was developed, submitted to the IRB, and administered to men and women STEM faculty members on May 4, 2011. An announcement appeared on the ADVANCE website explaining the survey. Email reminders were sent from the survey administrators, the Provost, and Department Chairs in order to boost response rates.
- Dr. Jackie Krasas, of the Social Science Research Team, conducted four focus groups of STEM faculty members on May 9, 10, 11 and 12. Each session involved a different group: pre-tenure and recently promoted STEM men, pre-tenure STEM women, tenured STEM women, and Social Science women. These sessions are intended to explore further issues raised in the Leadership/Retention Interviews.
- The first session of the Leadership Series was held on May 18, 2011. This session is entitled "The Connective Leadership Styles of Faculty: Leading Change." A brief feedback form will examine attendees' leadership ambitions, perceptions of their leadership skills, feedback on the usefulness of the session, and suggestions for improvement.

### Evaluation Activities

A detailed evaluation plan was submitted to the NSF on March 1. The Internal Evaluator attended all Leadership Team meetings to document the planning and implementation of the ADVANCE activities. The evaluator also attended the kick-off session, LU-WISE luncheons, the external speaker luncheon, and the first session of the leadership series. The purpose for attending these events was to underscore the importance of the evaluation to the ADVANCE project. By renewing acquaintances with and meeting new women faculty members, a level of trust is established, which can enhance the quality and quantity of information provided to the evaluation.

The internal evaluator worked with the Social Science Research Team to develop a survey instrument to collect baseline data for the ADVANCE grant as well as to gather information on the faculty's perceptions of and experience with collaborative and interdisciplinary research. Instruments used by other ADVANCE sites were reviewed, and questions chosen in the following areas: faculty positions, perceptions about their primary department and interdisciplinary centers/programs, hiring and promotion/tenure, work load and work/life balance, leadership, perceptions regarding collaboration and interdisciplinary research, impediments to collaborative/interdisciplinary research, relative time spent on work-related activities, research and accomplishments, mentoring, institutional policies/programs,

demographics, and utilization of university programs. The Lehigh ADVANCE Baseline Survey was administered on May 4, 2011.

In addition, the internal evaluator worked with Dr. Sibel Pamukcu to develop a brief form to get feedback from the women STEM faculty regarding the first LU WISE luncheon. These data were used to plan future sessions. Dr. Tina Richardson also conferred with the internal evaluator to conduct the evaluation of the Leadership Series. Baseline data on attitudes toward leadership in the university are being collected in the Lehigh ADVANCE Baseline Survey, and a workshop feedback form was developed to assess how the attendees perceived the value of the first session.

The internal evaluator has conferred several times with the external evaluator, Dr. Christine Pribbenow, from the University of Wisconsin. It was decided that the two would confer semi-annually, during the spring and fall semester, and as needed in the meantime. Dr. Pribbenow offered many helpful suggestions for the internal evaluation and reviewed evaluation instruments. She plans to visit Lehigh in the fall to attend one of the ADVANCE activities in order to meet the ADVANCE staff and chat informally with some of the women STEM faculty members.

Finally, the internal evaluator has been collecting archival data on several areas listed in the internal evaluation plan. Data were collected for the 2008-09, 2009-10, and 2010-11 academic years. This will provide a baseline against which to measure the progress of the institution in promoting the recruitment and advancement of women in the University.

### **Formative Evaluation**

The Leadership Team was able to make a number of important decisions in the early months of the grant, and these were implemented in a timely fashion. This was due to the frequency of the meetings, attendance by the Provost and the entire Leadership Team, and pre-planned agendas. The meetings were organized by the Project Director, who distributed written agendas and pre-reads prior to the set time. With the Provost and all PIs in attendance, the issues were given careful consideration and decisions made at the meeting.

Various members of the Leadership Team then took responsibility for implementing the initiatives and provided timelines to the Project Director. The Program Director saw to advertising and collecting applications for the positions of ADVANCE Faculty Chairs, organizing the Internal and External Advisory Committees, hiring the Program Manager, and working to find a space for the ADVANCE offices. The Leadership Team reviewed the applications and chose one ADVANCE Faculty Chair from the College of Arts and Sciences and one from the Rossin College of Engineering and Applied Science. The Social Science Research Team worked with two co-PIs and ADVANCE Faculty Chairs to develop the questions for the Leadership/Retention Interviews for the STEM women faculty and conduct of the interviews. The Research Team also worked with the internal evaluator to develop and administer the Faculty Baseline Survey. A co-PI organized the networking opportunities through LU-WISE, and Tina Richardson planned the Leadership Series. The Project Manager made arrangements for all of the scheduled ADVANCE activities, coordinated the development and launch of the ADVANCE website, and served as a liaison to other offices in the university.

To date, all but one of the women STEM faculty members initially identified (23 women) participated in at least one ADVANCE activity. The average among these women was 3.0 activities out of the six that

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## Internal Evaluation

occurred since the inception of the project, including the kick-off luncheon, two LU-WISE luncheons, the guest speaker, Leadership/Retention Interviews, and focus groups. In addition, seven chairs of the twelve departments initially identified as STEM attended either the kick-off luncheon or the presentation by the outside lecturer, the two activities to which department chairs were invited to date.

Generally, the project has adhered to the timeline outlined in the proposal for Year 1.

- In the fall of 2011, interdisciplinary mentoring committees will be established for all newly hired STEM faculty members.
- The Leadership/Retention Interviews were conducted in February/March 2011, followed by focus groups conducted in May.
- Data collected in the Leadership/Retention Interviews, focus groups, and the ADVANCE Baseline Survey will be used to begin the evaluation and revision of tenure and promotion policies.
- Networking opportunities for STEM women were provided through the LU-WISE luncheons, an outside lecturer on an issue of concern to women faculty, and an open invitation to the brown bag sessions in the ADVANCE offices.
- The ADVANCE website was launched on February 1, expanded in subsequent months, and advertised to the Lehigh community in May, 2011.
- The first two cluster hiring proposals were selected by President Alice Gast and Provost Pat Farrell in the areas of Smart Grid Electricity Systems and Africana Studies.
- The gender and interdisciplinarity research was begun through the administration of the ADVANCE Baseline Survey at Lehigh and the Survey on Interdisciplinarity and Collaboration administered at selected peer institutions.

There were slight delays in introducing some of the planned activities; however, the delays should not affect the likelihood of their success.

- It was initially proposed that a workshop was to be held in late spring for Lehigh mentors and faculty evaluators using feedback from early spring data collection. It quickly became obvious that time constraints would make a late-spring workshop unrealistic. The workshop will be developed during the summer of 2011 and offered in the fall. This is still within the first year of the grant and should not in any way affect the value of the workshop. In fact, it allows extra time to advertise and promote the workshop among the STEM departments.
- The roll-out date for the expanded ADVANCE website was to be April 1; however, the development process took slightly longer than expected. When the website was ready, the Project Manager had hoped to advertise it to the campus community around mid-April. The reasons for this timing were twofold: to stagger the ADVANCE information going out to the Lehigh community throughout the spring, and to avoid having it coincide with later communications regarding the Faculty Baseline Survey, which was to be administered in the beginning of May. The article outlining the progress of LU ADVANCE and promoting the webpage did not appear in the *Inside Lehigh* webpage until May 2. This did not pose a serious problem. However, to improve timing of communications pieces in the future, the Leadership Retreat in June should reference the communications plan while mapping out approximate dates for the various ADVANCE activities for the upcoming year. Then advertising strategies can be planned beforehand in accordance with the communications plan, the Program Manager can provide this information to the Communications Office with an approximate timeline, and with their help, the announcements can be made in a timely fashion.

There are several areas on which the ADVANCE Leadership Team should focus in the coming year.

- Strategies for promoting “buy-in” by the faculty in STEM departments and keeping them apprised of the progress of LU ADVANCE.
- Identifying male STEM faculty advocates and providing them with the means to promote the advancement of women faculty members in their departments.
- Involving the deans and chairs in promoting ADVANCE, as suggested by the External Advisory Committee.

The LU ADVANCE Project has made good progress in the first eight months of the grant. The project has taken the first steps to ensure that the institution is headed on a path that ensures that the representation and leadership of women will be enhanced in the sciences and engineering.

**Lehigh ADVANCE: Building Community Beyond Academic Departments**  
Proposal to the National Science Foundation  
(Submitted November 2009; revised October 2010 to reflect changes required by NSF)<sup>1</sup>

**Project Summary**

Lehigh University will exploit its commitment to interdisciplinary research and teaching to significantly improve recruitment, retention, career satisfaction, and leadership development of early- to mid-career women faculty in engineering and the natural sciences. The University's plans for cluster hiring and growth in interdisciplinary programs such as Environment, Health, and Information Science and Engineering will provide the opportunity to test model programs and to conduct social science research of the effectiveness of these programs. Lehigh will institutionalize the programs found to be most effective by embedding these programs within implementation of its 2009 Strategic Plan and by developing best practices for interdisciplinary mentoring and evaluation in dialogue with female and male STEM faculty and university leaders.

Lehigh will utilize a comprehensive set of interlocking programs formulated to maximize the impact of interdisciplinarity in creating and maintaining a critical mass of women STEM faculty. These programs include: enhanced search strategies for faculty hiring to substantially strengthen the candidate pools; interdisciplinary mentoring committees; best practices workshops for interdisciplinary mentors and evaluators; workshops and networking for women STEM faculty at Lehigh and regional institutions; leadership and retention interviews; and revised evaluation processes.

**Intellectual Merit**

Despite national focus on advancing engineering and science through interdisciplinary collaboration and increased participation of women, evidence about the impact of cross-disciplinary structures on the careers of early- and mid-career STEM women faculty is inadequate. Are faculty who choose interdisciplinary paths disadvantaged by the increased effort needed to acquire breadth of knowledge across fields and to establish collaborative connections? How are faculty careers affected by the challenges of obtaining cross-disciplinary funding and the lower number of high impact interdisciplinary journals? As emphasized in the National Academy of Sciences' *Facilitating Interdisciplinary Research* (2005), institutions that encourage such research must be willing to re-evaluate promotion criteria and procedures that have traditionally been disciplinary and departmental. Lehigh ADVANCE will test whether or not interdisciplinary organization can help to create a critical mass and equitable work environments for women STEM faculty if facilitated by vigorous search strategies, proactive evaluation policies, and mentoring and networking programs geared specifically to interdisciplinary research and teaching.

**Broader Impacts**

Lehigh ADVANCE will model, assess, and disseminate methods for creating, maintaining, and supporting a critical mass of women in engineering and the sciences in an interdisciplinary environment at institutions similar to Lehigh in size and mission. The results of Lehigh's proposed programs and social science study of the gendering of interdisciplinary research will provide evidence for and invite collaboration with other small to mid-sized research universities. These results will be disseminated through symposia, workshops, seminars, website, online toolkits, peer-reviewed journal articles, conference presentations, and networking with peer institutions. Lehigh's regional networks will offer models to other universities and colleges seeking to build intellectual communities beyond the boundaries

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<sup>1</sup> All data are from Fall 2009 unless otherwise noted.

of their own campuses. These networks are important for research and teaching collaboration and for attracting young engineers and scientists to academic careers.

## **Project Description**

Interdisciplinary collaboration is becoming the primary means by which scholars in engineering and the natural sciences conduct research for solving significant complex societal problems. Despite the essential focus of agencies such as the NSF and NIH on both interdisciplinarity and increasing the participation of women, we still have inadequate knowledge of the impact of cross-disciplinary structures on the careers of early- and mid-career STEM faculty. In particular, given recognition of gendered workplaces in STEM disciplines, we know little from social science research about whether or not interdisciplinary programs facilitate the career success of STEM women, and whether cross-disciplinary experience at the graduate and postdoctoral levels encourages or discourages women from taking academic paths. Our hypothesis, built upon existing social science findings and Lehigh's recent initiatives, is that interdisciplinary organization, if embedded with proactive evaluation policies and mentoring and networking programs, will help to create a critical mass of women faculty and reduce the professional and social isolation of STEM women.

As a medium-sized private research university with 433 tenure-track faculty, 4,809 undergraduates, and 2,187 graduate students, Lehigh University relies upon interdisciplinary collaboration to develop distinguished programs in education and research. During the past eight years we have invested significantly in clustered faculty hires and infrastructure in areas such as Environmental Science/ Engineering/ Policy (Environmental Initiative), Bioscience/ Bioengineering/ Health Policy (Health Initiative), and Information Science and Engineering. With Lehigh's 2009 Strategic Plan, "Advancing Our Intellectual Footprint," these investments will grow during the next ten to fifteen years with further hires and addition of Energy and Infrastructure to our interdisciplinary programs.

We have the opportunity for institutional transformation by aligning our proposed ADVANCE program for improving recruitment, retention, career satisfaction, and leadership development of early- and mid-career women STEM faculty with the larger goals and directions of the university. Recruiting and retaining women faculty in interdisciplinary structures will be central to implementing Lehigh's Strategic Plan. Transformation will involve analysis of processes, including tenure and promotion, to insure they are sensitive to the issues raised by interdisciplinary collaboration. Techniques and best practices for mentoring, networking, and evaluation will be developed to facilitate the careers of STEM faculty who are pulled in different directions by home departments, centers, and programs. We will model, assess, and disseminate methods for creating, maintaining, and supporting a critical mass of women in engineering and the sciences in an interdisciplinary environment at institutions similar to Lehigh in size and mission.

### Research on Gendered Organizations and Interdisciplinary Science

Kanter (1977) first highlighted the numerous effects of being a numerical minority in a work organization. Tokens, as a group, experience a variety of constraining and discriminatory workplace behaviors derived from their visibility including: harassment, isolation, role encapsulation, and restricted access to mentoring. Acker (1990) recognizes in the gendered organizations approach that while numbers do affect organizational inequalities, other factors hold strong influences as well. These occur in concrete ways (occupational segregation, differential access to resources), but also in more abstract ways at the level of meaning. In particular, Acker (1990) notes that women cannot as easily meet organizations' seemingly gender-neutral criteria to the extent that they fall short of the "disembodied universal worker." This concept describes a host of disadvantages that accumulate to women who have "families" and must

accommodate the everyday, and who are subject to gendered meanings (e.g. gender schemas) in their workplaces (Valian, 1998). Converging with Acker (1990), West (1990) analyzes gender and the “labor process,” that is how work is gendered through the ways in which it is conducted, the meanings given to that work (e.g. what counts as “skill”), and the power relations among individuals and groups in the organizational context.

STEM fields are gendered in multiple ways that align with these gendered organization approaches. STEM fields are imbued with deeply gendered meanings. For example, technical expertise, innovation, and rationality tend to be characteristics more easily associated with men than women (Bem, 1974; Cockburn, 1983). When women represent a stark minority in a given context (such as in STEM fields at Lehigh University), these gendered meanings come into play with regard to evaluation and compensation, distribution of resources, and mentoring/networking opportunities (Valian, 1999, Moody, 2009). Furthermore, the organization of work in STEM fields is founded on the unacknowledged construct of the “disembodied universal worker,” which very few women (and not all men) can attain.

Many women in the STEM fields at Lehigh University fall numerically into Kanter’s token category when we examine the gender composition of their home department. Thus, moving those faculty from the token position to a more gender-balanced context should temper many of the effects of tokenism. This is the idea of “critical mass” that Valian describes. While Lehigh University is a smaller university and sometimes cannot achieve the benefits of critical mass for women in the STEM fields easily or quickly through new faculty hires (even as existing faculty retire), we can more quickly employ developing interdisciplinary structures to that end – achieving critical mass.

Achieving critical mass through interdisciplinary initiatives has the potential to reduce tokenism, feelings of professional and social isolation, difficulty finding mentors, and exclusion from informal networks where new ideas are generated, which are all frequently cited as barriers to the early career development and retention of women faculty in STEM fields (Kemelgor & Etzkowitz, 2001). While the integration of female faculty into interdisciplinary collaborative research initiatives may be an effective strategy for addressing these barriers, this strategy may pose risks if university culture (e.g., promotion standards and procedures that have traditionally been situated within disciplines and departments) creates inequity in the evaluation of interdisciplinary scholarship.

While Rhoten and Pfirman (2007) recognize that more empirical research is needed to test this hypothesis explicitly, they propose the existence of a gendered preference for interdisciplinary science as well as gendered consequences of this approach. They hypothesize that female scientists are more attracted to interdisciplinarity because it typically involves team-based collaboration and adapting concepts, methods, and results from multiple disciplines to address complex, socially-relevant problems. Thus, Rhoten and Pfirman (2007) warn that while women may be more attracted to interdisciplinarity, there may be a gendering of the costs and benefits of this research. For example, since most interdisciplinary research leads to multi-authored publications, a result may be that the contributions of newer investigators, who are more likely to be women, will be overshadowed by the contributions of well known senior collaborators, who are more likely to be men.

Empirical data suggest that academic research centers (where interdisciplinary research is typically conducted) may provide a more gender equitable context for academic success compared to traditional department settings. Interdisciplinary research centers can take advantage of innovative perspectives on hiring and supporting center members. Centers may provide scientists enhanced research resources such as more opportunities to consult with other scientists, greater access to equipment, and a stronger support system for proposal preparation, all of which may lead to greater research productivity (Corley & Gaughan, 2005). However, other data (Corley, 2005) suggest that some gender differences found in traditional departments still persist in research centers. Female, compared to male, center-affiliated faculty still report having fewer collaborators, publish fewer articles per year, and are more likely to

report feeling discriminated against on the basis of gender. Erin Leahey (2006) raises another concern, proposing that research specialization (repeatedly engaging in research on the same substantive topic usually within a subfield of a discipline) actually aids productivity and visibility.

Evidence currently available from studies of gendered organizations and interdisciplinary science thus suggests both opportunities and cautions in pursuing collaborative strategies to advance the careers of women faculty in STEM fields. While improved search methods and cluster hiring to cross-disciplinary initiatives are important, they are insufficient to achieve critical mass and equitable environments. Institutional transformation also requires mentoring, networking, and review/revision of policy structures to support, retain, and promote women to the senior ranks and leadership.

### Institutional Context

#### **Interdisciplinary Initiatives and Gender at Lehigh University since 2001**

Since October 2000, Lehigh has targeted growth in critical fields, including the Health and Environmental initiatives and Information Science and Engineering, first with the 2020 Plan, which dedicated approximately \$75 million for academic initiatives. We are now moving forward with implementing our 2009 Strategic Plan, which will provide further growth in these areas. This ADVANCE proposal is connected explicitly to implementation of Lehigh's Strategic Plan. We are planning to develop faculty quality and quantity in concert with the goals of our plan. Our ADVANCE program will work hand-in-hand with the Strategic Plan, together transforming the structure of the university, faculty cultures, and patterns of work. With this interdependence in mind, we are crafting programs that will be sustained into the future.

Lehigh will continue to hire faculty strategically in clusters, with an estimated ten faculty searches each year in interdisciplinary STEM areas. This fall [2009], in addition to thirteen STEM assistant and associate professor positions, we will begin searches for two Presidential Chairs in the Health Initiative: one in Bioscience/Bioengineering and the other in Health Policy and Society. Lehigh has also committed substantial funds to campus infrastructure with the Science, Technology, Environment, Policy, and Society (STEPS) building. This is a 130,000 square foot building scheduled to open in August 2010, which will create a place where engineers, natural and social scientists, and students can work together across disciplinary boundaries.

These initiatives, inspired and developed by faculty and administrators, have already produced substantial change at Lehigh. Since 2001, when the first new faculty hired under the 2020 Plan arrived on campus, Lehigh has appointed 172 assistant professors (all pre-tenure), of whom 41 percent are women. In Fall 2009, assistant professors comprise 22 percent (97 of 433) of all tenure-track faculty, in contrast to 12 percent nine years ago. This faculty renewal, achieved through the 2020 Plan and faculty retirements, presents both the opportunity to create a more diverse faculty and the responsibility to generate the programs, policies, and culture to support the evolving needs of scholars from a variety of backgrounds and with a range of family responsibilities. The overall percentage of women faculty at Lehigh has increased from 20 percent in Fall 2000 to 27 percent this year [2009].

In addition, during the past six years, women have taken leadership positions as Department Chair, Associate Dean, Deputy Provost, Dean, and President. Among STEM faculty, Helen Chan is Chair of Materials Science and Engineering, Sibel Pamukcu serves as Associate Chair of Civil and Environmental Engineering, and Anne Meltzer, former Chair of Earth and Environmental Sciences, is Dean of the College of Arts and Sciences. President Alice Gast, also Professor of Chemical Engineering, since her appointment in 2006 has stirred enthusiasm across campus for new approaches to fostering faculty and student diversity and gender equity.

Recruiting and retaining women faculty in STEM fields has proved challenging for Lehigh as it has for many research universities. We have initiated a number of policies and programs, discussed below, that have improved faculty retention, yet to achieve the kind of results we want, we think we need to move forward to create and employ truly innovative practices that integrate our interdisciplinary initiatives with efforts for creating a more equitable environment for women and other scholars from underrepresented groups. We see promise for forming a critical mass of women in STEM fields through continued cluster hiring in interdisciplinary fields. The current and potential advantages can be seen by comparing the overall percentages of Lehigh women faculty in the natural sciences (12 percent) and engineering (10 percent) with female participation in the clusters. Women make up approximately 20 percent of the STEM faculty participating in the Environmental Initiative; 28 percent of the STEM faculty in the Health Initiative; and 16 percent in Information Science and Engineering. Participation of women faculty from the social sciences in these initiatives further contributes to the development of critical mass and opportunities for networking. Through these interdisciplinary initiatives, which will grow over the next ten to fifteen years, we see real potential for transforming Lehigh and providing a model for other research institutions approximately our size.

### **Barriers at Lehigh and Nationally**

Historically, Lehigh has experienced significant challenges in recruiting women STEM faculty and retaining them through tenure at the rank of associate professor and promotion to full professor. After some success during the 1990s in increasing the representation of women faculty in engineering and the natural sciences, the lack of programs to support work/life balance and improve department cultures resulted in a wave of resignations. During the three years from 1998 to 2001, Lehigh received resignations from twenty-six faculty, of whom 73 percent were women. All seven of the departing engineering faculty and 60 percent of the departing College of Arts and Sciences faculty were women. This was a wake-up call to administrators and faculty alike. Professor Diane Hyland of Psychology, co-PI on this proposal, conducted follow-up interviews of female faculty who resigned. They indicated that both “pull” factors, such as better teaching, research, and leadership opportunities, and “push” factors, including unsupportive Lehigh department culture, inadequate work/life policies, and lack of professional mentoring, loomed large in their decisions to leave.

Hyland also conducted a quantitative study of the advancement of Lehigh faculty from the associate professor to full professor rank. For faculty hired at the assistant professor rank after 1981, male faculty members in STEM disciplines had a high likelihood, by 2004, of being promoted from associate professor to full professor, most in six years or less. In contrast, female faculty members in these disciplines typically remained at the associate rank for more than nine years or voluntarily left Lehigh while still at the associate rank. The careers of current Lehigh STEM full professors reveal the same gap: male professors achieved promotion after an average of six years in the associate professor rank while female professors spent an average of nine years as associate professor. These very different patterns of professional advancement for women compared to men reflect national trends as reported by Valian (1998) and the Modern Language Association (2009).

The high attrition of Lehigh women STEM faculty in the late 1990s and early 2000s is apparent from looking at the numbers of current associate professors. Of twenty-seven associate professors who have held the rank more than five years, only three are women. Like the male associate professors, these women have served in rank for an average of twenty years and are finding the path to full professor difficult. Progress can be seen among the STEM faculty tenured and promoted in the past five years, as women comprise five of twenty-two (23 percent) of these associate professors. Their numbers will be joined by additional women engineers and scientists in the next several years. It is thus critical for Lehigh to evaluate policies and create programs to facilitate career and leadership development of associate professors as well as pre-tenure faculty.

In the past several years we have conducted five faculty surveys that provide relevant information on job satisfaction and barriers: the Campus Climate Survey conducted by Rankin & Associates (2006, entire Lehigh community including faculty); two Alfred P. Sloan Awards for Faculty Career Flexibility surveys (2006 and 2008, all tenure-track faculty); the Collaborative on Academic Careers in Higher Education (COACHE) Survey (2007-08, assistant professors); and a survey conducted by Susan Carlson of Iowa State University (2009, associate professors). These surveys, supplemented by exit interviews of departing faculty, have indicated recent improvement in several areas where Lehigh has revised policies and developed programs: increased flexibility through tenure-clock extensions, fully paid Family and Medical Leave policy, research support for new parents, dual-career programs, and the University Mentoring Program for assistant professors. Some details of these initiatives will be given in the next section.

Still, barriers to faculty career advancement and more equitable environments for women remain, barriers that we intend to address through this proposed ADVANCE program:

- Difficulty for new faculty in establishing research collaboration with senior colleagues;
- Difficulty at both the assistant and associate ranks in obtaining effective mentoring for promotion;
- Lack of a critical mass of women in STEM fields to offer collegiality within and across departments;
- Lack of a critical mass of women to assist in recruiting women candidates for faculty positions and to serve as role models and mentors for undergraduates, graduate students, postdoctoral scholars, and early- to mid-career faculty.

These findings at Lehigh are consistent with significant survey results reported in the National Research Council's *Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty* (2009). Surveys of STEM departments and faculty at four-year institutions indicated several important findings in the area of *recruitment*: 1) Women form a lower percentage of job applicants for tenure-track positions than their percentage among PhD recipients in STEM fields. Women were also less likely to accept a job offer (the one gender-related reason they gave was "family-related reasons"). 2) Two-thirds of the departments failed to utilize a full range of strategies for recruiting women, using at most targeted advertising and recruiting at conferences. 3) Departments were most successful in hiring a female candidate when a woman chaired or served on the search committee.

In the areas of *mentoring and retention*, the NRC study revealed that: 1) Female pre-tenure faculty who had mentors had a higher probability of obtaining grants (93 percent) than those without mentors (68 percent). For female associate professors, the pattern was similar but weaker. 2) Women continued to have an important challenge in department culture, particularly engagement with colleagues on the topics of research, salary, and benefits. 3) Women were equally or more successful than men in tenure review but were less likely to stay at the institution long enough to be considered for tenure.

Work/life issues (American Council on Education, 2005; Sullivan, Hollenshead, and Smith, 2004), gender-biased evaluative processes including teaching evaluations (Sandler, Silverberg, and Hall, 1996), organizational politics including resource allocation (Harvard University, 2005), and male-dominated networking and mentoring (The MIT Report, 1999; Didion, Fox, and Jones, 1998) are among the barriers that become embedded and subject to institutional inertia. Indeed, social science research argues that many of the barriers to women's advancement also involve a cultural component such that "non-conscious gender schema" that "accrue disadvantage to women" (Valian, 1998) devolve into institutional policies and practices that unwittingly limit women's advancement over time and produce women's dissatisfaction with academic employment. Individual and institutional resistance can hinder well-intentioned programs aimed at "fixing the women" (Burack and Franks, 2004).

### **Recent Faculty Programs and Policy Development at Lehigh**

In 2001, Lehigh took its first major step in work/life initiatives with the Family and Medical Leave Policy for Faculty, which provides full pay for full-time and intermittent leaves for a period of twelve weeks or its equivalent. Two years later, the University adopted the Domestic Partners Benefits Policy, which extends all benefits, including the FML policy, to domestic same-sex and opposite-sex partnerships. In 2006, the faculty and trustees approved an automatic one-year tenure-clock extension for new parents to supplement the previous six-month extensions associated with FMLA leaves.

Lehigh University then received an Alfred P. Sloan Award for Faculty Career Flexibility, one of five awarded in 2006 to research universities. The grant provided funding through June 2009 for several new initiatives and facilitated important progress in changing Lehigh's culture. Under leadership of faculty committees, the initiatives kindled discussion of work/life issues among the Board of Trustees, administration, deans, department chairs, and faculty. The follow-up Sloan survey (2008) indicated extensive dialogue and understanding of Lehigh's work/life policies.

The new initiatives included Lehigh Sloan Research Grants, expanded tenure extension policies, and dual-career programs. We are sustaining the programs with Lehigh funds. The *Lehigh Sloan Research Grants* provide \$6,000 to each pre-tenure Lehigh faculty member who takes an FMLA leave for the care of a newborn or adopted child or other family member. The purpose of the grant is to assist faculty members in maintaining visibility in their department and profession during the leave and the subsequent transition back to full-time status. The grant can be used for child or elder care and housekeeping as well as more traditional research expenses. In addition, pre-tenure faculty can now take one-year *tenure extensions* for parenthood by birth or adoption (including children under six years old at the time of the faculty member's hire), physical disability, primary care of a family member, public or military service, extreme personal hardship, foster care, and an exigency arising out of a family member's active military service. Our several *dual-career initiatives* include the Faculty Dual-Career Assistance Program for faculty partners/spouses to locate positions in the region. For academic faculty and staff positions, we helped to expand the New Jersey Higher Education Recruitment Consortium to include eastern Pennsylvania and Delaware. The Provost and Deans have also implemented guidelines that clarify the procedures and funding for hiring partners/spouses to faculty positions at Lehigh.

Since 2002, Lehigh's administration has also placed significant emphasis on *professional mentoring* of pre-tenure faculty, with programs in each of the four colleges and a university-wide mentoring program. Provost breakfasts with department chairs often focus on faculty mentoring, work/life issues, and retention. The Director of Faculty Development coordinates an annual two-day orientation for new faculty and organizes frequent events on teaching and technology. The Committee on Faculty Mentoring and Work Life Issues sponsors meetings of assistant professors with the university faculty mentors and holds events on faculty career development. We recently overhauled our policy for hiring, mentoring, and evaluating faculty with *formal joint appointments*, who comprise a small subset of faculty working in interdisciplinary initiatives. The new policy includes best practices such as memoranda of understanding (MOU) and special evaluation committees made up of faculty from each participating department/center. These mentoring and evaluation processes provide a basis for developing more broadly effective practices in our ADVANCE program.

The Sloan Award has been crucial in changing Lehigh's culture regarding work/life issues, with greater use of FMLA leaves and tenure extensions. During the academic years 2000-01 to 2004-05, only five Lehigh assistant professors took FMLA leaves for parenthood or care of a family member (one per year, 1.5 percent of the assistant professors per year). From AY 2005-06 to 2008-09, fifteen assistant professors (ten women, five men) took FMLA leaves for these reasons (3.75 per year, 4 percent of the assistant professors per year). Engineering and science faculty took seven of the leaves post 2004-05 on an intermittent basis, whereas this option had not been clarified earlier (and thus was not used). This

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permitted the assistant professors to keep their labs and research groups in operation during the FMLA leave. For example, the intermittent option allowed a geologist to conduct funded research in the Yukon during part of the semester she was on FMLA leave. An accompanying uptick occurred in use of the tenure extension for parenthood. We also see improvement regarding the dual-career issue. During the years 2006 and 2007, after we began conducting exit interviews on a systematic basis, six of ten departing assistant professors indicated that the dual-career issue played an important role in their decision to leave. Since we instituted the dual-career guidelines, we have hired spouses/partners to tenure-track faculty and staff positions, and no faculty have given that reason for leaving.

At the same time assistant professors acknowledge significant improvements with tenure-clock flexibility, dual-career programs, and the Lehigh Sloan Research Grants, as they gain tenure they feel less support at the associate professor level. For this reason the Committee on Faculty Mentoring and Work Life Issues has conducted a survey and workshops to obtain data for moving forward to improve mentoring toward promotion of associate professors; encourage use of Lehigh's sabbatical policy to promote their research and scholarly programs; improve communications for associate professors about Lehigh's work/life policies and programs; and revise policies on triennial review and promotion to full professor for clarity of process and criteria.

Through work/life programs, new tenure extension policies, dual-career programs, and improved mentoring, Lehigh has increased retention of women faculty in STEM fields during the past five years. Yet recruitment of female faculty remains difficult and women comprise a small minority in engineering, physical sciences, and mathematics. Vigorous efforts for expanding candidate pools and reconfiguring programs/policies to foster success of early- and mid-career faculty in interdisciplinary initiatives are needed to transform Lehigh's work culture, maximize the promise of Lehigh's Strategic Plan, and provide models for other institutions our size.

#### Strategies: Lehigh ADVANCE through Interdisciplinary Networks and Mentoring

While exploring the promise of interdisciplinarity to attract and retain women in STEM, we must also transform institutional contexts to insure that these engineering and science faculty are not, as a result, disadvantaged in systems of evaluation and reward. Mentors and evaluators must be aware of these aspects of interdisciplinary scholarship: the increased preparation needed to acquire breadth of knowledge across fields, extra efforts required for establishing and maintaining collaborative connections, challenges of obtaining funding for this scholarship, and the lower number of high impact interdisciplinary journals. Risks also exist of increased service, particularly in small and newly emerging clusters. Pre-tenure and mid-career faculty may be called upon and will desire to invest in building the program, benefiting the organization but perhaps at costs to their own productivity. As emphasized in the NAS's *Facilitating Interdisciplinary Research* (2005), institutions that encourage interdisciplinary research must be willing to re-evaluate promotion criteria and procedures that have traditionally been disciplinary and departmental.

By leveraging Lehigh's commitment to interdisciplinary research and teaching, which our 2009 Strategic Plan reaffirms and strengthens, we intend to significantly improve recruitment, retention, career satisfaction, and leadership development of early- to mid-career women faculty in engineering and the natural sciences. Our plans for cluster hiring and growth in interdisciplinary programs such as the Environmental Initiative, Health Initiative, and Information Science and Engineering will provide both the opportunity to test model programs and to conduct social science research on the effectiveness of these programs. We will assess these interventions formulated to maximize the impact of interdisciplinarity in creating and maintaining a critical mass of women STEM faculty: interdisciplinary mentoring, proximity of offices and labs, revised evaluation processes, workshops for mentors and evaluators, workshops and networking for women STEM faculty, and enhanced search methods to substantially strengthen the candidate pools. Through the strategies discussed below, we will overcome

the barriers to women's advancement, forming the critical mass of faculty needed for effective mentoring and network support.

While Lehigh can pursue a few aspects of this proposal without NSF funding, we cannot create the comprehensive program, including social science research, that will assess and disseminate dynamic, intentional efforts to create systematic opportunities for mentoring and networking within the university and with regional institutions. Our goals for this program include:

Increase the numbers of women faculty in engineering and the natural sciences through improved recruitment and retention.

Facilitate the advancement of women faculty in STEM fields to tenure, promotion, and leadership positions.

Advance the careers of women STEM faculty who participate in interdisciplinary initiatives through improved mentoring, networking, and clear and equitable evaluation criteria and procedures.

Institutionalize this change by embedding the program within Lehigh's Strategic Plan and developing best practices for interdisciplinary mentoring and evaluation in dialogue with female and male STEM faculty and university leaders.

#### Interdisciplinary Mentoring Committees

Beginning in spring 2011, for new faculty hired to start in fall 2011, all new women STEM faculty will receive a three-person interdisciplinary mentoring committee of senior faculty in fields related to their research and teaching. One mentor will be the chair or full professor of their home department. The other mentors will be faculty in other departments with expertise and research interests that will facilitate networking for the new faculty within Lehigh and in their broader profession. The mentors will immediately help integrate the new faculty member into the research and curriculum of the interdisciplinary initiative. The first step will be to develop a workshop for introducing mentors to current research on gender and interdisciplinarity as well as best practices in mentoring.

The goal of this program is to formalize mentoring processes that we should expect from research/teaching clusters, but which do not always materialize, particularly for women scholars in fields lacking a critical mass of women (Nolan et al. 2008)). While Moody (2009) and Girves et al. (2005) have recommended mentoring programs with multiple mentors, ours will intentionally function as part of interdisciplinary initiatives and within a university culture in which interdisciplinary collaboration is becoming ever more crucial. At hire, the new faculty member will discuss possible mentors with the Deputy Provost for Faculty Affairs and together they will draft an MOU linking the mentors with specific goals. The MOU will also provide flexibility if one or more of the mentors need to be replaced at a later time. With Lehigh resources, and assuming positive outcomes, we aim to expand this program to all new faculty and offer the opportunity to continuing faculty. At an institution our size, with its relatively small departments, female and male faculty are more likely to find collaborators in other departments than in their own. This meshes well with the more general trajectory of academic research and teaching. Interdisciplinary mentoring will become a permanent Lehigh program, underpinning and supporting equitable interdisciplinary work cultures.

#### ADVANCE Chairs

Each year two tenured Lehigh STEM women faculty will be selected as ADVANCE Chairs to participate as core members of the Lehigh ADVANCE program. The ADVANCE Chairs will bring fresh ideas to the leadership group, participate in the Leadership and Retention Interviews, and help to develop and participate in the workshops, seminar/dinners, and symposia. The one-year positions will be filled through an appropriate nomination and appointment process, and carry the possibility of reappointment for a second year.

#### Proximity Study

The opening of the STEPS building in August 2010 will present a unique opportunity to study the impact of physical proximity, with resulting day-to-day interactions, on promoting interdisciplinary networks and reducing isolation. The STEPS building will provide office and laboratory facilities for faculty in the Environmental Initiative, bringing together scientists from several STEM departments with social scientists from Journalism and Communication, Political Science, History, and International Relations. In contrast, faculty affiliated with the Health Initiative have offices and laboratories distributed across campus. Similarly, participants in Information Science and Engineering are located in different buildings. Can community be developed among colleagues who do not work in the same building? Can electronic correspondence, seminars, interdisciplinary mentoring, and social networks replace physical proximity? What are the necessary components for fostering interdisciplinary teams? This research will intersect with our studies of interdisciplinary mentoring, evaluation, and networking to examine the significance of physical proximity and other key network elements in creating equitable interdisciplinary communities.

#### Leadership and Retention Interviews

To assist in developing best practices for mentoring and evaluating women STEM faculty involved in interdisciplinary work and for cultivating leadership, the four co-PIs and two ADVANCE Chairs will conduct in years 1 and 2 standardized individual interviews with Lehigh women STEM faculty of each rank. The interview questions will vary by rank. We will use the information gained to help build our knowledge base on interdisciplinarity and gender to be used for workshops, online toolkits, and publications on women and cross-disciplinary teams. In interviews with *full professors*, we will ask about keys to success and barriers in scholarship and teaching. What were their experiences in disciplinary and interdisciplinary research and teaching? How did they become leaders in their field? What advice would they give to mentors and young faculty to optimize careers in interdisciplinary initiatives? With *associate professors* we will discuss keys to success in tenure, challenges in promotion to full professor, and barriers more generally in academic research and teaching. With *assistant professors* we will explore their early career successes, challenges in achieving promotion and tenure, and barriers in academic research and teaching.

We expect these interviews to last an average of 30 to 60 minutes each. The interview questions will be developed with our evaluators, Jean Russo and Christine Pribbenow, so that the evaluative interviews they conduct with Lehigh women STEM faculty in Years 3-5 will be consistent with the earlier interviews. The project manager and co-PIs will receive information from Drs. Russo and Pribbenow in Years 3-5 that will be helpful in improving the ADVANCE programs and Lehigh culture.

These interviews over the course of five years will allow us to assess the impact of Lehigh's ADVANCE program and changing climate. We intend to continue the retention interviews after the completion of the grant period under supervision of the Deputy Provost for Faculty Affairs. In addition to understanding current best practices from these interviews, we will use insights gleaned from them to evaluate and revise Lehigh policies/programs and follow up specific (perhaps confidential) information to address problems encountered by individual faculty.

#### Evaluating Tenure and Promotion Criteria and Procedures to Address Interdisciplinary Issues

As part of the current review of the criteria and procedures for promotion to full professor, the Faculty Personnel Committee and Committee on Faculty Mentoring and Work Life Issues are examining the impact of decisions by associate professors to explore cross-disciplinary and innovative teaching and research during the years following tenure. The ADVANCE Team will build on this effort to determine what changes are needed in tenure and promotion criteria and procedures to insure that faculty involved in interdisciplinary research and teaching before tenure are evaluated appropriately.

#### Best Practices Workshops for Faculty Mentors and Evaluators

In addition to reviewing and revising policies, we will develop best practices workshops for two groups of faculty. 1) In Year 1 and each succeeding year, we will hold workshops for department chairs, center directors, interdisciplinary program directors, college promotion and tenure committees, and senior faculty on best practices in mentoring and evaluating engineers and scientists in interdisciplinary research and teaching, focusing on issues for women and other underrepresented groups. The workshops will build on the literature on mentoring and multiple mentors, but tailor the best practices most specifically to academic careers in interdisciplinary contexts. The literature on team science will provide important insights, yet its attention to gender is limited. Thus we will contribute to this literature both through development of best practices and research focused on the intersection of interdisciplinary science and gender. 2) In Year 4 we will hold a day-long workshop on best practices in interdisciplinary mentoring for department chairs, center directors, interdisciplinary program directors, and senior faculty in the Pennsylvania, New York, Delaware, and New Jersey region, inviting several guest speakers on topics related to gender and team science. We will also utilize our expertise developed through three years of interdisciplinary mentoring, individual interviews, and mentors/evaluators workshops.

#### Workshops and Networking for Women STEM Faculty

The Lehigh ADVANCE program will build within Lehigh's structure new opportunities for women faculty in engineering and the natural sciences to mentor and network with other women scholars within Lehigh and with neighboring institutions. The Lehigh ADVANCE team will provide institutional support for these groups and will work with the Lehigh administration to continue the programs beyond the NSF grant.

1. During each year of the ADVANCE program and thereafter, we will hold ADVANCE *workshops for Lehigh pre-tenure and mid-career STEM faculty and postdoctoral scholars* involved in interdisciplinary research and teaching, focusing on issues for women and other underrepresented groups. These workshops will be themed on exploration of obstacles to achieving career advancement and strategies for overcoming barriers, including communication and advocacy. Faculty will bring topics to the table and assume leadership of segments of the workshops as their careers advance.
2. Provost Patrick Farrell will organize *leadership development dinner/seminars* for senior Lehigh women in the natural sciences and engineering (associate and full professors, including President Alice Gast and Dean Anne Meltzer) to discuss research and career development issues. We expect this group, too, will set its own agenda in moving forward.
3. The *Lehigh Women's Studies Program* will expand its support for academic and social networking among faculty across disciplines. For example, the Women's Studies research forums currently draw women faculty from across the university in many disciplines even if they do not work on gender-related scholarship. Women's Studies also has social events that include women faculty from around the university, facilitating informal mentoring and advice. With the ADVANCE program, Women's Studies will invite additional external speakers each year to discuss topics of interest to women scholars across many fields, including engineering and the natural sciences.

4. Lehigh's geographical location and size offer the opportunity to serve as a model for other small to mid-sized universities by creating a regional network with surrounding academic institutions. We will start by working with the Lehigh Valley Association of Independent Colleges (LVAIC) to create a "Women in Science and Engineering" group, which will give women STEM faculty in the region the opportunity to review each other's work, invite speakers, and participate in panels on career development in teaching and academic research. We will invite faculty from other colleges and universities in the region as well as scientists and research engineers from local corporations and medical schools (for example, Air Products, St. Luke's Hospital, and Lehigh Valley Hospital).
5. We will build on this regional network to hold Academic Symposia in Years 3 and 5 for women scientists and engineers in the larger region encompassing Pennsylvania, New York, New Jersey, and Delaware. We will focus on Interdisciplinary Research, inviting guest speakers to discuss topics of particular interest to women at various career stages who are building interdisciplinary networks.

#### Open Access Information Initiative to Facilitate Interdisciplinary Collaboration

A key element of the Lehigh ADVANCE program website will be a dedicated link where faculty and other researchers can conduct searches by keywords, titles, or names to find potential collaborators or intersecting areas of interdisciplinary work. To facilitate spontaneous collaboration, the site may list the expertise, recent research grants, publications, and/or visionary statements of the existing faculty and researchers who are champions of interdisciplinary work and would welcome wholeheartedly the inquiry of new faculty. The faculty list on the site will be updated periodically as more members join the collective. This site will also boast lists of facilities, laboratories, and equipment with contact names, where STEM faculty may inquire about shared use of such resources. We intend to launch this site for Lehigh faculty initially and make it available to regional institutions in later years as we discern the benefits of the site for its participants.

#### Strategies for Clustered Faculty Hiring

As noted earlier, Lehigh will hire an estimated ten faculty annually to interdisciplinary STEM areas outlined in the Strategic Plan. Through robust searches we intend to match in our hiring, at the minimum, the availability of women PhDs in the relevant fields in engineering and the natural sciences. We will pursue a planned suite of strategies including clustered faculty hiring, broad definition of fields, multi-year hiring plans that permit long-term search strategies, interdisciplinary search committees that include women, networking with target departments and centers for recruiting recent PhDs and postdoctoral scholars, and providing funds to departments for inviting advanced graduate students to give seminars and become familiar with Lehigh.

#### Statement of Institutional Commitment and Sustainability

Lehigh's administration is fully engaged in the development of this proposal. As PI, Provost Patrick Farrell initiated this project and will chair the Lehigh ADVANCE Leadership Team. President Alice Gast will lend her international stature to mentoring senior STEM women faculty in leadership. Dean Anne Meltzer will also participate in the leadership development/dinner seminars and, with Dean S. David Wu, will provide oversight as a member of the Internal Advisory Committee. Evelyn Lynch, the LVAIC Executive Director, has pledged assistance in creating the regional network Women in Science and Engineering and organizing the academic symposia in Years 3 and 5. Please see their attached letters of commitment.

As noted in the narrative above, we expect to sustain many of our activities beyond the term of the ADVANCE grant period, including the interdisciplinary mentoring committees; retention interviews; revised evaluation policies; workshops for mentors, evaluators, and women STEM faculty; the regional network

Women in Science and Engineering; and strategies for clustered faculty hiring. Our goal of institutional transformation will result from integrating these policies and programs into our interdisciplinary structure.

### Dissemination

We will disseminate the outcomes of our strategies and research through a variety of media:

Workshops, online toolkits, and brochures on best practices in interdisciplinary mentoring and evaluation developed through leadership and retention interviews and research.

Publication in top-tier peer-reviewed journals of social science research.

Presentations at interdisciplinary and disciplinary conferences, and workshops and conferences focusing on gender in STEM fields.

Best practices workshops on interdisciplinary mentoring and evaluation at Lehigh; day-long workshop for regional faculty in Year 4.

Workshops on career advancement for women STEM faculty, postdoctoral scholars, and advanced graduate students at Lehigh; symposia on topics related to Interdisciplinary Research in Years 3 and 5.

Lehigh ADVANCE website highlighting: ADVANCE program activities and reports; achievements of Lehigh and regional STEM women; Lehigh online toolkits on interdisciplinary mentoring, evaluation, and searches; open access information to facilitate interdisciplinary collaboration.

Correspondence and networking with administrators and interested faculty at our peer institutions regarding our ADVANCE program and findings about gender and interdisciplinary collaboration. We will specifically invite individuals from these institutions, as well as colleagues at regional colleges and universities, to our workshop and symposia in Years 3-5.

### Project Management

The *Lehigh ADVANCE Leadership Team* will direct the program under leadership of Principal Investigator, Provost Patrick Farrell, to implement programs and work with faculty leaders and trustees to revise university policies. Provost Farrell will also take responsibility for convening the senior leadership development dinner/seminars and supervise faculty hiring. Co-PIs Diane Hyland, Professor of Psychology and Associate Dean for Faculty and Staff of the College of Arts and Sciences, and Jacqueline Krasas, Associate Professor of Sociology and Anthropology and Director of Women's Studies, will conduct the social science research. They will receive research support from a Research Associate. Professor Hyland will also develop the Workshops for Faculty Mentors and Evaluators and Professor Krasas will direct the joint Women's Studies-Lehigh ADVANCE activities. Co-PI Sibel Pamukcu, Professor and Associate Chair of Civil and Environmental Engineering, will collaborate with LVAIC Director Evelyn Lynch to create the regional network Women in Science and Engineering. Co-PI Jeffrey Sands, Professor of Biological Sciences, with Professor Pamukcu will organize the Academic Symposia in Years 3 and 5. Jean Soderlund will serve as Project Director of Lehigh ADVANCE, supervising the staff Project Manager.

The *Lehigh Internal Advisory Committee* will include Dean Anne Meltzer, College of Arts and Sciences, and Dean S. David Wu, P.C. Rossin College of Engineering and Applied Science. We will also invite as members four or five female and male STEM department chairs and senior faculty who participated in focus groups that we held to plan this ADVANCE proposal and the Vice President for Research and Graduate Studies. The committee will meet at least three times per year to assist the Leadership Team with issues that arise, hear reports on progress, and help implement programs/policies within their colleges and the University as a whole. We will also convene an *External Advisory Committee* of national experts in research and programs on advancing the careers of women STEM faculty. Dr. Jennifer Sheridan, Executive and Research Director of WISELI at the University of Wisconsin-Madison, and Dr. Susan Carlson, Associate Provost for Faculty Advancement and Diversity at Iowa State University, have agreed to serve on our external committee. We would like to recruit several experts on gender and

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interdisciplinarity such as Dr. Stephanie Pfirman of Barnard College, to join them on the committee. Our plan is to hold an External Advisory Committee meeting each year.

Project Evaluation

Several of the key goals of our proposal will be measured through ADVANCE Institutional Transformation indicators: 1) increasing the numbers of women faculty in engineering and the natural sciences through improved recruitment and retention; and 2) facilitating the advancement of women faculty in STEM fields to tenure, promotion, and leadership positions. We currently collect and report these data internally in order to measure our progress in diversifying the faculty. Regarding allocation of salaries, space, and start-up packages, currently the Deans and Provost monitor the distribution of resources. Compilation and reports of these data on a regular basis to the NSF will provide a systematic method for measuring equity for women STEM faculty.

Goals 3 and 4 of our proposed program will require a more extensive evaluation plan:

- 3) Advance the careers of women STEM faculty who participate in interdisciplinary initiatives through improved mentoring, networking, and clear and equitable evaluation criteria and procedures.
- 4) Institutionalize this change by embedding the program within Lehigh's Strategic Plan and developing best practices for interdisciplinary mentoring and evaluation in dialogue with female and male STEM faculty and university leaders.

Internal Evaluation

Our internal evaluator is Dr. M. Jean Russo, Senior Research Scientist and Scholar, Center for Social Research, who is external to this project but is currently conducting evaluations of two other Lehigh academic programs supported by the National Science Foundation. The aim of this internal evaluation will be to provide the Lehigh ADVANCE Program administrators with timely information regarding the aspects of the program that are successful and to advise them of the less successful aspects of the program so they can be reexamined and modified. The internal evaluator will explore the following evaluation questions. Does ADVANCE have a presence in the University? Are women STEM faculty members aware of the activities supported by the program? Have specific activities supported by ADVANCE affected career satisfaction for women STEM faculty members? Has the ADVANCE team developed workshops and symposia for department chairs, center directors, and senior faculty evaluators to educate them on issues involved in the recruitment and retention of women STEM faculty and the evaluation of interdisciplinary research? Are these workshops perceived as useful to the participants? Do women STEM faculty members perceive that interdisciplinary research is valued by their colleagues and those who evaluate their academic progress? To what extent are the activities of ADVANCE affecting institutional transformation at Lehigh University?

The internal evaluation will involve both quantitative and qualitative methods. To become aware of the activities being supported by Lehigh ADVANCE, the internal evaluator will attend strategy meetings and meet regularly with program administrators. The implementation of the activities will be documented in an annual evaluation report. An annual survey of women STEM faculty members will be conducted starting at the end of the second year of the grant. In year 2, the focus of the survey will be on their awareness of ADVANCE-supported activities and levels of participation in these activities. In years 3 and 5, the survey will focus on career satisfaction, and how ADVANCE activities, such as Interdisciplinary Mentoring Committees, workshops, and opportunities for interaction with other women faculty, affected their level of satisfaction. In years 4 and 5, additional questions will deal with their perceptions of whether collaboration and interdisciplinary research are supported and valued by their colleagues in their department or program and at the University level.

## Appendix C

## Final Proposal, 10-27-10

These same questions will be asked in year 1 as a part of the research initiative of the ADVANCE Program (see the “Measures” section of the five-page social science research supplementary document). The progress of this aspect of the program can be monitored by comparing the percentage of women STEM faculty agreeing with statements regarding value placed on interdisciplinary research in year 1 versus years 4 and 5. The internal evaluator will collect feedback from participants at the conclusion of all ADVANCE-supported workshops and symposia. Participants will provide information on what was learned, its perceived usefulness, and how workshops can be improved. In years 3 and 5, a survey will be conducted with department chairs, center directors, and senior faculty who are evaluating women STEM faculty to establish whether they understand the barriers involved in interdisciplinary research and the extent to which they are supportive of it. Finally, the internal evaluator will assist with the collection of ADVANCE IT indicators and help with preparation of the annual report.

All instruments designed for the internal evaluation will be submitted for review to Lehigh’s Institutional Review Board. All the data gathered as a part of the internal evaluation will be analyzed and reported in aggregate to Lehigh ADVANCE Program administrators. In addition to timely informal feedback, the internal evaluator will provide an annual evaluation report that summarizes all evaluation activities and outcomes for the year. This will be submitted to the Lehigh ADVANCE Program administrators and to the external evaluator.

<b>Internal Evaluation Timeline</b>	
Year 1	Document ADVANCE activities and their implementation
Years 1 through 5	Collect feedback on workshops and symposia; assist in collection of NSF ADVANCE Institutional Transformation indicators; preparation of annual evaluation report
Years 2 through 5	Annual survey of women STEM faculty
	Year 2: awareness of and participation in ADVANCE activities
	Years 3 and 5: career satisfaction and role played by ADVANCE activities
	Years 4 and 5: perceived institutional support for interdisciplinary research
Years 3 and 5	Survey of department heads, center directors, faculty evaluators regarding perceptions of interdisciplinary research

#### External Evaluation

Dr. Christine Pribbenow, Associate Scientist at the Wisconsin Center for Education Research, has agreed to serve as our external evaluator. We will communicate with Dr. Pribbenow informally during the initial years of the implementation of grant activities (years 1 and 2) by sharing evaluation and annual reports and through email and phone correspondence for consultation. In the beginning of the third year, Pribbenow will visit Lehigh to conduct interviews and focus groups with female faculty and other stakeholders, and with the Lehigh ADVANCE Program administrators and University leaders. This visit will be held in conjunction with the convening of the annual meeting of our External Advisory Committee and one of Lehigh’s events—such as a workshop, seminar, or symposium. This third year evaluation will be formative in nature and will address the following questions: Is Lehigh on track to meeting its goals of the Lehigh ADVANCE grant? Specifically, how many female STEM faculty have been hired? How many have been retained? How many have left? Why? What programs and activities have been implemented? Have they been effective? What are the barriers to achieving the goals of the grant? What changes or improvements can be made to ensure Lehigh’s success?

Appendix C

Final Proposal, 10-27-10

In year 4, Pribbenow will consult with the Lehigh ADVANCE Program administrators and internal evaluator about the data gleaned from the interviews of female faculty, particularly recent hires and assistant professors. This external review will be primarily focused on the success of the mentoring program and to be preemptive with issues in tenure and promotion for these faculty. Pribbenow will also review the evaluation data related to workshops/seminars, and department chairs' and center directors' understanding and application of best practices in faculty involved in interdisciplinary research and teaching. This fourth year review will be used to ensure that programmatic activities are aligned with the grant's goals and that they have been effective in ensuring success for faculty at Lehigh.

In year 5, Pribbenow will conduct a final site visit to conduct in-depth interviews with a sample of faculty, department chairs, center directors, and administrators, and with the Lehigh ADVANCE Program administrators. The interviews will focus on issues related to institutional change and sustainability. These data will be reported together with the results from the internal evaluation. In conjunction, the summative report will highlight the NSF indicators, such as hiring, retention and attrition, success and effectiveness of workshops, seminars, symposia, and best practices, lessons learned for creating interdisciplinary communities to advance female faculty, and sustainability of Lehigh ADVANCE programs such as the Interdisciplinary Mentoring Committees, workshops, and the regional group, Women in Science and Engineering.

Timeline of Activities and Evaluation

<b>Strategies and Research</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Interdisc. mentoring comms.					
Proximity study					
Leadership and retention Interviews					
Eval. and revise T&P Policies					
Workshops for Lehigh mentors/evaluators					
Workshop for regional mentors/evaluators					
Workshops/networking for women STEM faculty					
Symposia for regional women STEM faculty					
Website w/open access info					
Clustered hiring strategies					
Gender & interdisciplinarity research					
<b>Evaluation</b>					
Internal evaluator					
External evaluator					
External advisory comm.					

## Research Statement

“A Multi-Method Examination of the Gendering of Collaborative and Interdisciplinary Research”

Fox (2001) suggests that women, compared to men, may be more attracted to collaborative research, but may actually engage in less collaborative research due to lower levels of access to networks that foster collaboration. These problems can be exacerbated in smaller and mid-sized universities with relatively small numbers of faculty in a department and persistent underrepresentation of women. One way to build collaborative networks in this type of setting is to pursue interdisciplinary collaboration with colleagues from other departments. However, this strategy may pose risks if the university culture (e.g., promotion policies and procedures) creates inequities in the evaluation of interdisciplinary scholarship. In the Fall of 2007, a workshop, co-chaired by Diana Rhoten and Stephanie Pfirman and sponsored by the NSF ADVANCE program at Columbia, Barnard College, and the Social Science Research Council, brought together panels of scholars from a number of disciplines to assess current knowledge and unresolved questions related to women, minorities, and interdisciplinarity. One major conclusion from this workshop is that there has been inadequate research which examines gender differences in intellectual preferences for and professional consequences of interdisciplinary science. We propose research that will address these questions in the particular organizational context of mid-sized, private, research universities, which may pose a unique set of opportunities and constraints.

### Key Questions the Research Will Address

This project will explore the gendering of collaboration and interdisciplinarity by studying research preferences, research activity patterns (which reflect faculty preferences, the norms of academia, patterns of networking and mentoring, and the organizational constraints of their institutions), and career outcomes of women and men. One strand of this empirical research will focus on the gendering of antecedents, research activities, and career consequences of interdisciplinary research. It is often difficult in reviewing earlier findings to disentangle effects of team-based collaboration from effects of interdisciplinarity. Single investigators can pursue unidisciplinary or multidisciplinary research programs, and team-based collaboration can be conducted within a single discipline or can span multiple disciplines. The proposed research will examine these dimensions independently and in interaction. We will explore the antecedents, research activities, and career consequences for female and male scientists who predominantly: work within established disciplinary boundaries; pursue interdisciplinarity by single-handedly integrating the concepts, methods and results from multiple disciplines; engage in team-based research with collaborators working within a single discipline; and engage in interdisciplinary team-based research as a member of a multidisciplinary team. A second strand of this empirical research will explore the gendered organization of work through an ethnographic case study of Lehigh University faculty working in the interdisciplinary clusters as the university implements the ADVANCE interventions. This research will examine academic labor processes and the social organization of work in STEM fields particularly as they relate to the complex interaction of organizational culture and practices and formal policies. The main areas of inquiry will focus on the social organization of work, including the relational and technical/procedural aspects of the work, the meaning of work, and the dynamics of power and inequality as they play out in this particular institutional context.

A rich understanding of the gendering of collaboration and interdisciplinarity will require combined use of survey, interview, observation, and bibliometric methods. Survey methods will examine research preferences and self-reported research activities in faculty representing multiple disciplines and ranks, including comparisons between faculty who do and do not participate in interdisciplinary initiatives. This is an important expansion on research that has solely focused on the self-selected faculty in interdisciplinary centers. Surveys will also be used to examine perceptions of the costs, benefits, and

evaluation of collaborative and interdisciplinary research. Ethnographic interviews and observations of individuals participating in interdisciplinary initiatives will complement the survey research by providing thick description corresponding to the main thematic areas and will allow the researchers to pursue paths of inquiry that were not predetermined, potentially shedding light on some less obvious but equally important phenomena. Data will be gleaned from in-depth interviews conducted with faculty, department chairs, program directors, and deans to shed light on the organization of work in STEM fields. Bibliometric analyses of the research productivity of scholars pursuing different research paths will be used to assess gendering of career outcomes in scientists who vary in the degree of collaboration and interdisciplinarity of their research.

### The Theories that Guide the Research

The conceptual model guiding this research is itself interdisciplinary drawing from existing theories and empirical research in sociology, labor relations, women's studies, psychology, and evaluation science.

**Gendered Organizations and Labor Process Theory:** As indicated in the project proposal, part of the theoretical framework for this research rests on labor process theory and a gendered organizations approach that stems from the early work of Kanter (1977) on tokenism and the work of Braverman (1974) on the social and technical organization of work. According to Acker (1990) "to say that an organization is gendered means that advantage and disadvantage, exploitation and control, action and emotion, meaning and identity, are patterned through and in terms of a distinction between male and female, masculine and feminine" (p. 146). Organizational logic, formerly understood as gender-neutral, is thus undergirded and permeated by gender. Gendering in this sense pertains to everything from divisions of labor (e.g. specialization) and identity to interaction and organizational structures. West (1990) specifically analyzes gender and the "labor process" (Braverman 1974, Thompson 1983), the gendering of work through the ways in which it is conducted, the meanings given to that work (e.g. what counts as "skill"), and the power relations among individuals and groups in the organizational context. Scholarship anchored in these approaches is often conducted using ethnographic methods (Burawoy 1979, Pierce 1996, Smith 1997).

**The Science of Team Science:** To date, this recently developed field of evaluation research (Stokols, Hall, Taylor, & Moser, 2008) has focused on providing theories, methods, and measures useful to the design, implementation, and evaluation of large-scale, multi-institutional, cross-disciplinary research initiatives, particularly in the area of health. However, the science of team science social-ecologic model (Stokols, Misra, Moser, Hall, & Taylor, 2008) can provide a useful lens for examining antecedents, processes, and outcomes of any type of collaborative research. An important theme in this approach is "readiness for collaboration." For the purpose of the present project three important factors have been found to facilitate or constrain capacity for collaboration: intrapersonal factors, such as individual scientists' unidisciplinary/ interdisciplinary research orientations and their attitudes toward collaboration; interpersonal factors, such as leadership styles of team leaders, mutual respect among team members, and effective communication opportunities; and, organizational/ environmental factors, such as size of work group, spatial proximity, and institutional support for interdisciplinary research.

**Social Cognitive Career Theory (SCCT):** Lent, Brown, and Hackett (1994; Lent & Brown, 2006) developed an integrative theory to explain academic and occupational interest, choice, performance, and satisfaction. The basic elements of SCCT are: self-efficacy, beliefs about ability to perform specific behaviors; outcome expectations, beliefs about the consequences of actions; goals, desire to engage in an activity or produce an outcome; and perceptions of contextual supports and barriers that will influence goal pursuit and attainment. This model has explained effectively the factors that attract (and retain) students, including women and students attending Historically Black Colleges, to STEM fields such as engineering and computing (Lent et al., 2005; Lent et al., 2008) and differences in male and female

chemists' perceptions of quality of mentoring they received during graduate, postdoctoral and early career training (Nolan, Buckner, Marzabadi, & Kuck, 2008). The elements of SCCT most relevant to this project are goals and perceptions of contextual supports and barriers for interdisciplinary research.

### Study 1: Gendering of Research Preferences, Activities and Outcomes

Faculty from mid-sized, private, research extensive universities will complete a survey assessing their research preferences, research activities, self-reported productivity, and perceptions of interdisciplinary research. Bibliometric analyses of their research productivity will also be conducted. Data will be disaggregated for gender, rank, discipline/department, and whether or not affiliated with an interdisciplinary center. If there are sufficient data we will also conduct exploratory analyses for race and age/cohort.

#### **Hypotheses:**

With respect to research preferences, women (compared to men) will have greater preferences for collaboration and for interdisciplinary research.

With respect to research activities, gender differences in the amount of collaborative research will be smaller in faculty who are affiliated with interdisciplinary centers compared to non-affiliated faculty.

With respect to collaboration, the correlation between preferences and research activities will be stronger for males than females and for center-affiliated than non-affiliated faculty.

With respect to interdisciplinary research activities, the largest gender difference will be found for single investigators pursuing sole interdisciplinary research.

With respect to career outcomes, gender differences in research productivity will be smaller in center-affiliated than non-affiliated faculty.

**Participants:** Faculty will be recruited from Lehigh and the following institutions (listed with the number of full time tenure track faculty and % women based on Fall 2007 IPEDS data): Case Western Reserve University (554 – 34.1%), Catholic University of America (345 – 36.2%), Rensselaer Polytechnic Institute (398 – 20.9%), Rice University (491 – 25.5%), Southern Methodist University (474 – 25.9%), Tufts University (534 – 38.0%), Tulane University (454 – 30.6%), University of Denver (461 – 40.6%), and University of Rochester (476 – 25.0%). These institutions were selected because they meet the following criteria: Carnegie Doctoral/Research University – Extensive; offer doctoral degrees in engineering as well as the sciences; private; medium-sized faculty; and presence of many interdisciplinary centers and institutes. We will verify that at each institution all tenure track faculty have a departmental appointment. Then for each institution we will review faculty listings on department web pages for all engineering, physical science, and life science departments. Since the primary analyses will involve gender comparisons, all female faculty in these departments, and a male peer of the same rank from that department, will be asked to participate.

**Procedures:** The survey will be administered online. Each potential faculty participant will be sent an email with a link to the password-protected survey. Reminder emails will be sent at 1-, 2-, and 3-week intervals.

**Measures:** The survey will include a number of items assessing collaborative and interdisciplinary research preferences and activities. Type of research preferred will be assessed with the 10-item, Research Orientation Scale developed by Hall et al. (2008) that assesses preferences for unidisciplinary, multidisciplinary, and interdisciplinary research. Adapted from Boardman and Corley (2008), we will ask what percentage of research-related work time they would *prefer to spend* and the percentage they *actually spend* on the following: working alone on research that does not include a collaborator; working

with faculty and graduate students in your discipline at your institution; working with faculty and graduate students in other disciplines at your institution; working with faculty and graduate students in your discipline at other institutions; working with faculty and graduate students in other disciplines at other institutions. Adapted from Rhoten (2003), we will ask respondents to classify % of collaborations that are predominantly “close-knowledge creating, involving not only the sharing of ideas and information, but also the collection of data and preparation of papers” and % that are “collegial – primarily information sharing.” We will also ask for the % of collaborators who are female, the % who are individuals the researcher is supervising or mentoring, and the % who are the researcher’s mentors or graduate advisors. We will also ask whether they have co-authored research articles or books with individuals outside their home discipline; published research findings in a journal outside their home discipline; or presented research findings at a conference outside their home discipline; written a research proposal with a colleague from another discipline; obtained a grant with a colleague from another discipline; team-taught a course with someone from another discipline; and mentored a graduate student from another discipline. To assess self-reported productivity, participants will be asked how many books, journal articles, and book chapters have been published and how many grant proposals have been submitted during the last 4 years. The final set of questions will assess faculty perceptions of the value placed on and ease of evaluating interdisciplinary research. For example, they will be asked for level of agreement with the following types of statements: faculty members in my department value collaboration; faculty members in my department value interdisciplinary research; my department chair (dean) values collaboration; my department chair (dean) values interdisciplinary research; interdisciplinary scholarship is more difficult to evaluate than disciplinary scholarship.

**Bibliometric Analyses of Gender Similarities and Differences in Research Productivity:** As each potential participant is identified, we will search on department and center web pages to code for gender, discipline of PhD, year of PhD, current rank, current department affiliation, and affiliation with interdisciplinary initiatives. Then we will use ISI Web of Knowledge to conduct an author search to create a list of published journal articles. For each faculty member, we will code for number of publications, fields of publications, % single author, % coauthored within discipline with one institution, % coauthored within discipline more than one institution, % more than one discipline within institution, and % more than one discipline more than one institution. Number of published journal articles was selected as the measure of research productivity since it is the primary form of scholarly output in these disciplines at research extensive universities. Prior research (Leahey, 2007) has shown that it is also highly correlated with total productivity counts that include books, book reviews, and contributions to edited volumes.

### Study 2: Gender and the Labor Process in Interdisciplinary Clusters

A combination of ethnographic interviews and observations will be used to assess Lehigh faculty experiences in the interdisciplinary clusters. In addition to demographic information and a basic work history, the main areas of inquiry for the interview guide are designed to analyze both the material and social organization of work. For each area, we will develop specific questions to be asked in a semi-structured in-depth interview format. Broadly, interview questions will be ordered around the following themes:

- Career trajectories and decisions about work.
- Key individuals and structures that enable them and/or hinder them.
- Their evaluation of interdisciplinary work, its value to them, to their field, and to the institution.
- Interpersonal relations at work in disciplinary and interdisciplinary contexts.
- Work and family dynamics.
- How power is distributed.

**Examples of in-depth interview questions:**

Describe how your discipline views and rewards interdisciplinary work.

What led you to work in this interdisciplinary cluster?

What portion of your time is devoted to interdisciplinary work?

To what extent do you think that participation in a cluster has an impact on teaching, research, networking and/or productivity?

What are the risks and rewards that accompany participating in a cluster for you? Would you say your experience is typical?

How does working in the interdisciplinary cluster compare with other academic work experiences for you? For example, is there more or less social support? Intellectual support? Resource support?

In your view, why do faculty seek out interdisciplinary work?

What organizational aspects of your research cluster facilitate collaboration, productivity and satisfaction? What are the barriers? What other kinds of organizational policies/practices would be beneficial to you?

Describe how faculty relate to each other within the cluster. How does this compare with intradepartmental relations?

Would you say it is easier or more difficult to find balance between work and home life working through an interdisciplinary cluster?

**Hypotheses:**

Interdisciplinary work will have a beneficial effect upon feelings of integration or isolation.

Institutional arrangements can help or hinder the pursuit of interdisciplinary work.

Interdisciplinary work represents a risk to the scholar.

Work and family dynamics affect and are affected by interdisciplinary work.

Power is distributed in more egalitarian ways in interdisciplinary contexts.

Interdisciplinary work is gendered.

Expected Results

The results of these two studies will give us rich qualitative data about the gendering of interdisciplinarity in the ongoing experiences of faculty at Lehigh and a base of quantitative data on the research preferences, activities, and outcomes of faculty at mid-sized research extensive universities. Our findings will shed light on the complexity of organizational practices and structures within which interdisciplinary work is located. Together the two studies will help us understand how trends toward scholarly interdisciplinary study may enhance or impede the recruitment, retention, and advancement of women faculty in STEM fields.

**Lehigh ADVANCE External Advisory Committee  
Meeting with Leadership Team**

Friday January 28, 2011

9:00-10:00 am, *University Center, 306***Participants:*****External Advisory Committee:***

Alice Gast, Chair of External Advisory Committee

Susan Carlson, University of California

Jennifer Sheridan, University of Wisconsin

Karen Thole, The Pennsylvania State University

***Leadership Team Participants:***

Pat Farrell, PI, ADVANCE Leadership Team Chair

Mooi-Choo Chuah, ADVANCE Chair, Assoc. Prof. Computer Sci.&amp;Eng.

Elizabeth Hendrey, Visiting ACE Fellow, Dean Sociology, Queens College

Diane Hyland, Co-PI, Assoc. Dean College of Arts &amp; Sciences

Jackie Krasas, Co-PI, Dir. Women's Studies

Marci Levine, ADVANCE Project Manager

Pat Mann, Admin. Director to Provost's Office

Jean Russo, ADVANCE Internal Evaluator, Ctr Soc. Res.

Jeff Sands, Co-PI, Prof. Biological Sciences

Jean Soderlund, ADVANCE Project Director

Susan Szczepanski, ADVANCE Chair, Assoc. Prof. Mathematics

**Summary:****I. Welcome and Orientation to Plan of Day**

Dr. Alice Gast, President of Lehigh University opened the meeting and invited participants to introduce themselves. Provost Patrick Farrell then explained that the overall goal for the meeting is for the Lehigh ADVANCE Leadership Team to learn what works and what doesn't, and what might be of benefit at Lehigh, given the experience and expertise of the EAC members. During this session, several LT members reported on progress and plans on initiatives not covered in depth at later discussions with the EAC.

**II. Leadership and Retention Interviews**

Jeff Sands reported that Leadership & Retention Interviews have been initiated. Four science and engineering faculty members of the LT (Jeff Sands, Sibel Pamukcu, Susan Szczepanski, and Mooi Choo Chuah) will individually interview all 30 women STEM faculty. Guidance on conducting interviews was provided by Jackie Krasas and Diane Hyland, including having mock interview training. They have IRB approval and the interviewees were told that the information will be used only in aggregate to discover important themes, and no information will be traced to their personal narrative. The interviewees will be asked to describe their view of the landscape at Lehigh, given their personal history and the questions are tailored to their rank. Questions include open-ended prompts to discuss aspects of their experiences at Lehigh that are good or positive and those that might need improvement. Dr. Thole asked if this process will interview the male faculty, and noted that the new, younger male faculty tends to see the benefit of the types of changes ADVANCE can bring. LT members explained this type of interview is not questioning the men; it aims to inform the planning process of the ADVANCE programs that will work on behalf of women in STEM. Everyone agreed the overall learnings will be of benefit to the broader University Community and men will be included in other initiatives.

**III. Women's Studies Collaboration.**

Jackie Krasas summarized the history of the WS program and its successes connecting women across departments and administrative offices through its informal gatherings and reading groups. By leveraging the WS program, the presence of ADVANCE related issues can be enhanced and discussed campus-wide. Events are promoted primarily through a list-serve. **It was suggested and agreed that the STEM post-doctoral researchers should be added to the list serve because they often are very isolated.** A joint

## External Advisory Committee Meeting Minutes 1-28-11

ADVANCE-WS event is planned for February 25; Susan Basow, Lafayette College will speak on gender bias in teacher evaluations. Another possible topic could be about gendering of letters of recommendation. The Faculty Research Forum will feature ADVANCE. WS has reached out to women faculty candidates and remains available for search committees to discuss issues related to gender and hiring.

**IV. Social Science Research**

Diane Hyland and Jackie Krasas reviewed the scope of the social science research ADVANCE will conduct. There is considerable speculation in the literature that women are drawn to interdisciplinary activities, however this is only from evidence of large universities and has not been studied in depth. Understanding the factors of gendering in interdisciplinary work is complicated by how different institutions define interdisciplinarity and the complex relationships such work entails. The first Lehigh ADVANCE research study will identify nine other universities similar to Lehigh (small, private, research focused). The goal is to identify women STEM faculty and their career matched male peers as the study population. Questions to be explored include: is there gendering of preference to interdisciplinary work, is there gendering of actual activity patterns, what are any perceptions of value placed at your institution, how is research success/career success evaluated for such faculty members. A bibliometric study will be conducted to examine how interdisciplinarity impacts publication record, a key metric of tenure evaluation. A qualitative study will be conducted at Lehigh comparing men and women focusing on interdisciplinary clusters and applying academic labor process theory to understand what the work is like and how proximity impacts the work experience. Teaching will be part of the cluster hiring and might also need to be evaluated with a different model. Attention should be paid to the candidacy exam requirements for the graduate students trained in interdisciplinary research teams.

**V. LU-WISE Group**

The ADVANCE grant affords Lehigh University to form a Women in Science and Engineering Group focused primarily on building community and reducing isolation and Mooi Choo Chuah, reported that Sibel Pamukcu is spearheading this initiative. Initially, LU-WISE aims to provide opportunities to network and promote research collaborations. The first LU-WISE event was held January 21, 2011 and 18 women attended to become familiar with the research of two women STEM faculty. Overall feedback indicates this was a successful event and the planning team aims to deliver these throughout each semester. A web-based database of women STEM faculty is planned for the LU community and beyond. Our proposal is to broaden the network of WISE to the LVAIC schools and to regional corporations and non-profits.

**VI. Leadership Development Seminar Series**

Patrick Farrell reported on this initiative led by Tina Richardson, College of Education. Tina has spent considerable time reviewing what other ADVANCE programs have offered and has initiated a dialogue with Lehigh women STEM faculty to understand what will provide value to them. Here at Lehigh, student leadership training is strong. For faculty, it was recognized there are two types of leadership: formal (with department chair titles, etc.) and informal, leading an activity or convincing others to do something. Two colleges at Lehigh (CAS and RCEAS) include leadership in their criteria for promotion to full professor.

**VII. Evaluation of P&T procedures for interdisciplinary faculty.**

Patrick Farrell described that over the past few years Lehigh has developed specific processes for hiring, mentoring, and evaluating faculty with formal joint appointments. It is clear, however, that we need to assess systematically the situation for faculty who participate in interdisciplinary research and teaching but do not have formal joint appointments. Evidence suggests that faculty evaluators sometimes have insufficient knowledge of the teaching and service that faculty contribute to interdisciplinary programs, and lack understanding/appreciation for journals and other publication venues in newer fields. We intend to benchmark policies/guidelines for evaluating interdisciplinary research & teaching. At this point we are unsure whether new formal P&T policies and criteria are needed or whether this is more a matter of addressing department climate through guidelines and workshops. If new P&T policies and criteria are needed, we will development them in consultation with faculty committees.

**Lehigh ADVANCE External Advisory Committee****WORKSHOPS**

Friday January 28, 2011

11:00am-12:00pm, *University Center, 306***Design & Delivery of ADVANCE Workshops for  
STEM Women Faculty, Department Chairs, P&T Committees****Participants:*****External Advisory Committee:***

Alice Gast, Chair of External Advisory Committee

Susan Carlson, University of California

Jennifer Sheridan, University of Wisconsin

Karen Thole, The Pennsylvania State University

***Lehigh University Participants:***

Elizabeth Hendrey, Visiting ACE Fellow, Dean Sociology, Queens College

Diane Hyland, Co-PI, Assoc. Dean College of Arts &amp; Sciences

Marcy Levine, ADVANCE Project Manager

Pat Mann, Admin. Director to Provost's Office

Vincent Munley, Deputy Provost, Faculty Affairs

Jean Russo, ADVANCE Internal Evaluator, Ctr Soc. Res.

Alan Snyder, VP &amp; Assoc. Prov. Research &amp; Grad. Studies

Jean Soderlund, ADVANCE Project Director

S. David Wu, Dean PC Rossin College Engineering &amp; Applied Sciences

**SUMMARY- Discussion regarding workshops:**

Diane Hyland initiated the discussion by explaining that Lehigh ADVANCE is looking for advice about how to provide opportunities while avoiding overload. Initially, Diane pictured three categories of training: for STEM women, for Mentors, for Evaluators, however these will frequently be the same people. Concerns include how to roll out 'training' programs? How much repetition is required, and who should be the messengers and how and when to focus activities appropriately for STEM women faculty and the broader University community.

One thing that became clearer throughout the conversation is that it is appropriate to separate mentoring from the evaluation workshops.

In Spring 2011 we aim to provide training for the new "interdisciplinary networking committees" for new faculty hires (these are three person mentoring committees). It was pointed out this effort can serve as a pilot program. It was suggested to review the other ADVANCE programs' materials, especially University of Michigan and New Mexico State, and make these specific to interdisciplinary mentoring. The emphasis should be on mentoring, but introduce as a segment of the event (maybe a 2-4 hour event, not an all day program) the concept of gender bias. It was suggested that other scientists/engineers make good messengers because of added credibility with the science and engineering faculty. Case studies will be important and delivering data will be meaningful to the target audience. Georgia Tech has some case studies on its website.

Some of the discussion explored how best to tap internal and external speakers. ADVANCE can support external speakers by paying for travel of the expert and by helping the external speaker to understand the culture at Lehigh. For a big event involving an external speaker it is best to make it multi-disciplinary and to make sure key people are able to

## Appendix D

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attend (department chairs, deans, vice president for research, and internal experts in STEM). Such an event requires lots of careful preparation; a bad workshop is hard to recover from.

For workshops geared towards P&T committees, faculty evaluators, and chairs, Lehigh ADVANCE team was steered to the PSU activity on implicit gender bias. It was suggested to have a workshop that includes the outcomes of the Leadership & Retention interview data.

Diane imagines that when search committees are initiated, the issues that ADVANCE aims to address will be included in the formative discussions of each committee; she wondered how to get invited to departments and programs to keep the dialogue going. The EAC members suggested that other campus programs can support the work of ADVANCE; not every ADVANCE-related topic should be branded ADVANCE. Also, it maybe possible to learn from progress made in other fields like law and medicine.

One suggestion was for members of the Leadership Team to interview each department chair to learn about their challenges and strategies in the areas are recruiting and retaining women STEM faculty. Another approach is to have a prominent, campus-wide workshop on interdisciplinarity, which would be the hook to discuss implicit gender bias. Again, the importance of having support from the Deans was referenced.

*Overall, a careful well thought out approach leveraging existing standing meetings, demonstrating the visible support of high-level administrators while offering only a few additional workshops was supported.* Lehigh ADVANCE Leadership Team could consider an annual planning retreat to map out all events in the upcoming calendar year. Examples of events could be to have an annual meeting or an all-faculty workshop, tapping into existing department head breakfasts, etc. Additional 'training' can be offered on an invitation basis.

**Lehigh ADVANCE External Advisory Committee**

**LU STEM Women LUNCH**

Friday January 28, 2011

12:00-1:00, University Center, Faculty East Lounge

**Topics for Discussion:**

- \* Climate for women STEM faculty at Lehigh University
- \* Suggestions for improving recruitment, retention, and career support
- \* Other topics of interest

**Participants:**

***External Advisory Committee:***

Susan Carlson, University of California

Jennifer Sheridan, University of Wisconsin

Karen Thole, The Pennsylvania State University

***Lehigh University STEM Women Faculty:***

Mooi-Choo Chuah, ADVANCE Chair, Assoc. Prof. Computer Sci.&Eng.

Xiaolei Huang, Asst. Professor Computer Sci.&Eng.

Sabrina Jedlicka, Asst. Professor, Materials Science & Engineering

Tiffany Jing Li, Assoc. Professor Elect. & Computer Engineering

M. Virginia (Ginny) McSwain, Assist. Prof. Physics

Joan Ramage McDonald, Assist. Prof. EES

Jennifer Swann, Prof. Biological Sciences

Susan Szczepanski, ADVANCE Chair, Assoc. Prof. Mathematics

***No notes from the lunch, some were captured in the final summary of the EAC to Farrell and Soderlund.***

## **Lehigh ADVANCE External Advisory Committee RECRUITMENT**

Friday January 28, 2011

1:00-2:00, University Center, 306

### **Recruitment of STEM Women Faculty at Lehigh University**

#### **Participants:**

##### ***External Advisory Committee:***

Alice Gast, President Lehigh University, Chair of EAC

Susan Carlson, University of California

Jennifer Sheridan, University of Wisconsin

Karen Thole, The Pennsylvania State University

##### ***Lehigh University Participants:***

Pat Farrell, PI, LT Chair

D. Gary Harlow, Chair, Professor MEE

Elizabeth Hendrey, Visiting ACE Fellow, Dean Sociology, Queens College

Jackie Krasas, Co-PI, Dir. Women's Studies

Anne Meltzer, Dean, College of Arts & Sciences

Frank Pazzaglia, Chair, Professor Earth & Environ. Sci.

Jeff Sands, Co-PI, Prof. Biological Sciences

Jean Soderlund, ADVANCE Project Director

#### **Summary:**

President Alice Gast, the External Advisory Committee chair, opened the meeting by asking participants to introduce themselves. Provost Pat Farrell, Lehigh ADVANCE Principal Investigator, provided a brief overview of existing and proposed recruitment initiatives:

- I. Departmental Seminar Grants:** We have initiated our grant program to provide funding for departments and interdisciplinary programs to bring women STEM postdoctoral scholars and advanced graduate students to campus to give a seminar about their research and network with Lehigh faculty with the goal of encouraging them to consider Lehigh when appropriate positions become available.
- II. Existing Lehigh programs for faculty work life balance:** Spousal hiring guidelines, tenure clock extensions, fully paid FMLA leave for faculty, Lehigh Sloan Research Grants to assist pre-tenure faculty who take FMLA leave for care of a child or other family member, to sustain or ramp up research productivity during or after the FMLA leave.
- III. Vice Provost Academic Diversity:** Person who holds position will focus particularly on recruiting faculty from underrepresented groups in addition to other responsibilities. The VPAD will collaborate with the ADVANCE Leadership Team to develop strategies for recruiting women in STEM fields that will work at Lehigh.
- IV. Cluster Hiring:** Received 19 submissions for pre-proposals during the fall semester, of which the Cluster Faculty Hiring Committee recommended 7 for full proposal review this spring of which 2 will be approved for searches in AY 2011-12. The potential for recruiting faculty from underrepresented groups, including women in STEM fields, was one of the criteria for selection.
- V. Outcomes of Internal Advisory Committee's discussion on recruitment.** At the IAC's first meeting in December 2010, we focused on how to step up efforts to improve the recruitment of women faculty

in STEM fields. We reviewed some of the strategies that other institutions have developed and agreed that Lehigh ADVANCE can start by providing a toolkit for department chairs and search committees on recruiting STEM women.

**VI. Discussion: Recruitment of STEM Women Faculty at Lehigh University**

- A. Are we keeping a record of faculty use of FMLAs, tenure extensions, etc. Yes.
- B. Need to recognize that cluster hiring may not result in a more diverse faculty.
- C. When creating recruitment strategies, need to start at the department level and make sure that the rationale is clear—for better science, a better department, a better Lehigh.
- D. Does Lehigh have an EEO-AA officer who trains search committees? (If we did, we would want to make sure that the person uses methods that do not alienate faculty.) The College of Arts and Sciences has full documentation and process for making sure that searches are inclusive and result in diverse candidate pools.
- E. The recruitment seminar grants are a good strategy. The administration needs to give a clear message that candidate pools must be diverse.
- F. How to make sure that, when the department chair and some faculty fully embrace need for department diversity, the rest of the department also comes on board? Experience of one department chair is that serving as an example helps to do this.
- G. Experience has shown that sometimes when a woman is the top candidate, she goes somewhere else. How can we be more consistently successful in recruiting faculty? Reasons for going elsewhere sometimes insurmountable—better fit at another institution, dual career issue that we can't meet. Lehigh now has a good dual career program and guidelines—everyone comes together to do our best—but sometimes the spouse/partner is looking for a position that is available at another institution but not here or in the Lehigh Valley. Point made that dual career issues are especially significant for women STEM faculty.
- H. Rice University's database of postdocs, grad students is very useful. Use databases like this to write letters regarding search to potential candidates.
- I. Other suggested strategies include bringing together search committee chairs from across university to discuss strategies; ADVANCE LT members meet with individual department chairs to discuss the challenges they face in both recruitment and retention of women faculty; keep an open search mentality—may need to change Lehigh policy to allow for open searches—have a job advertisement posted all of the time; start including the ADVANCE grant in job ads.
- J. Make sure that search committees start from day one in “recruiting” mode rather than “evaluation” mode. Too often Lehigh does the latter. After a strong candidate leaves campus send chocolates, emails, etc. to reinforce positive message while on campus. Place emphasis on positive environment—it can compete successfully against higher salary and start-up packages elsewhere.
- K. Provide a safe forum for all candidates to ask the climate questions (away from the department and search committee). This could be a group of Women's Studies faculty or faculty from other departments.
- L. How to create a critical mass of women for departments with few or no women? Interdisciplinary groups, courtesy appointments, add to departments/programs that currently have women faculty, hire two women to department instead of one.

**Lehigh ADVANCE External Advisory Committee**

**EAC Departing Thoughts**

Friday January 28, 2011

2:30-3:00, University Center, 306

***Participants:***

Susan Carlson, University of California

Pat Farrell, PI, LT Chair

Alice Gast, President Lehigh University, Chair of EAC

Jennifer Sheridan, University of Wisconsin

Karen Thole, The Pennsylvania State University

Jean Soderlund, ADVANCE Project Director

Departing Thoughts from members of the External Advisory Committee based on the day's meetings, including luncheon with the STEM women faculty members.

1. We are well organized for an ADVANCE program in its first year ("in great shape").
2. We should consider holding an annual retreat after the spring semester. The retreat could last four hours (lunch and afternoon), and include the LT and, for part of the day, the IAC. The main purpose of the retreat would be to create the shell of activities for the next academic year.
3. Need to recognize the significant amount of time that participants are devoting to Lehigh ADVANCE.
4. Concerns from STEM women faculty: need for mentoring of Associate Professors; women faculty often asked to serve on search committees—underscores their feelings of overload and isolation; need male advocates; some women faculty were aware of events during their hire that they should not have been told—red flag regarding climate; some departments are not very welcoming.
5. Make sure that chairs and deans are fully involved in ADVANCE.
6. Be aware that Lehigh is fairly unique among ADVANCE institutions because of our size. Keep hold of our goal to serve as model for other institutions similar to Lehigh.
7. The next hires are critically important.
8. In creating the interdisciplinary networking committees need to be careful because the full department evaluates candidates for P&T. Be sure to listen to faculty in regard to these committees. Build in a way to have turnover on committee in case of need for a new member or members.
9. Create the networking committees for women and men faculty, otherwise women faculty will think they are being targeted in some way.

**NSF Advance Grant  
Internal Advisory Committee  
5-11-11 Meeting Minutes**

Present: Anne Meltzer, David Wu, Alan Snyder Tiffany Jing Li, Jennifer Swann, Gary Harlow,  
Vince Munley  
Absent: Frank Pazzaglia

Agenda Items:

1. Selection of IAC Chair: Tiffany Jing Li
2. Selection of IAC Secretary Vincent Munley
3. Frequency of Meetings:
  - a. Once per semester with Leadership Team
  - b. Once per semester alone – a week or two after joint meeting with leadership team to facilitate reflection / deliberations
4. A discussion ensued about the mission of the IAC and how it will function operationally  
Mission
  - a. Advisory capacity, not action orientated
  - b. Contribution: Independent thought and independent voice
  - c. Measuring progress relative to stated goals
  - d. Identifying appropriate mid-course corrections / adjustments (if needed)
  - e. Recognize successes & make sure that these are communicated effectivelyOperational
  - a. On the record communication to Leadership Team
  - b. Explicitly ascertain the degree / extent to which the activities underway are clear to us – if they are not clear to us, then what about the rest of campus
  - c. Seek to identify potential pitfalls and bring these to the attention of the Leadership Team

Action Steps for IAC

- a. Understand the plan / action items of intended progress for the project  
{Short term & long term objectives}
- b. Develop a mechanism for obtaining assessment results from Jean Russo
  - Determine if she has / will complete a baseline assessment
- c. Brainstorm about results
- d. Develop a (consistent) framework for structuring our documentation
  - (e.g., Opportunities and Threats)
- e. Importance of evaluating the impact of Advance Grant activities within the context of other (quite possibly related) activities on campus (e.g., cluster development)
- f. Maintain focus on importance of identifying aspects of the Advance Grant activities that are ‘unique’ to the many other universities of like size, like mission to Lehigh that may not manifest themselves in the same way at large State universities  
(e.g., the relative importance of interdisciplinary work)

**Action Items**

1. All IAC members re-read final version of Lehigh's Advance Proposal
2. Determine if any dimensions of the proposal's deliverables are not clear
3. Develop a small number of questions to submit to the Leadership Team prior to its June 7 retreat about how all the pieces of the proposal and initial two quarterly reports fit together
4. List any opportunities or threats that the IAC has identified thus far

## **Synthesis of Leadership & Retention Interviews** **4/1/11**

n=20 (4 did not respond to multiple contacts to sign up)

Mentoring issues: most, if it's there, is how to work in the 'system', need help building network; get mixed messages about way to plan career (individual PI or collaborative; when is it right to pursue new research direction) mentors need better training, including chairs

Isolated: either by gender or scope of research (especially if advised to do solo grant vs. team) relative to dept. or by geography, feelings of competition with other junior faculty: suggestions and things that work include casual settings to discuss solutions to common problems (different life stage from sr male faculty reduces chances for socializing)

Work-life issues: *especially child care* and especially not feeling respected for making certain choices, adds to "feeling like there are *difficult people* to deal with" who "don't get it" for example, if took tenure clock extension. (adds to isolation, adds to self-doubt). Of the women here long enough to report a change, recognize an evolution in the work/life issue here at Lehigh; several really think child care options are not adequate; several want it recognized that it's multiple responsibilities/jobs throughout lifecycle (teenagers, aging parents, not having your own children)- and the choices that go with balancing a career and personal life seem incongruent with some deans/chairs expectations, some said deans/chairs have good intentions, but need continual training

Hiring strategies/searches: need improvement!!! (this was said explicitly by 7 out of 11 women) and emphasized in most of other interviews. Need to do a better job.

Promotion/Tenure/Recognition: many unclear of requirements, some hadn't been told of tenure clock extension, some had; hard to decipher deans/chairs expectations or definitions of success, different disciplines have different metrics of success, comments about potential inequities in approach to promotion of women and composition of P&T committee; mentoring students (esp. MS students) not always valued.

Research: resource allocation, including graduate students not equal, some say they don't have good PhD students.

Teaching: not always equitable or clear why assignments made certain ways.

Big Picture: High level administrative support: not always sure it's really there, train the deans/chairs, strong messages from provost/president needed, and information flow from senior women to junior women, reality that Lehigh isn't really as diverse as it advertises.

Problematic people-men-lack of respect/"don't get it", give mixed messages

Resources/Recourse/Safe place: visible and 'safe' location for consulting about issues without fear of repercussions/ women's group to get together and discuss solutions to common issues; how to say no.

Things that were good for my career: senior colleagues that are supportive (emotional, technical), having same career stage peers (esp at jr faculty level), getting help to organize a workshop or conference in my area of research.

Related to Interdisciplinarity: most rely on own connections, many received mixed messages about merits of pursuing interdisciplinary or even new direction in research as it isn't clear how this would be evaluated.

### **Faculty Focus Groups**

May 2011

*Preliminary Summary*

*(final summary will be prepared for the next interim report)*

During the week of May 9, 2011, four focus groups were conducted to collect qualitative baseline data at Lehigh University. Based on the notes provided from the March & April 2011 Leadership and Retention Interviews, we developed questions to guide the discussion for the focus groups.

Jackie Krasas and Diane Hyland of the Lehigh ADVANCE social science research team conducted the focus groups. Focus groups were recorded; however, identifying information will be removed upon transcription. Once transcription is complete, the recordings will be destroyed. Recordings are kept in a locked drawer in the ADVANCE research office. The social science team will analyze the transcripts and prepare a final summary for the next interim report.

All women assistant, associate, and full professors in mathematics, psychology, sociology and anthropology, economics, natural sciences, and engineering departments at Lehigh were contacted by email to request their participation in the focus groups. We included a group of matched male untenured male faculty in these same departments in order to gauge to what extent issues raised may be relevant to all new faculty.

Potential faculty participants were emailed the informed consent and the purpose of the ADVANCE project and the role that the Leadership and Retention Focus groups will have in shaping institutional transformation at Lehigh. Once faculty consented to participate in a focus group they were directed to the ADVANCE website and a link to sign up for the appropriate focus group time.

We aimed for focus groups of 6-8 participants designed to be as homogeneous as possible with regard to gender and rank to promote comfort and ease of discussion for the participants. However, due to subject availability, the focus groups were a little smaller. The four resulting groups were:

1. May 9: Untenured STEM women, n=4
2. May 10: Tenured STEM women, n=4
3. May 11, Social Science STEM women, n=5
4. May 12, Untenured STEM men, n=4

Generally, the results of the focus groups mirror the L&R interviews, with the addition of women requesting more attention to mid-career initiatives. For example, someone said it would be nice to have a Sloan-type award for associate professors trying to move toward full.

The younger men seemed especially to echo the work/family issues and said that their colleagues who raised families under very different circumstances sometimes "don't get it."

Women mentioned the additional difficulty of traveling to conferences or symposia when they have small children. When this is seen as a marker of success, women fall short because they don't tend to leave their small kids often. It's important to recognize life-stage related fluctuations in the rate and type of "productivity."

Several identified a good chair as the key to realizing many of the policies and changes we've already implemented. Without them, policies don't get used. Several thought it very important to educate and get on board anyone who is involved regularly in hiring, tenure, & promotion -- so search committees, P&T committees, chairs, deans, etc.

Interdisciplinary work is seen as potentially a risk. Departments want faculty to be department-focused.

Several identified positives include: the tenure clock policy, Sloan grant, FMLA for faculty, and Women's Studies events where faculty network/mentor and feel a sense of reduced isolation.

**FOCUS GROUP QUESTIONS:**

*Do you have any questions before we begin the focus groups?*

*In terms of women in STEM at Lehigh, what are your top 3 major concerns there?*

*Does Lehigh have the right policies and procedures in place to support recruitment and retention of women faculty?*

*Do you find that colleagues understand the issues of women in STEM fields? To what extent are they educated and helpful?*

*How well does Lehigh handle mentoring of faculty at different stages?*

*What is it like to try to balance work and life at Lehigh? Have the university's recent efforts helped you or others like you in any way?*

*To what extent do you think isolation is an issue for certain faculty at Lehigh? What kinds of things might reduce isolation that some people feel?*

*In your experience, how equitable is Lehigh when it comes to things like resources, teaching load, service, evaluation?*

*What is your assessment of the promotion and tenure process? How clear is it? How fair is it?*

*What are the benefits and drawbacks of participation in interdisciplinary research at Lehigh?*

*When it comes to your career progression, what kinds of things have worked well for you here at Lehigh? What can Lehigh do to improve?*

*LU-Survey Instrument Email:*

**Message: Lehigh ADVANCE STEM Faculty Survey** 

 Reply ▼  Forward ▼  Delete

**Subject:** Lehigh ADVANCE STEM Faculty Survey  Print  
**Date:** Mon, 02 May 2011 11:35:10 -0400 [05/02/2011 11:35:10 AM EDT]  View Message Source  
**From:** Pat Farrell <provost@Lehigh.EDU>  
**To:** [\[Show Addresses - 238 recipients\]](#)  
**Cc:** Marci Levine <mjl410@lehigh.edu>, Wendy Abrantes <waa3@lehigh.edu>, Patrick Farrell <pvf209@lehigh.edu>, Jean Soderlund <jrsa@lehigh.edu>, Pat Mann <pam8@lehigh.edu>

Show this HTML in a new window?

Dear Faculty in STEM Departments:

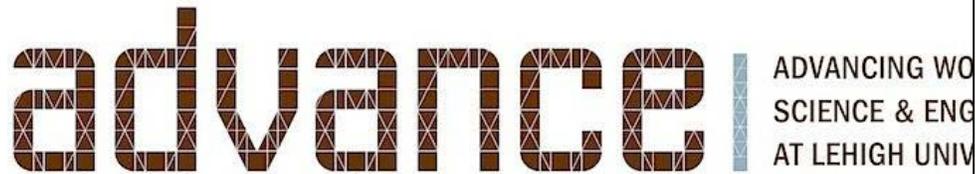
In the next few days you will receive an email message from the Lehigh ADVANCE Institutional Transformation Grant Research office containing a link to a survey. This survey will address your general perceptions of many aspects of your work environment and will serve as a baseline from which to compare our progress towards transforming the culture of Lehigh as part of our efforts to enhance the representation and leadership of women in the sciences and engineering.

Your input is extremely important to ensure that we get a full and valid picture of the work environment in your department, center, or program. Be assured that your responses will be held strictly confidential, and only aggregated responses will be reported in any publications or reports. Your participation in this survey is essential, and the time you take to complete it will be greatly appreciated.

Regards,  
Pat Farrell

## Lehigh ADVANCE Baseline Survey

### 1. Lehigh ADVANCE Baseline Survey



1. Thank you for your interest in the Lehigh NSF Advance Survey. Your responses will help provide baseline data that will be used to evaluate Lehigh's progress over the 5-year life of the grant. In addition to the questions providing baseline data, the survey also has questions that concern your perceptions of and participation in collaborative and interdisciplinary research. This is a major focus of the research component of the Lehigh ADVANCE project, and Lehigh data will be combined with data from nine other private, mid-sized, research institutions.

If you agree to complete the attached survey, we will protect your confidentiality in the following ways. You will not be asked to provide your name on your survey. All numerical survey data will be aggregated. In any Lehigh reports that emanate from this survey, data will be presented in aggregate form at the level of divisions (Engineering, Natural Sciences and Mathematics, Social and Behavioral Sciences). Analyses involving data on collaborative and interdisciplinary research will aggregate the data from Lehigh faculty with data from faculty from nine other institutions. If we report written comments faculty have made, we will first remove any identifying information. Finally, only the ADVANCE social science research team and the project's internal evaluator will have access to the data.

If you decide to participate in this study, you may not receive any direct benefits, but your responses will be very useful in establishing a valid baseline for the Lehigh ADVANCE project. You will also be contributing to the research literature on gender and perceptions of and participation in collaborative and interdisciplinary research. The minimal risks associated with your participation might include consideration of aspects of your work environment that cause you discomfort. Of course, if you decide to complete the survey, you are free to decide not to answer specific questions. Choosing not to complete the survey will not affect your relationship with Lehigh University. If you feel that any problems resulted, or may result, from your completion of this survey, you can contact Susan Disidore, the Office of Research & Sponsored Programs, Lehigh

**Lehigh ADVANCE Baseline Survey**

**University, 610-758-3020. By completing this survey, you are agreeing to allow your data to be used as described above in any reports or papers produced for this study.**

**Please click “yes” if you wish to continue to the survey.**

No  Yes

**2. Your Current Faculty Position**

**1. What year did you receive your doctoral degree?**

**2. What year were you hired by your current institution?**

**3. What is your current rank?**

Assistant Professor  Associate Professor  Full Professor

**4. Do you have tenure?**

No  Yes

If yes, in what year did you receive tenure at your current institution?

**5. Please indicate how satisfied you are with the following:**

	Very Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Very Satisfied
Your current faculty position	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How your career has progressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your work load	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time available for keeping current in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teaching environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources for research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opportunities for collaboration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**6. In what department do you have your primary appointment?**

<b>Lehigh ADVANCE Baseline Survey</b>							
<b>7. If forced to select one, into which of the following disciplinary divisions do you feel you should be categorized:</b>							
<input type="radio"/> Engineering <input type="radio"/> Natural Sciences or Mathematics <input type="radio"/> Social and Behavioral Sciences							
<b>3. Your Perceptions of Your Primary Department</b>							
<b>1. How much do you agree or disagree with the following statements about your primary department?</b>							
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable		
I feel like I "fit" in this department.	<input type="radio"/>						
In my department, I feel that my research is considered mainstream.	<input type="radio"/>						
In my department, I feel that my colleagues value my research.	<input type="radio"/>						
Colleagues in my department approach me to discuss their research.	<input type="radio"/>						
There is appropriate professional mentoring.	<input type="radio"/>						
I play an important role in department decision making.	<input type="radio"/>						
It is safe to take a risk in this department.	<input type="radio"/>						
Members of this department are able to bring up problems and tough issues.	<input type="radio"/>						
I often feel that I am "out of the loop" in terms of receiving information.	<input type="radio"/>						
I have to work harder than my departmental colleagues to be perceived as a legitimate scholar.	<input type="radio"/>						
I do a great deal of work that is not formally recognized by my department.	<input type="radio"/>						
I feel isolated in my department.	<input type="radio"/>						
<b>2. Each scale below reflects a continuum between the two terms listed. For each scale, select the number that best represents your impression of your primary department as a whole.</b>							
	1	2	3	4	5	6	7
Competitive (1) . . . (7) Cooperative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Not Supportive (1) . . . (7) Supportive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Unexciting (1) . . . (7) Stimulating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Uneven Participation (1) . . . (7) Even participation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Individualistic (1) . . . (7) Collaborative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

### Lehigh ADVANCE Baseline Survey

**3. Each scale below reflects a continuum between the two terms listed. For each scale, select the number that best represents how you generally feel as a member of your department.**

	1	2	3	4	5	6	7
Unsuccessful (1) . . . (7) Successful	<input type="radio"/>						
Unappreciated (1) . . . (7) Appreciated	<input type="radio"/>						
Socially Alienated (1) . . . (7) Socially Integrated	<input type="radio"/>						
Intellectually Isolated (1) . . . (7) Intellectually Integrated	<input type="radio"/>						

**\* 4. Do you have an appointment or affiliation with an interdisciplinary center or program?**

No  Yes

If yes, please list the programs/centers?

### 4. Your Perceptions of Your Interdisciplinary Center/Program

**1. How much do you agree or disagree with the following statements about the interdisciplinary center/program in which you are most heavily involved?**

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
I feel like I "fit" in this center/program.	<input type="radio"/>				
In my center/program, I feel that my research is considered mainstream.	<input type="radio"/>				
In my center/program, I feel that my colleagues value my research.	<input type="radio"/>				
Colleagues in my center/program approach me to discuss their research.	<input type="radio"/>				
There is appropriate professional mentoring.	<input type="radio"/>				
I play an important role in center/program decision making.	<input type="radio"/>				
It is safe to take a risk in this center/program.	<input type="radio"/>				
Members of this center/program are able to bring up problems and tough issues.	<input type="radio"/>				
I often feel that I am "out of the loop" in terms of receiving information.	<input type="radio"/>				
I have to work harder than my center/program colleagues to be perceived as a legitimate scholar.	<input type="radio"/>				
I do a great deal of work that is not formally recognized by my center/program.	<input type="radio"/>				
I feel isolated in my center/program.	<input type="radio"/>				

**Lehigh ADVANCE Baseline Survey**

**2. Each scale below reflects a continuum between the two terms listed. For each scale, select the number that best represents your impression of your interdisciplinary center/program as a whole.**

	1	2	3	4	5	6	7
Competitive (1) . . . (7) Cooperative	<input type="radio"/>						
Not Supportive (1) . . . (7) Supportive	<input type="radio"/>						
Unexciting (1) . . . (7) Stimulating	<input type="radio"/>						
Uneven Participation (1) . . . (7) Even participation	<input type="radio"/>						
Individualistic (1) . . . (7) Collaborative	<input type="radio"/>						

**3. Each scale below reflects a continuum between the two terms listed. For each scale, select the number that best represents how you generally feel as a member of your interdisciplinary center/program.**

	1	2	3	4	5	6	7
Unsuccessful (1) . . . (7) Successful	<input type="radio"/>						
Unappreciated (1) . . . (7) Appreciated	<input type="radio"/>						
Socially Alienated (1) . . . (7) Socially Integrated	<input type="radio"/>						
Intellectually Isolated (1) . . . (7) Intellectually Integrated	<input type="radio"/>						

**5. General Perceptions of Your Current Institution and Your Faculty Position**

**1. Perceptions about hiring:**

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
When I came to this institution, I was satisfied with the hiring process overall.	<input type="radio"/>				
In general, the process for hiring faculty is conducted fairly.	<input type="radio"/>				
In my department, women candidates for faculty positions are given full consideration.	<input type="radio"/>				
I believe my department has taken all the actions it could to successfully hire women candidates in faculty positions.	<input type="radio"/>				
In my department, racial minorities candidates for faculty positions are given full consideration.	<input type="radio"/>				
I believe my department has taken all the actions it could to successfully hire racial minority candidates in faculty positions.	<input type="radio"/>				
To recruit faculty, it is very important to offer an employment assistance program for partners.	<input type="radio"/>				
In my department women candidates are given an unfair advantage in hiring.	<input type="radio"/>				
In my department racial minority candidates are given an unfair advantage in hiring.	<input type="radio"/>				

<b>Lehigh ADVANCE Baseline Survey</b>					
<b>2. Perceptions about evaluation, tenure and promotion:</b>					
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
My professional activities are fairly evaluated.	<input type="radio"/>				
The salary adjustment process is equitable.	<input type="radio"/>				
The criteria for achieving tenure/promotion are clear.	<input type="radio"/>				
Faculty receive useful feedback on progress toward tenure/promotion.	<input type="radio"/>				
The tenure/promotion process is fair.	<input type="radio"/>				
I feel/felt supported in my advancement to tenure/promotion.	<input type="radio"/>				
I feel there is/was a strong fit between the way I balance research, teaching, and service, and the criteria for tenure and promotion.	<input type="radio"/>				
<b>6. Work Environment</b>					
<b>1. Perceptions about the work environment in your department and institution:</b>					
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
I am able to balance the teaching, research and service activities expected of me.	<input type="radio"/>				
I am expected to serve on more committees and/or provide more assistance to students than others in my department.	<input type="radio"/>				
Resources for research/scholarship are fairly distributed.	<input type="radio"/>				
Teaching responsibilities are fairly distributed.	<input type="radio"/>				
Service responsibilities are fairly distributed.	<input type="radio"/>				
The work environment for faculty is about the same for women and men.	<input type="radio"/>				
Faculty members are treated fairly regardless of their race or ethnicity.	<input type="radio"/>				
Students treat women faculty with less respect compared to men faculty .	<input type="radio"/>				
Some faculty have a condescending attitude toward women.	<input type="radio"/>				
Men are more likely than women to receive helpful career advice from colleagues.	<input type="radio"/>				
In meetings, people pay just as much attention when women speak as when men do.	<input type="radio"/>				
Women are appropriately represented in senior positions.	<input type="radio"/>				
<b>7. Work/Life Balance</b>					

<b>Lehigh ADVANCE Baseline Survey</b>					
<b>1. Perceptions about work/life balance:</b>					
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
I am usually satisfied with the way I balance my professional and personal life.	<input type="radio"/>				
Most faculty in my department are supportive of colleagues who want to balance their personal and career lives.	<input type="radio"/>				
In my department, faculty who have children are considered less committed to their careers.	<input type="radio"/>				
It is difficult to have a personal life and be promoted or earn tenure.	<input type="radio"/>				
I am comfortable raising personal and/or family responsibilities when scheduling department obligations.	<input type="radio"/>				
Meetings in my department are often scheduled at times that conflict with my personal responsibilities.	<input type="radio"/>				
I have considered delaying or not having children because of work/life balance issues.	<input type="radio"/>				
I often have to forego professional activities because of personal responsibilities.	<input type="radio"/>				
I often have to forego personal activities because of professional responsibilities.	<input type="radio"/>				
Personal responsibilities and commitments have slowed down my career progression.	<input type="radio"/>				
I have seriously considered leaving my faculty position in order to achieve better balance between work and personal life.	<input type="radio"/>				
<b>8. Leadership</b>					
<b>1. Perceptions about leadership:</b>					
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not Applicable
I consider myself a leader.	<input type="radio"/>				
I aspire to a leadership position at my institution beyond my current position.	<input type="radio"/>				
At some point in my career, I could see myself applying for a senior leadership position (dean, provost, president) at my institution or at another institution.	<input type="radio"/>				
If I chose to pursue them, I believe that significant leadership opportunities would be available to me at my institution.	<input type="radio"/>				
At my institution, service/committee responsibilities help faculty achieve formal leadership goals.	<input type="radio"/>				
It is possible to hold a leadership position at my institution while maintaining an active research agenda.	<input type="radio"/>				
It is possible to hold a leadership position at my institution while balancing work and personal responsibilities.	<input type="radio"/>				
I believe that I exhibit strong leadership skills.	<input type="radio"/>				
I am interested in opportunities to develop my leadership skills.	<input type="radio"/>				
I have a career plan that will help me achieve my formal leadership goals.	<input type="radio"/>				
I select service responsibilities that will help me to achieve my formal leadership goals.	<input type="radio"/>				

## Lehigh ADVANCE Baseline Survey

### 9. Research Collaboration

#### 1. Perceptions of research collaboration (including collaboration within and across disciplines):

	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
Since I began my current faculty position, I have increased the degree to which I collaborate with colleagues <u>within</u> my primary discipline.	<input type="radio"/>				
Since I began my current faculty position, I have increased the degree to which I collaborate with colleagues <u>outside</u> my primary discipline.	<input type="radio"/>				
I am satisfied with opportunities to collaborate with faculty in my primary department.	<input type="radio"/>				
I am satisfied with opportunities to collaborate with colleagues in other departments at my institution.	<input type="radio"/>				
I tend to be more productive working on my own than working as a member of a research team.	<input type="radio"/>				
Challenges I face in balancing work and personal commitments prevent me from engaging in as much collaboration as I would like.	<input type="radio"/>				
Research collaboration is best pursued after a faculty member is established in their career.	<input type="radio"/>				
The faculty members in my <u>department</u> value collaboration.	<input type="radio"/>				
My <u>institution</u> values collaboration.	<input type="radio"/>				
I find it difficult to evaluate an individual faculty member's contributions to collaborative work.	<input type="radio"/>				
Participation in collaborative research is viewed positively during the tenure/promotion review process.	<input type="radio"/>				
In general, collaboration has increased my research productivity.	<input type="radio"/>				
Collaboration has posed a significant time burden on my research.	<input type="radio"/>				
I am comfortable showing limits or gaps in my knowledge to those with whom I collaborate.	<input type="radio"/>				
I collaborate primarily to help graduate students and junior colleagues.	<input type="radio"/>				
I seek out collaborations with more senior scholars who have strong research reputations.	<input type="radio"/>				
I seek out collaborators who have skills that complement my own.	<input type="radio"/>				

### 10. Interdisciplinary Research

**Interdisciplinary research draws on more than one discipline and may be conducted solo or in collaboration with others.**

Lehigh ADVANCE Baseline Survey					
1. Perceptions about interdisciplinary research:					
	Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly	Not sure/Not applicable
I would describe myself as someone who strongly values interdisciplinary research.	<input type="radio"/>				
The research questions I am often interested in generally do not require scholarship from other disciplines.	<input type="radio"/>				
Interdisciplinary work interferes with my ability to maintain knowledge in my primary area.	<input type="radio"/>				
When conducting interdisciplinary research, it takes more time to produce a research article.	<input type="radio"/>				
I believe the benefits of interdisciplinary work usually outweigh the inconveniences and costs of such work.	<input type="radio"/>				
I have changed the way I pursue a research idea because of my involvement in interdisciplinary work.	<input type="radio"/>				
My colleagues are open-minded about considering research perspectives from fields other than their own.	<input type="radio"/>				
Policies at my institution impede interdisciplinary research.	<input type="radio"/>				
I am optimistic that interdisciplinary work will lead to valuable scientific outcomes that would not otherwise have occurred.	<input type="radio"/>				
My interdisciplinary projects are sustainable over the long haul.	<input type="radio"/>				
I would like to pursue more interdisciplinary research but only after I am more established in my career.	<input type="radio"/>				
Faculty in my <u>department</u> value interdisciplinary research.	<input type="radio"/>				
My <u>institution</u> values interdisciplinary research.	<input type="radio"/>				
Interdisciplinary research is more difficult to evaluate than disciplinary research.	<input type="radio"/>				
Participation in interdisciplinary research is viewed positively during the tenure/promotion review process.	<input type="radio"/>				
I believe that participation in interdisciplinary work reduces feelings of isolation.	<input type="radio"/>				
Lack of physical proximity impedes interdisciplinary research.	<input type="radio"/>				
11. Impediments to Interdisciplinary and Collaborative Research					
1. Please rate the degree to which each of the following is an impediment to interdisciplinary work and/or collaboration at your institution.					
	Not an Impediment	A minor Impediment	A major impediment	Don't know	
Indirect cost recovery distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Incompatibility with department and/or institution strategic plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
The tenure and promotion process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Credit for joint authorship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Evaluation of publications in interdisciplinary vs. disciplinary journals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Departmental control of institutional resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Lack of visibility of interdisciplinary contributions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

**Lehigh ADVANCE Baseline Survey**

**2. Is there anything else we should know about interdisciplinary research at your institution?**

**12. Your Work Activities**

**1. As you think about how you spend your time in an academic year, what percent of your average work week do you actually spend on the following activities? Totals must equal 100%**

Teaching (including preparing material for class, lecturing, etc.)	<input type="text"/>
Meeting with or communicating with students outside of class (office hours, advising, supervising research, recommendation letters, email)	<input type="text"/>
Scholarship and research	<input type="text"/>
Service to department/institution/profession	<input type="text"/>
Administrative responsibilities	<input type="text"/>

**2. As you think about how you spend your time in an academic year, what percent of your average work week would you ideally like to spend on the following activities? Totals must equal 100%**

Teaching (including preparing material for class, lecturing, etc.)	<input type="text"/>
Meeting with or communicating with students outside of class (office hours, advising, supervising research, recommendation letters, email)	<input type="text"/>
Scholarship and research	<input type="text"/>
Service to department/institution/profession	<input type="text"/>
Administrative responsibilities	<input type="text"/>

**3. How would you characterize your most frequent mode of conducting scholarly research? (choose one)**

I most typically work alone and my scholarship is within my discipline.

I most typically work alone and my scholarship is interdisciplinary.

I most typically work with collaborators who are in my discipline.

I most typically work with collaborators who are from disciplines other than my own.

**4. Thinking about the last three years, how many colleagues in your department have you collaborated with on research?**

### Lehigh ADVANCE Baseline Survey

5. In the past three years, how many colleagues outside your department at your institution have you collaborated with on research?

6. In the past three years, how many colleagues outside your institution have you collaborated with on research?

7. If you have collaborated in the last three years, what % of your collaborators were women?

8. If you have collaborated in the last three years, what % of your collaborators were graduate students or junior colleagues who you are advising/mentoring?

9. If you have collaborated in the last three years, what % of your collaborators were senior colleagues who were/are your advisors or mentors?

10. On average, how frequently do you engage in each of the following activities?

	Never	Once a year or less	Several times a year	At least once a month
Read journals or publications outside of your primary discipline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attend meetings and conferences outside of your primary discipline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work with graduate students outside of your primary discipline.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Submit manuscripts to interdisciplinary journals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 13. Your Recent Research and Accomplishments

**Lehigh ADVANCE Baseline Survey**

**1. For the following research accomplishments, please indicate the total number of each that have occurred for you during the past 3 years:**

Sole-authored papers published in peer-reviewed journals	<input style="width: 40px; height: 20px;" type="text"/>
Co-authored papers published in peer-reviewed journals	<input style="width: 40px; height: 20px;" type="text"/>
Sole-authored/edited books published	<input style="width: 40px; height: 20px;" type="text"/>
Co-authored/edited books published	<input style="width: 40px; height: 20px;" type="text"/>
Sole-authored chapters in books	<input style="width: 40px; height: 20px;" type="text"/>
Co-authored chapters in books	<input style="width: 40px; height: 20px;" type="text"/>
Sole-authored grant proposals submitted	<input style="width: 40px; height: 20px;" type="text"/>
Co-authored grant proposals submitted	<input style="width: 40px; height: 20px;" type="text"/>

**2. Thinking about the last 3 years,**

What % of your publications are co-authored with colleagues outside of your primary discipline?

What % of your publications are in journals outside your primary discipline?

What % of your grant proposals were written with colleagues outside your primary discipline?

**14. Mentoring**

**\* 1. Do you or did you ever have a mentor or mentors?**

No  Yes

**15. Your Mentors**

**1. Please indicate how many of your mentors are/were:**

Within your primary discipline?	<input style="width: 40px; height: 20px;" type="text"/>	
Outside your primary discipline?	<input style="width: 40px; height: 20px;" type="text"/>	

**2. Thinking about your most significant mentor, on average, how much does or did your mentor:**

	Never	Sometimes	Frequently
Advise you about promotion and career advancement issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilitate your networking with the larger scholarly community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist you to get your work published	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist with the grant process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Help you to understand institutional policies and politics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Lehigh ADVANCE Baseline Survey					
16. Institutional Policies/Programs					
1. For each of the following policies/programs, please indicate the availability and efficacy within your institution.					
	Not at all effective	Somewhat effective	Very effective	No policy or program	Don't know
Tenure clock extension	<input type="radio"/>				
Paid parental leave	<input type="radio"/>				
Dual career assistance for spouses/partners	<input type="radio"/>				
On-site child care	<input type="radio"/>				
Formal mentoring program	<input type="radio"/>				

17. Demographics	
1. What is your sex?	
<input type="radio"/> Male <input type="radio"/> Female	
2. Are you Hispanic or Latino?	
<input type="radio"/> No <input type="radio"/> Yes	
3. Please check all categories that describe your race:	
<input type="checkbox"/> African American or Black	<input type="checkbox"/> Caucasian or White
<input type="checkbox"/> Asian	<input type="checkbox"/> Native Hawaiian or other Pacific Islander
<input type="checkbox"/> American Indian or Alaskan Native	
<input type="checkbox"/> Other (please specify)	
<input type="text"/>	
4. Do you currently hold a position as department chair, center director, or other formal administrative position?	
<input type="radio"/> No <input type="radio"/> Yes	
5. Have you ever held a position as department chair, center director, or other formal administrative position?	
<input type="radio"/> No <input type="radio"/> Yes	

Lehigh ADVANCE Baseline Survey			
<b>6. Thinking about the past 3 years, please check all apply:</b>			
<input type="checkbox"/> I have thought about leaving Lehigh for another position			
<input type="checkbox"/> I researched opportunities at other institutions			
<input type="checkbox"/> I applied for a position at another institution			
<b>* 7. Do you have a spouse or domestic partner?</b>			
<input type="radio"/> No <input type="radio"/> Yes			
18. Questions about your spouse/domestic partner			
<b>1. What is your spouse/partner's:</b>			
	Full Time	Part Time	Not Employed
Current employment status	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preferred employment status	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Children and Household Duties			
<b>1. Do you currently have children under the age of 18 living with you?</b>			
<input type="radio"/> No <input type="radio"/> Yes			
If yes, what percentage of childcare duties are you responsible for?			
<input type="text"/>			
<b>2. Have you ever had a leave or tenure clock extension for personal health or care giving reasons?</b>			
<input type="radio"/> No <input type="radio"/> Yes			
20. Department Support			
<b>1. You indicated that you had a leave or tenure clock extension. Please rate how supportive of your extension your department was:</b>			
<input type="radio"/> Not at all supportive			
<input type="radio"/> A little bit supportive			
<input type="radio"/> Moderately supportive			
<input type="radio"/> Very supportive			
21. Final Thoughts			

**Lehigh ADVANCE Baseline Survey**

**1. What, if anything, most interferes with your ability to be successful as a faculty member at your institution?**

**2. What, if anything, most helps you to be successful in your role as a faculty member at your institution?**

**3. Please add any additional comments here:**

**22. Thank you!**

Thank you for taking the time to complete our survey. Your feedback is very important to us. To learn more about Lehigh Advance, please visit our website at: <http://www.lehigh.edu/luadvance/>

The Connective Leadership Styles of Faculty: Leading Change Workshop

May 18, 2011

1:00-4:30 pm

Governor's Suite, Iacocca Hall

Agenda:

- 1:00 Introduction, Overview
- 1:30 Connective Leadership
- 2:30 Break
- 2:45 Connective Leadership (con't)
- 3:00 Achieving/Organization Styles
- 3:30 Application
- 4:00 Wrap-Up
- 4:15 Complete Feedback Survey

To view the workshop handouts and slides, please visit

<http://advance.cc.lehigh.edu/events/LeadershipWorkshopMay2011>

A report on the workshop is being prepared and will be available by the next interim report.

Featured Inside Lehigh Communications Item 1, From Oct. 13, 2010, announcing the award:  
<http://www4.lehigh.edu/news/newsarticle.aspx?Channel=%2fChannels%2fNews%3a+2010&WorkflowItemID=fdf26b13-aae7-4f71-a2b7-6b1238dea624>

## Lehigh receives \$2.6 million to increase female faculty

Lehigh has received a \$2.6 million five-year grant from the [National Science Foundation \(NSF\) ADVANCE](#)-Institutional Transformation program as part of a national push to increase the ranks of women in academic science and engineering careers. The university is one of seven schools to receive funding this year.

Historically, a gender gap has existed in the science, technology, engineering and math (STEM) fields. Data published in the 2009 National Research Council's *Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty* shows that while women have increased in academic science and engineering in recent years, they remain less than one-quarter of faculty in most STEM disciplines.

Efforts to include women in the STEM fields have focused on increasing their admittance to undergraduate and graduate programs, with considerable success: 45 percent of doctorates in Biology and 32 percent in Chemistry are earned by women. Yet only 26 percent and 18 percent of these Ph.D.s apply for academic jobs. Many opt for positions in industry. The purpose of the NSF ADVANCE Program is to attract more of these young scientists and engineers to faculty positions where they can serve as role models for undergraduates and graduate students.

“We have the opportunity for institutional transformation by aligning the ADVANCE program with the larger goals and directions of the university,” says Pat Farrell, provost and vice president for academic affairs. Farrell serves as the lead principal investigator (PI) on the NSF ADVANCE grant. “Taking advantage of the best minds in the STEM fields requires removing barriers to ensure all groups have the opportunity to excel in these areas.”

Diane Hyland, associate dean for faculty and staff in the College of Arts and Sciences and professor of psychology; Jackie Krasas, associate professor of sociology and director of women studies; Jeff Sands, professor of biological sciences; and Sibel Pamukcu, professor of civil and environmental engineering, will be co-PIs on the project. Jean Soderlund, professor of history, helped to write the grant and will serve as the project director.

In the past several years, Lehigh has revised policies and developed programs for faculty, including increased flexibility through tenure-clock extensions, a fully paid Family and Medical Leave policy and a university mentoring program for assistant professors, and has provided research support for new parents. Still, barriers to faculty career advancement remain and recruitment of female faculty remains difficult.

“The ADVANCE Program will work with Lehigh faculty to expand candidate pools and reconfigure programs/policies to foster success of early- and mid-career faculty in STEM departments and interdisciplinary initiatives,” Soderlund says. Results from the Lehigh ADVANCE program are intended to be shared with other universities.

### **About the NSF Advance Program**

The goal of the National Science Foundation's (NSF) ADVANCE program is to increase the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse science and engineering workforce. ADVANCE encourages institutions of

higher education and the broader science, technology, engineering and mathematics (STEM) community, including professional societies and other STEM-related not-for-profit organizations, to address various aspects of STEM academic culture and institutional structure that may differentially affect women faculty and academic administrators. As such, ADVANCE is an integral part of the NSF's multifaceted strategy to broaden participation in the STEM workforce, and supports the critical role of the Foundation in advancing the status of women in academic science and engineering.

Since 2001, the NSF has invested more than \$130 million to support [ADVANCE projects](#) at more than 100 institutions of higher education and STEM-related, not-for-profit organizations in 41 states, the District of Columbia, and Puerto Rico, including 24 [EPSCoR](#) jurisdictions.

Posted on Wednesday, October 13, 2010

Featured Inside Lehigh Communications Item 2, From May 2, 2011, describing website and progress:

<http://www4.lehigh.edu/news/newsarticle.aspx?Channel=%2fChannels%2fNews%3a+2011&WorkflowItemID=101f2179-d37b-434b-85d8-36a807930f0b>

## Lehigh ADVANCE shows progress

Six months into a five-year federal grant designed to increase the ranks of women in academic science and engineering careers, Lehigh is making progress on several fronts.

Lehigh was one of just seven schools to receive funding last year from the National Science Foundation (NSF) ADVANCE-Institutional Transformation program. The \$2.6 million grant is part of a national push to address the gender gap which has historically existed in the science, technology, engineering and math (STEM) fields.

The STEM programs at Lehigh, as defined by NSF, include the departments of biological sciences, chemistry, earth and environmental sciences, mathematics, physics, psychology, sociology/anthropology, economics, and the disciplines within the P.C. Rossin College of Engineering and Applied Science. Collectively, male faculty members out-number female faculty by about 4.3-to-1 in these areas at Lehigh.

To reduce isolation and enhance collegiality, the Lehigh ADVANCE program launched “LU-WISE: Women in Science and Engineering” this spring. The group has already met twice, with almost half of STEM women participating.

Sibel Pamukcu, professor of civil and environmental engineering and one of the co-principal investigators on the grant, believes strongly in creating a structure within the university for women in science and engineering to build community.

“First we will focus on the relationships between women at Lehigh, then we will expand the network to women scholars in the region,” Pamukcu says. “We can learn about one another professionally, by explaining the research we do and perhaps identify new collaborations, new ways to solve problems. But LU-WISE can also discuss career challenges and tips for success, be a forum to foster mentoring or support each other on work-life balance issues, too.”

Among numerous other positive steps taken are:

- In February, Lehigh ADVANCE joined with Lehigh Women’s Studies to bring Dr. Susan Basow of Lafayette College in to speak about her research on “Gender and STEM Course Evaluations: Teaching While Female.”
- Tina Richardson, associate professor of education, has been named special assistant to the provost for the ADVANCE Grant’s Leadership Initiatives, which enable Lehigh to offer its faculty the opportunity to examine and grow their professional skill sets. “Through ADVANCE, we will build a better framework for support and recognition of women who can thrive as leaders in all contexts,” Richardson says.
- To close the spring semester, faculty from STEM departments have been invited to attend a half-day workshop on May 18 designed to help faculty in STEM fields gain personalized insights into

## Lehigh ADVANCE Communications

academic leadership, a range of achieving styles, and ways that individuals and institutions can develop effective leaders to transform their institution.

The ADVANCE Grant Leadership Team, which is responsible for implementing the project, is chaired by Provost Patrick Farrell, who serves as principal investigator. Serving as co-principal investigators are Pamukcu; Jeffrey Sands, professor of biological sciences; Diane Hyland, professor of psychology; and Jackie Krasas, associate professor of sociology and anthropology. Mooi Choo Chuah, associate professor of computer science and engineering, and Susan Szczepanski, associate professor of mathematics, were appointed in January as ADVANCE chairs for 2011 to bring fresh ideas to the leadership team, participate in the leadership and retention interviews, and help develop and participate in workshops and other programs.

Complete information about ADVANCE is now available on a new website, [www.lehigh.edu/luadvance](http://www.lehigh.edu/luadvance), developed by the Lehigh ADVANCE Grant Leadership Team and the Provost's Office in partnership with the Office of Communications and Public Affairs.

"The site really is the window into Lehigh ADVANCE," Farrell says. "When the fifth year is upon us, we can look back and see all of the tangible outcomes, workshop summaries, toolkits and publications that will inform Lehigh's policies. The website lets us easily share our efforts towards transforming Lehigh's work culture, maximizing the promise of our Strategic Plan, and providing a model for other institutions our size."

Posted on Monday, May 02, 2011

-- [Marci Levine](#)

## Appendix G

## Lehigh ADVANCE Communications

**Draft: Communications Goals for Lehigh ADVANCE**

- Raise the visibility of ADVANCE and its activities and resources across the University and the region
- Promote the concepts that inspire Lehigh ADVANCE
- Build Community of Women in Science & Engineering
  - LU
  - LVAIC
  - Industry
  - Allies/Supporters of WISE
- Ensure successful implementation and dissemination of ADVANCE research programs and activities (Project Management Communication Channels, Provide Training and other Educational Opportunities to change agents and Policy Makers)
- Raise awareness of and make contributions to scientific research surrounding gender and interdisciplinarity and its applicability to Lehigh University and other institutes
- Foster cooperation across relevant Lehigh University Entities and special events planning groups: departments and other academic units, provosts & communications units, women's studies, etc.
- Help to build the capacity of new and existing faculty to enable them to participate in and benefit from (and apply knowledge from) ADVANCE (Lehigh) activities and programs.
- Enable the best practices learned through ADVANCE to be translated into sustainable policies
- Help to build the capacity of regional institutes and national institutes of similar size to tackle institutional transformation through NSF ADVANCE programs or other tools
- Connect effectively (as appropriate) and learn from other ADVANCE programs and activities
- Report Progress to NSF and other Target Audience Stakeholders

**Lehigh ADVANCE target audiences will include:**

- [internal/downstream] Lehigh ADVANCE Program Management, Leadership, and Advisors
- The social science research community
- Existing faculty:
  - Women STEM
  - All STEM
  - All Faculty
- University Policy Makers
- University Policy Practitioners: P&T Committees & Search Committees
- Agents of Climate Transformation: Deans, Department & Program Chairs, Search Committees, Mentoring committee members
- Potential new women STEM faculty
  - Graduate Students
  - Post-Docs
  - Faculty elsewhere
- Other Universities or Institutes
- NSF ADVANCE

***Draft Communications for Lehigh ADVANCE:***  
**Identifying Audience, Goals, and Likely Tactics for each of the Strategies & Initiatives to Achieve the Objectives of the Proposal.**

**GRANT Goal 1: Increase the number of women STEM faculty.**

**Strategies:** *Recruitment*

1. Lehigh ADVANCE will consult with STEM faculty search committees on best practices and ways Lehigh ADVANCE can assist **recruitment** of women faculty.
  - AUDIENCE: MEMBERS OF STEM FACULTY SEARCH COMMITTEES
    - Goal: Attend & apply learnings from special ADVANCE consultations (roundtables, workshops, etc. ) for “Best Practices” for Lehigh Search Committees
      - Messages: Search Committee Members should be knowledgeable about and be able to readily share with 1) internal dept. faculty & 2) potential recruits
        - Existing Lehigh Work Life Balance efforts -how far LU has come
        - Relevant existing and emerging social science research and ADVANCE initiative/Lehigh
        - Interdisciplinarity
        - mentoring committees
        - leadership development opportunities
        - new faculty expectations and evaluations
        - Women’s Studies resources
        - Other messages? “Lehigh is great (for women) talking points”
          - At Lehigh you will be successful at balancing career and other goals
          - Hired and get tenure, not 10 hired and 1 gets the spot
          - Strategic, cluster hiring→interdisciplinarity is supported
          - Modernized policies and practices so P&T makes sense for interdisciplinarity
          - Lehigh professional development opportunities tailored to your needs (ex: leadership development series is very focused)
          - ADVANCE enhances of climate & mechanisms for sustainability
      - Tactic: invitation: Advertise, announce, Invite, remind→email, website, course site
      - Tactic: Post-event summary, key findings, added value for participants→website news story, part of “tool kit”
        - Published online, model for other institutes
        - Presented at Conferences (**See Dissemination Plan**)
    - Goal: Aware of guidance and resources for developing creative job description and vision of recruitment pool
      - Messages: Use ADVANCE resources to carry out faculty search
      - Tactic: Promote ADVANCE by HR/ faculty position announcements **(done!)**
      - Tactic: Recruitment Resources Section of Website
        - ADVANCE compiles resources for creative job defining & put on web

## Lehigh ADVANCE Communications

- Can ADVANCE help search committee with candidate pool identification resources?
- Professional Societies (already done by dept)
- Other ADVANCE Institutes
- National Database of Underrepresented PhD Students & Postdocs (<http://advance.rice.edu/nifpdb.aspx>)
- AUDIENCE: ADVANCE Leadership Team, IAC, and LU Policy Makers
  - Goal: solid vision of strategy to implement consultations and collect feedback to provide to policy makers to lead to transformation & institutionalization of recruitment process
  - Goal: Develop Training/Resources for Delivering Messages/Consultations to the Search Committee (target audience)
    - Messages: Consider state of science on interdisciplinary hiring in light of gender and discipline issues; each member of LT informed and knows role; clear outline of path to modify LU policy if needed
    - Tactics: face-face planning and follow-up meetings, Course Site, Emails, Meeting minutes to keep progress moving forward
- 2. Funding of travel and honoraria for seminars presented by prospective STEM women faculty.
  - AUDIENCE: STEM Departmental Faculty:
    - Goal: STEM Departments are aware award exists and can find information to make request
      - Message: use the award to attract rising women scholars (graduate students & postdoctoral researchers) who could be future faculty
      - Tactics: Periodic schedule of announcements on the Daily News List Serve 2x semester? Recruitment Award Request form included on website, Get on agendas of Department Chair meetings, faculty meetings
      - *We track # awards per year. Do we need to keep tabs on the invited guest speaker's career? For how long? Who?*
    - Goal: STEM Departments with an award increase visibility of ADVANCE
      - Message: Lehigh values ADVANCE concepts
      - Tactic: Mention the invited speaker's visit is partially funded through ADVANCE (in invitation & in introduction of speaker).
  - AUDIENCE: ADVANCE Leadership Team & Administrative Committee
    - Goal: Informed on Progress of requests
    - Goal: Budgeting: Adequate documentation & efficient cross-departmental transfer of funds
    - Goal: application and information available when needed
    - Tactics: keep application download & information active on website; face-face planning and follow-up meetings, Course Site, Emails (academic departments & finance), Meeting minutes to keep progress moving forward
  - AUDIENCE: Travel Award Recipient
    - Goal: Show how great Lehigh is, keep Lehigh on their radar
    - Tactic: Include ADVANCE in invitation

## Lehigh ADVANCE Communications

3. Recruitment strategies including clustered faculty hiring, broad definition of fields, multi-year hiring plans, interdisciplinary search committees that include women, and networking with target departments and centers.
  - AUDIENCE: Creators of Search Committees
    - Goal: use best practices for interdisciplinary hiring & value of diversity/increasing # of women on search committees without burdening the women faculty (who are usually fewer in number)
      - Included in the workshop described above & outcomes will be summarized and put into tool kit
    - *Do existing networks fit this [item 3] purpose? Do new or supplemental networks/network strategies need to be created to connect departments & centers?*

**Strategies:** *Retention through Mentoring and Networking*

4. Interdisciplinary Mentoring/Networking Committees for women STEM faculty in interdisciplinary fields.
  - AUDIENCE: Existing faculty serving on interdisciplinary networking committee (INC)
    - Goals: Understand how to be a mentor for new faculty with a focus on interdisciplinary research & teaching
    - Messages: about mentoring women, mentoring for interdisciplinary environments, learnings from L&R interviews (etc) what new faculty need to succeed, how ADVANCE will evaluate this program and how LU is looking at this program in terms of policy
    - Tactics: Consultations/Workshops, create section on mentoring on ADVANCE website, provost's influence at faculty meetings
    - Expected Outcomes: improved networking and mentoring skills, improved sense of fitting in/belonging
    - *Is/will there be there a training workshop/manual to deliver to provide mentoring committee member guidance?*
  - AUDIENCE: New faculty hired through the cluster hire plan & matched to a committee
    - Goals: improved feeling of belonging and support to succeed, improved networking/mentee skills, reduced isolation, reinforces visibility of ADVANCE
    - Messages: about being a good mentee in interdisciplinary environment
    - Tactics: provost's influence at new faculty meetings, emails, *brochures/handouts? Connect with the committee units at least 1x a semester (will reinforce value, interactions, and goodwill) & feedback obtained at end of 2<sup>nd</sup> semester of hire*
  - AUDIENCE: LT, Policy Makers
    - Goal: Refinement of INC process and understand value of this model for new faculty, *consider including information about this in start-up package info*
    - Messages: Input: feedback from following up with INCs and Output: strategies to use this model as policy for new faculty hires
    - Tactics: face-face planning and follow-up meetings, Course Site, Emails, Meeting minutes to keep progress moving forward, may want to develop brochure/flyer as part of start-up package information

## Lehigh ADVANCE Communications

- *Expected outcomes: by year 3 of grant, this INC program should be running smoothly from new faculty hire and a recommendation finalized and policy developed*
- 5. Open Access Information Initiative to facilitate interdisciplinary collaboration through the Lehigh ADVANCE program website, providing a dedicated link where faculty and other researchers can conduct searches by keywords, titles, or names to find potential collaborators or intersecting areas of interdisciplinary work.
  - AUDIENCE: Existing STEM Women at Lehigh University Community, then LVAIC & Region if interest
    - Goal: STEM women populate database (email, x )
    - Messages: why use this database vs. other networking/collaboration tools
    - Tactic: Advertise availability of online system: website, LVAIC network outlets, *other?*
    - Tactic: Track & report usage data (hits, time using search) could we learn if research connections made through this tool
  - AUDIENCE: Existing Lehigh University Community, then LVAIC & Region if interest
    - Goal: contact and interact with women in database
    - Messages: why use the database
    - Tactics to promote: existing LVAIC networking systems, LUWISE : emails, list-serves, other websites to add links!
- 6. Leadership and Retention Interviews to assist in developing best practices for mentoring and evaluating women STEM faculty and to address problems encountered by individual faculty.
  - AUDIENCE: Existing Lehigh University STEM Women
    - Goal: Awareness of ADVANCE, “What’s in it for me”
    - Messages: ADVANCE wants to know your successes & challenges to design programs for your benefit & overall improvement of Lehigh. Your story is confidential. LU is listening to your needs;
    - Tactics: Invite, Informed Consent, Remind
      - *Any follow-up planned? Diane’s idea for May 2011?*
  - AUDIENCE: ADVANCE Planners:
    - Goal remain informed of progress to completion and findings & develop summary to guide additional programming
    - Message: informed by results, promote
    - Tactic: meetings/team writing to develop L&R Interview report
  - AUDIENCE: Change Agents/LU Policy Makers
    - Goal: inform ADVANCE Program Development and Delivery based on actual need
    - Message: based on report
    - Communications Tactics: report
- 7. Workshops for department chairs, center directors, interdisciplinary program directors, college promotion and tenure committees, and senior faculty on best practices in mentoring and evaluating STEM faculty in interdisciplinary research and teaching, focusing on issues for women and other underrepresented groups.
  - AUDIENCE: LT
    - Goal: Prepared to deliver workshops

## Lehigh ADVANCE Communications

- Messages: know roles in delivering workshops and how to collect feedback to inform policy
  - Tactics: planning meetings, emails, course site, timelines, inviting speakers
  - AUDIENCE: Multiple, overlapping named above
    - Goal: Learn and apply best practices in mentoring and evaluating STEM faculty in interdisciplinary research & teaching
    - Goal: understand issues for women and other underrepresented groups
    - Goal: Raise visibility of ADVANCE as a resource while promoting critical concepts and building capacity of faculty to use the information
    - Messages: state of science on mentoring in interdisciplinary situations & evaluation of interdisciplinary research, teaching, leadership and
    - Tactics: Pre & Post Workshop Communications: invitations/email, learning objectives, summary of event for web story, *slides? workbooks? brochures?*
8. Workshops for Lehigh pre-tenure and mid-career STEM faculty, postdoctoral scholars, and advanced doctoral students involved in interdisciplinary research and teaching, focusing on issues for women and other underrepresented groups.
- AUDIENCE: Multiple, overlapping
    - Goal: Learn and apply best practices for interdisciplinary research & teaching while increasing capacity to use the information and awareness of ADVANCE as a resource
    - Goal: understand issues for women and other underrepresented groups
    - Messages: state of science on succeeding in interdisciplinary academic science, given issues (and solutions) for women and other underrepresented groups
    - Tactics: Pre & Post Workshop Communications: advertising invitations/email, learning objectives, summary of event for web story, *slides? Workbooks? Brochures?*
  - AUDIENCE: LT
    - Goal: Prepared to deliver workshops
    - Messages: know roles in delivering workshops and how to collect feedback to inform policy
    - Tactics: planning meetings, emails, course site, timelines, inviting speakers
9. As part of Lehigh ADVANCE, the Lehigh Women's Studies Program will invite additional external speakers each year to discuss topics of interest to women scholars across many fields, including engineering and the natural sciences. NSF ADVANCE themed WS events will include social, networking, retention and scholarship. Scholarly work will be incorporated not only through speakers but also by including ADVANCE-related topics to WS reading group lunches and/or faculty research forums.
- AUDIENCE: Attendees to these events will include range of audiences of relevance to ADVANCE and WS
    - Goal: learn and apply knowledge from speakers, foster information sharing, raise visibility of ADVANCE and promote critical concepts by building community at social & scholarly events

## Lehigh ADVANCE Communications

- Messages: collegiality, support & cooperation.
  - Tactics: joint planning and promotion are needed
10. In collaboration with the Lehigh Valley Association of Independent Colleges (LVAIC), Lehigh ADVANCE will work with regional colleges and universities, corporations, and nonprofit organizations to create a *Women in Science and Engineering* regional seminar for women scientists and research engineers to discuss each other's work, invite speakers, and participate in panels on career development in teaching and academic research.
- AUDIENCE: Women In Science & Engineering
    - Goals: Awareness of research of Regional WISE
    - Messages: networking, collaboration, reduce isolation,
    - Tactics: invitations, website promotion of Academic Regional Seminar

**Goal 2: Support the career advancement and leadership roles of women STEM faculty.****Strategies:**

1. Facilitate revision of existing tenure and promotion criteria and procedures to insure that faculty involved in interdisciplinary research and teaching are evaluated appropriately.
 

*Overall Goal: Improved success of women STEM faculty in tenure and promotion, resulting in a larger pool of senior women STEM faculty at Lehigh to serve as mentors and participate in leadership roles (measured by number of women STEM faculty tenured and promoted)*

  - AUDIENCE: Leadership Team
    - Goal: Review LU P&T criteria and explore other systems with focus on interdisciplinary research strengths and pitfalls. Develop potential revisions
    - Messages: use latest social science evidence & lessons learned from L&R interviews and consultations with faculty evaluators to support proposed changes
    - Tactics: meetings, course site/email to compare and contrast documentation, develop summary recommendation
  - AUDIENCE: P&T Committees (Change Agents/Policy Practitioners)
    - Goals: attend programs to learn, understand and apply science-backed recommendations for interdisciplinary evaluations
    - Messages: relate the state of knowledge about best practices
    - Tactics: advertise events (Annual Fall Semester Workshop Series): brochures, emails, department & Provost influences at key P&T work times
  - AUDIENCE: Lehigh University Policy Makers
    - Goal: review and modify P&T criteria and procedures to accurately evaluate interdisciplinary teaching and research
    - Messages: ensure evaluative framework aligns with push for interdisciplinarity and considers latest social science
    - Tactics: Leadership Team Advising Policy Makers based on Workshop Series (each Fall Semester), Summaries of Workshops, Reinforcing materials (brochures, toolkit documentation), advertising the events and availability of informational materials via website & using website to summarize the information, the events, etc.

## Lehigh ADVANCE Communications

2. Leadership and Retention Interviews to assist in developing best practices for mentoring and evaluating women STEM faculty and to address problems encountered by individual faculty.
  - AUDIENCE: Lehigh University STEM women faculty
    - Goal: increased self awareness of mentoring, career advancement and leadership goals and challenges
    - Messages: ADVANCE is listening, Lehigh is listening to ADVANCE
    - Tactics: conducting the interviews, provide a summary of outcomes
  - AUDIENCE: Lehigh ADVANCE LT
    - Goal: Develop summary of Interviews & use to develop programs to meet the mentoring, career development, goals and close the gaps in the challenges identified by the STEM women
    - Messages: to be determined from outcomes of L&T interviews
    - Tactics: interviewers distill notes and formulate interview summary and discuss with LT. Identify common themes, meetings, course site, identify resources and compile on website to share synopsis of process; LT to engage & inform Policy Makers
  - AUDIENCE: Lehigh University Policy Makers/Practitioners (Deans, Chairs)
    - Goal: review policies and ensure leadership positions exist and that informal and formal leadership are recognized for their important contributions
    - Goal: promote culture, environment and opportunities attuned to advancement of STEM women, building capacity of authority figures to reduce isolation and promote best practices in all functional areas of their job
    - Messages: “you are the change agent” to help move towards transformed climate. Revise practices where gaps exist to improve sense of community, reduce isolation, and ensure authority figures aware specific issues and potential solutions
    - Tactics: LT will inform Policy Practitioners/Policy Makers of outcomes (via meetings/workshops) and develop tool kits/case studies to guide effective transformation (email, course site, website resources)
3. Workshops for department chairs, center directors, interdisciplinary program directors, college promotion and tenure committees, and senior faculty on best practices in mentoring and evaluating STEM faculty in interdisciplinary research and teaching, focusing on issues for women and other underrepresented groups.
  - AUDIENCE: LT
    - Goal: Prepared to deliver workshops
    - Messages: know roles in delivering workshops and how to collect feedback to inform policy
    - Tactics: planning meetings, emails, course site, timelines, inviting speakers
  - AUDIENCE: Multiple, overlapping named above
    - Goal: Learn and apply best practices in mentoring and evaluating STEM faculty in interdisciplinary research & teaching
    - Goal: understand issues for women and other underrepresented groups
    - Goal: Raise visibility of ADVANCE as a resource while promoting critical concepts and building capacity of faculty to use the information

## Lehigh ADVANCE Communications

- Messages: state of science on mentoring in interdisciplinary situations & evaluation of interdisciplinary research, teaching, leadership and
  - Tactics: Pre & Post Workshop Communications: invitations/email, learning objectives, summary of event for web story, *slides? workbooks? brochures?*
4. Leadership Development Seminars for senior Lehigh women (associate and full professors) in the natural sciences, mathematics, and engineering to discuss research and career development issues.
- AUDIENCE: associate and full professors
    - GOAL: 1. To inspire women STEM faculty to pursue a broad range of leadership opportunities that enhance career progression
    - Goal 2. To support professional development particularly as it relates to the promotion process
    - Goal 3. To support interdisciplinary collaboration and development of professional networks on and off campus
    - Messages: *To be developed:*
    - Tactics: small, personalized events (survey completed, Tina is developing plan for implementing)
  - AUDIENCE: Lehigh Leadership
    - Goals: support identification of under recognized leadership roles and integration into evaluation procedures & support creating of new leadership roles on campus,
    - Messages:
  - AUDIENCE: Lehigh Policy makers:
    - Goals: Maintain, create, recognize and support women in informal and formal leadership positions while aligning best practices with evaluation policies
    - Messages: improving the success of women in attaining leadership positions and recognizing the contributions of formal and informal leadership will result in increased success of women STEM faculty in career progression, and a larger pool of senior women STEM to serve as mentors & leadership roles.
    - Tactics: Communicating outcomes of development seminars, updating P&T to include recognition of various types of leadership, identifying women with leadership potential and desire to have those roles: guidelines/recommendations can come from ADVANCE in forms of brochures/tool kits to inform policy

**Goal 3: Institutionalize effective policies and programs for institutional transformation.**

**Strategy:** Sustain successful activities beyond the term of the NSF ADVANCE grant period by integrating these policies and programs into our departmental and interdisciplinary structures.

- AUDIENCE: Various, repeats as above
  - GOALS: to develop a budget and policies that promote the concepts and insights from the ADVANCE process and incorporate those into university's cultural fabric that outlive the grant's life

## Appendix G

## Lehigh ADVANCE Communications

- Messages: transformation and sustainability of programs that support themes of ADVANCE while aligning with university goals
- TACTICS: develop Administrative Support for continuing to examine or sponsor:
  - Recruitment strategies
  - Interdisciplinary mentoring committees
  - Retention interviews
  - Revised evaluation policies and practices
  - Open access initiative through ADVANCE web site
  - Workshops and seminars for mentors, evaluators, and women STEM faculty and scholars
  - Women in Science and Engineering regional seminars

**Goal 4: Conduct social science research on the usefulness of interdisciplinary organization in promoting the careers of women STEM faculty.**

- AUDIENCE: Subjects (Lehigh & non-Lehigh Faculty)
  - Goal: Awareness of Lehigh ADVANCE
  - Messages: Important to be a participant to explore our hypotheses of gendering of academic interdisciplinary research
  - Tactics: Participation in the surveys
- AUDIENCE: Social Science Community
  - Goal: contribute to social science knowledge about gender and interdisciplinary research and teaching in STEM
  - Messages: research results
  - Tactics: conferences, publications (quality of article, conference, citations)
- AUDIENCE: LT & LU Policy Makers
  - Goal: use solid science to develop/revise the relevant policies to support the strategic plan's emphasis on interdisciplinarity
  - Messages: based on results
  - Tactics: keep informed of progress, findings, conferences/publications & include in workshops based on the findings to support potential policy modifications

**Goal 5: Dissemination of Lehigh's findings. Strategies for disseminating findings of programs for institutional transformation-See *Dissemination Plan for more details*:**

1. Workshops, online toolkits, and brochures on best practices in interdisciplinary mentoring and evaluation developed through leadership and retention interviews and research.
2. Presentations at interdisciplinary and disciplinary conferences, and workshops and conferences in STEM fields.
3. Best practices workshops on interdisciplinary mentoring and evaluation at Lehigh; day-long workshop for regional faculty in Year 4.
4. Workshops on career advancement for women STEM faculty, postdoctoral scholars, and advanced doctoral students at Lehigh; symposia on topics related to Interdisciplinary Research in Years 3 and 5.
5. Lehigh ADVANCE website highlighting: ADVANCE program activities and reports; achievements of Lehigh and regional STEM women; Lehigh online toolkits on interdisciplinary mentoring, evaluation, and searches; open access information to facilitate interdisciplinary collaboration.

Lehigh ADVANCE Communications

6. Correspondence and networking with administrators and interested faculty at our peer institutions regarding our ADVANCE program and findings about gender and interdisciplinary collaboration.

*TACTICS: Report on publications, presentations, conferences, symposia workshops to keep conversation flowing, can include social media in addition to ADVANCE website and other university and departmental web-spaces, magazines, etc.*

### **Summary of Communications Goals for ADVANCE & Tactics or Other Program Features to Achieve**

- Raise the visibility of ADVANCE and its activities across the University and the region
  - Events
  - Brochures
  - Leadership & Retention Interviews
  - Surveys
  - Training Workshops
  - Website
  - Best Practices/Tool Kits/Guidance/Recommendations/Publications
  - Other Media: Consider Social Media
- Promote the concepts that inspire Lehigh ADVANCE
  - Events
  - Training Workshops (includes development series)
  - Brochures?
  - Other Media: Social Media
- Build Community of Women in Science & Engineering
  - LU
  - LVAIC
  - Broader Region
  - Allies/Supporters of WISE
    - LU-WISE: Research
    - Brown Bag Lunches
    - Outreach to STEM alumnae
    - Social Media Tools
- Raise awareness of scientific research surrounding gender and interdisciplinarity and its applicability to Lehigh University and other institutes
  - Seminars/Workshops
  - Publications, Reports, Tool Kit
  - Conferences
  - Website