Appendix A

EVALUATION OF THE UNDERGRADUATE FACULTY ENHANCEMENT PROGRAM

DESIRED OUTCOMES AND INDICATORS

The numbers in parentheses are used to cross-reference the indicators with items in the survey (see Appendix C).

A. Desired Outcomes for Faculty

SMET faculty incorporate current and relevant content into their teaching, use state-of-the-art experimental techniques and technology, and apply best practices in instruction. Indicators are:

Proportion of participants:

- Developing/revising courses with content that is current and relevant to the real world. (A1)
- Developing/revising courses that incorporate best practices (e.g., providing opportunities for students to engage in open-ended problem solving, developing hypotheses, designing and carrying out experiments to test hypotheses). (A2)
- Developing/revising courses to incorporate new experimental techniques. (A3)
- Developing/revising courses to incorporate state-of-the-art technology. (A4)
- Developing/revising interdisciplinary courses. (A5)
- Developing new majors or plans of study. (A6)
- Teaching courses that were developed/revised. (A-7)
- Collaborating with other faculty to develop or revise their courses. (A8)
- Attending subsequent workshops/seminars. (A9)
- Communicating with experts in their field and other scientists subsequent to UFE workshops. (A10)
- Engaged in professional development activities that promote best practices or increase knowledge of content, technology, or experimental techniques (e.g., workshops, institutes, conferences). (A11)
- From underrepresented groups. (A12)

Extent to which participants report:

- learning new content, teaching methods, technologies, and/or experimental techniques. (A13)
- implementing concepts and skills learned in UFE activities. (A14)
- attendance at subsequent professional development activities was influenced by their UFE participation. (A15)
- implementing concepts and skills learned at professional development activities subsequent to UFE workshop. (A16)
- Participants from underrepresented groups report that UFE workshops are relevant to their needs. (A17)

B. Desired Outcomes for Students

Students, including those from underrepresented groups, gain proficiency in SMET, improve their attitudes toward SMET, and are prepared to apply SMET concepts to their lives. Indicators are:

Numbers of students completing courses that were developed/revised as a result of UFE and that:

- Reflect best practices (e.g., providing opportunities for students to engage in open-ended problem solving, developing hypotheses, designing and carrying out experiments to test hypotheses). (B1)
- Incorporate content that is current and relevant to the real world. (B2)
- Incorporate advanced technologies. (B3
- Incorporate state-of-the-art experimental/lab techniques. (B4)

Extent to which students completing the new/revised courses:

- Achieve high grades in such courses. (B5)
- Take follow-on courses. (B6)
- Report that such courses are relevant and motivating. (B7
- Report having confidence in applying SMET concepts. (B8)

Extent to which faculty report that students in new/revised courses showed improvements in:

- SMET knowledge among students enrolled in new/revised courses. (B9)
- Problem-solving skills among students enrolled in new/revised courses. (B10)
- Communication skills among students enrolled in new/revised courses. (B11)
- Ability to apply new knowledge among students enrolled in new/revised courses. (B12)
- Critical-thinking skills among students enrolled in new/revised courses. (B13)
- Ability to collaborate among students enrolled in new/revised courses. (B14)
- Ability to use advanced technology among students enrolled in new/revised courses. (B15)
- Understanding of the scientific method among students enrolled in new/revised courses. (B16)

C. Desired Outcome for Learning Infrastructure

Institutions offer SMET courses/labs for undergraduates that are state-of-the-art in their content and technology, incorporate best practices in their pedagogy, are accessible to all students, and are relevant to the real world. Indicators are:

Number of SMET courses that were developed/revised as a result of UFE workshops and that:

- Incorporate current, relevant content. (D1)
- Integrate advanced technology. (D2)
- Incorporate best practices. (D3)
- Integrate inquiry-based labs. (D4)
- Experts judge that new/revised courses/labs reflect state-of-the-art SMET content and technology and best practice in pedagogy. (D5)

- Faculty and administrators report that, compared with previous courses, new/revised lower-level courses offer better preparation for upper-level courses in all SMET areas. (D6)
- Faculty and administrators report that, compared with previous courses, new/revised courses are more relevant to the current labor market. (D7)
- Students rate new/revised courses/labs as more interesting, less intimidating, and more relevant to the real world (compared with previous students' ratings of commensurate traditional courses/labs). (D8)
- Underrepresented students report that new/revised courses take their needs into account. (D9)

D. Desired Outcome for Collaboration

SMET Faculty collaborate with one another and with other experts in their fields. Indicators are:

Extent to which UFE workshops have been collaborative efforts between various types of institutions. (E1)

Extent to which participants:

- Establish new research or teaching collaborations with colleagues. (E2)
- Communicate with other participants or workshop PIs following UFE workshops regarding content, teaching practices, or technology. (E3)
- Communicate with experts in SMET fields. (E4)
- Report that communications they have engaged in as a result of UFE workshops have had value for their careers. (E5)
- Report team teaching courses that were developed/revised as a result of UFE workshops. (E-6)
- Extent to which courses/labs developed as a result of UFE workshops are interdisciplinary. (E7)

E. Institutionalization of Reform

Reforms in undergraduate SMET courses are sustained. Indicators are:

Extent to which courses developed/revised as a result of UFE workshops:

- Have had formal departmental and program approval. (F1)
- Continue to be offered to date. (F2)

Institutions plan to continue to offer new/revised courses/labs. (F3)

F. Desired Outcome for the Broader Academic Community

Knowledge and skills from UFE workshops are disseminated widely. Indicators are:

Extent to which participants disseminate what they learned in UFE workshops by:

- Publishing in professional journals and/or making presentations at conferences, seminars, or workshops. (G1)
- Communicating informally with colleagues. (G2)
- Demonstrating or modeling new teaching strategies or technology for colleagues. (G3)
- Participating in department and/or campus committees on curricular change and/or reform. (G4)

Extent to which nonparticipant faculty have developed new courses or revised old courses and attribute changes to participants' influence. (G5)

Extent to which nonparticipant faculty have attended UFE workshops because of participants' influence. (G6)