

## Examples of Synergistic Activities for NSF Biographical Sketches Prepared by Utah Valley University, Office of Sponsored Programs

**Synergistic Activities:** A list of up to five examples that demonstrate the broader impact of the individual's professional and scholarly activities that focuses on the integration and transfer of knowledge as well as its creation. Examples could include, among others: innovations in teaching and training (e.g., development of curricular materials and pedagogical methods); contributions to the science of learning; development and/or refinement of research tools; computation methodologies, and algorithms for problem-solving; development of databases to support research and education; broadening the participation of groups underrepresented in STEM; and service to the scientific and engineering community outside of the individual's immediate organization. (PAPPG, 2018) **Note: Proposals with more than five synergistic activities may be returned without review.**

**Helps:** Activities should be selected based on the specific proposal. Their aim is to demonstrate that the individual is well-qualified to direct or contribute to the proposed proposal. There are many forms and styles these activities can take. A format that utilizes text paragraphs to explain an activity or group together closely related activities under one heading can be effective. Activities (in the broad sense) can span several appointments and many years. PI should include activities that show leadership and project completion abilities. Proposals for undergraduate research should describe your experience with student researchers and the outcome (their graduation, enrollment in graduate school, or job in field). This section is different than what is typically included in a CV. This is your opportunity to sell yourself. Here are some examples:

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**Teaching.** I have taught courses in general geology, geologic hazards, environmental geology, oceanography, and survey of physical science, including a distance learning course that is broadcast live to sites throughout Utah. Courses and laboratories have included field-trips to investigate local geology.

**STEM Recruitment.** I have worked to advance programs that attract students to the sciences. For instance, I developed the Latino Scientists of Tomorrow program (LST) summer program where Latino/a high school students explore careers in the sciences and get with a jump start on their university degrees. I serve as co-Chair of the SheTech Explorer Day committee that hosts a conference for high school girls 9th - 12th grade. I have also organized and lead science outreach events for various Native American groups and events. I currently serve as PI of an NSF INCLUDES award (#164936) to disseminate the UVU PREP program, an intensive summer math and science program for middle school students, to other educational institutions in Utah in an effort to strengthen the STEM pipeline for students from underrepresented backgrounds.

**Informal Science Education.** I have developed field trips for students and others interested in geology throughout parts of Utah, California, and Hawaii. As a visiting professor of Semester at Sea (summer 2009), I developed and led field trips to explore the geology and oceanography in parts of Spain, Italy, Croatia, and Turkey. Have written field trip guide books with other colleagues for the following organizations: Rocky Mountain Section of the American Assoc. of Petroleum Geologists (2007), National Science Teachers' Association (2006), Geological Society of America (2005), American Association of Petroleum Geologists (2003), Assoc. of Engineering Geologists (1999).

**Supervise Student Research.** I have lead a number of student field studies and supervised ## student research projects and senior theses. For example, I have worked with several students and geologists from the Utah Geological Survey to map the surficial geology along a section of the Wasatch Fault, excavate a trench across the fault, and analyze the wall of the trench in order to better-constrain the history of earthquakes on the segment. (The Wasatch Fault runs through Utah's heavily populated urban corridor.) ## students have continued to graduate studies and ## are employed in geoscience fields.

**Consulting in the Community.** I served on the Project Impact committee funded by the Federal Emergency Management Agency that assessed landslide hazards that may impact Salt Lake City and recommended actions to reduce those hazards (2000 – 2001). Also, wrote the Utah Lake Comprehensive Management Plan, Resource Document, for the Utah Division of Fire, Forestry, and Public Lands (2005). I worked with an engineering consulting firm to assess landslide hazards that may impact a proposed natural gas pipeline in central Utah. The work involved mapping and characterizing ancient landslides based on field mapping and aerial reconnaissance.

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- 1) While Dean at UVU, I have established 7 science education baccalaureate programs in the sciences and math as well as 9 baccalaureate degree programs in the sciences, math, and health sciences.
  - 2) I created a multidisciplinary BS program in Conservation Biology at Brigham Young University in 1998-1999. The program still exists.
  - 3) I was chosen Karl G. Maeser Professor of General Education, Brigham Young University for the years 1990-1993. This was due to my interest and abilities in broad general science education.
  - 4) I was awarded an United Nations Environment Programme (USUNEP) 500 Award for the year 1991. This was due to my efforts in clean air research and activism.
  - 5) I have been involved as investigator and co-investigator on more than a million dollars of research grants and contracts. The majority of these have involved undergraduate and graduate students.
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**Experience in Industry.** She worked as a control engineer and product owner for G.E. Commercial Transformer plant in Shreveport, Louisiana where she developed an Electronics testing lab for testing regulator controllers. Developed classes for training customers on theory and application of regulators and regulator controllers.

**Teaching and Curriculum Development.** Currently working in the College of Technology and Computing at UVU where she has developed the curriculum for the UVU's Computer Engineering program. Some of the courses that she has developed and taught for that program are: Digital Design I & Lab, Digital Design II, Circuit Theory & Lab, Signal & Systems I & II, Digital Signal Processing, Electronics Systems & Lab, Engineering Analysis, Introduction to MATLAB, Embedded Systems, and Computer Engineering Senior Design Project. She has advised more than 30 students with their senior design projects which has resulted in three presentations at UCUR conferences and six presentations at NCUR Conferences.

**Women in STEM.** She has collaborated with the Equity in Education Center to organize the Expanding Your Horizons Conference for women in STEM and has presented in that conference. Previously, served as a judge for the Louisiana State Science Fair which involved middle-level and high school students. Served as an associate site director for the 2005, and 2009 ACM International Collegiate Programming Contest. Served as judge in the Central Utah Sterling Scholar Competition, 2008. Serves as a presenter for the Empowering Your Tomorrow Conferences (UVU).

**Conference Presentations.** Actively involved in the academic community, particularly through presentations and attendance at national and international conferences and has published in the proceedings of a number of other conferences and symposium, including Symposium on Applied Computing (1992), Conference on Computer Applications in Design, Simulation and Analysis (1993), The First Eurasian Conference on Advances in Information and Communication Technology (2002), and American Society for Engineering Education (ASEE) Annual Conferences. She has served as a reviewer and moderator for various annual conferences such as SIGCSE, and ASEE.

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- ✧ Chairman, **Utah Mathematics General Education Tuning Team** (2011 – 2014) – Led team of faculty from all USHE (Utah System of Higher Education) institutions, current and former students, and USOE (Utah State Office of Education) personnel in determining core outcomes common to General Education (GE) Mathematics courses across the state. Wrote the learning outcomes for Math GE with examples of how they apply to each of the primary Math GE courses (<http://utahtuning.weebly.com/sharing-math.html>).
- ✧ Chairman, **Utah System of Higher Education Mathematics Majors Meetings** (2009 – present) – Representatives from all USHE school math departments come together to share successful ideas and to discuss and resolve concerns.

- ✧ Team Leader, **Western Interstate Commission for Higher Education (WICHE) Passport Project** (2012 – 2014) – Representatives from five western states on determine learning outcomes common to General Education Mathematics courses at participating states. Objective: students at an institution can transfer course/learning outcomes to another state without having to repeat coursework.
- ✧ Team Member, **Utah Middle School Mathematics Project** (2012 –2014) – Wrote mathematical foundation pieces for text aligned to 7<sup>th</sup> and 8<sup>th</sup> grade Utah Core Standards (modeled on Common Core State Standards). Reviewed and revised most chapters in 7<sup>th</sup> and 8<sup>th</sup> grade texts for students and for teachers.
- ✧ Team Member, **Utah College Readiness Task Force** (Summer 2012) – Assisted with the “creation of a web-based, self-initiated, automatically scored set of practice standards positively correlated to student success” in USHE Math GE classes. My primary involvement was writing problems for statistics and probability standards and providing critical review of the full committee report.

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*Teaching and Curriculum Development.* I currently work in the Woodbury School of Business at Utah Valley University (UVU), where I am involved in teaching and curriculum development. The courses I have taught at UVU include: Introduction to Business (MGMT), Organizational Behavior (MGMT3000), Business Ethics (MGMT3020), International Business (MGMT330G), Cross-Cultural Communication (MGMT332G), and Strategic Compensation (MGMT4000).

*Experience in HR Development.* While at Digital Technology International Germany, I was responsible for hiring and firing, attracting, retaining, developing, and motivating personnel in a medium-size international software company.

*Experience in large-scale, international Project Management.* I have served in several positions of management during my career. While at Digital Technology International Germany, I learned to manage an internationally diverse team’s development and worked with customers, technicians, and software engineers to resolve issues with regard to the implementation of large-scale, year-long software integrations. I was responsible for creating project plans for multimillion-dollar software implementations, setting, coordinating, and monitoring project milestones, managing the workflow and motivating multi-ethnic team members to meet implementation deadlines, monitoring the budget, and coordinating the development of customized software features.

*Experience in Contract Negotiations.* While at Digital Technology International USA, I was responsible for the financial soundness of multimillion-dollar software deals on a global basis. I negotiated face-to-face with customers on the executive level. I also worked within a team of executive level officers, senior salesmen, senior engineers and technicians, and lawyers.

*Experience in Financial Planning.* While at Digital Technology International USA, I was responsible for the financial planning and controlling of five international entities located in the UK, Germany, Denmark, Norway, and Australia.

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Teaching: Introductory Biology, General Biology, Invertebrate Zoology, Entomology, Principles of Evolution, Bioinformatics & Genome Analysis, Molecular Evolution and Bioinformatics, Senior Seminar.

Broadening the participation of groups underrepresented in science: Faculty member for UVU PREP: intensive STEM summer training for underrepresented groups – 7<sup>th</sup> - 9<sup>th</sup> grade students.

Membership to professional societies: Society for Molecular Biology and Evolution, Entomological Society of America, Society of Systematic Biologists, Willi Hennig Society, Dragonfly Society of America, Chilean Entomological Society

Service to scientific community: Designer Technology Intensive Concurrent Enrollment Course for Utah State Higher Education (2013-2014).

Peer reviewer for the journals: BMC Bioinformatics, BMC Evolutionary Biology, Systematic Biology, Molecular Phylogenetics and Evolution, Cladistics, Bioinformatics, Systematic Entomology, Zoological Science, Zootaxa, Morphology, Trends in Evolutionary Biology, Freshwater Science

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1. Managing the collaborative project titled "An investigation of wave dynamics in the Arctic mesosphere and coupling between the lower and upper Polar atmosphere".
  2. Advisor to six undergraduate students in the fields of atmospheric, space, and medical physics. Three students recently presented their work at the 2013 CEDAR workshop.
  3. Developed a new curriculum in the Department of Physics at Utah Valley University titled "Space Plasma Physics" to introduce undergraduate students to the field of Plasma Physics and applications towards the Space Environment.
  4. Advisor to the local Society of Physics Students program.
  5. Active reviewer for NSF and peer-review journals.
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**Curriculum Development.** Curriculum development with the ACM (Association for Computing Machinery) curriculum committee. One of the co-authors of *Curriculum '78*; have had continuous involvement with computer science curriculum issues since that time at the national level as well with the Brigham Young University (BYU) Computer Science Department as Chair of the department curriculum committee. Principal designer for a computer based computer science course that served over 6,000 students at BYU from 1984-1998.

**Accreditation & Standards.** Member of the Executive Committee of the first Computer Science Accreditation Commission in 1986 and team chair of several accreditation teams over the years. Currently a member of the ABET Computing Accreditation Commission. Also a member of an IEEE committee that drew up guidelines and standards for laboratories in support of Computer Science education. 1988-92

**NSF Task Force.** Member of an NSF joint Taskforce consisting of industry and academic representatives that produced a curriculum for improving the education of Information Systems Specialists. It was titled "ISCC'99 Educating the Next Generation of Information Systems specialists in Collaboration with Industry."

**Outcomes-Based Assessment.** Presented an invited seminar at University of California – Santa Barbara on conducting outcomes-based assessment activities for ABET accreditation. Invited to write the chapter for assessing computer science programs in the Palumbo and Banta book on assessment.

**Grant Management.** Awarded 7 and lead major grants from private industries including Hewlett-Packard Corporation, Digital Equipment Corporation, IBM (Santa Teresa Laboratories, Data Base Management) totaling over \$1,500,000. All awards were completed on time and within budget.

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**Educator/Mentor & Supervisor.** Currently teach classes in mathematics and mathematics education with a focus on preparing secondary education teachers and elementary education teachers. Supervisor for student teachers and interns in mathematics. Previously supervised student teachers at State University of New York College at Cortland, 1994 – 1997 where I also taught classes in mathematics.

**Presenter at Utah Council of Teachers of Mathematics Conference.** In recent presentations, I have introduced teachers of mathematics to GeoGebra and also have shown elementary and middle school teachers how area models can be used to justify all algorithms for computing with fractions. These sessions involved much discussion between the presenter and the attendees.

**Poster session at the NSF Robert Noyce Teacher Scholarship Program Conference, Utah Valley University and Noyce.** (May 2012) At this session, I showed how the Noyce Scholarship benefited two undergraduate students, both single-mothers and of nontraditional age, one in science education and the other in mathematics education.

**Professional Organizations.** I maintain membership and stay actively involved in the following organizations: Utah Council of Teachers of Mathematics (UCTM); National Council of Teachers of Mathematics (NCTM); Utah Association of Mathematics Teacher Educators (UAMTE); American Association of Mathematics Teacher Educators (AMTE).

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**Supervision of Undergraduate Research.** Throughout my time at Ferrum College and Utah Valley University, I have mentored 14 past and 13 current undergraduate students on a variety of research projects. These have led to 18 different student presentations at various regional and national scientific conferences. Approximately 50% of the students I mentor are women/minorities and I have had one student present at the national Annual Biomedical Research Conference for Minority Students (ABRCMS). Of my past research students, six have gone on to M.S. or Ph.D. programs, one D.C. program, and one D.V.M./Ph.D. program.

**Grant Management.** I have been awarded and successfully managed \$300,000 in federal funds through NIH R15 and SIBR grant programs. These grants funded research that supported seven undergraduate researchers during my time at Ferrum College. I have also been awarded numerous internal grants from Ferrum College, Intermountain Healthcare, and Utah Valley University totaling approximately \$140,000. Internal funds were awarded to support a range of projects including support for undergraduate lab-based microbiological research, pedagogical research, organization of faculty development workshops, and curriculum development.

**Learning Outcomes Assessment.** I have been heavily involved with assessment of student learning outcomes throughout my career. In my current role as the Biology Department Assessment Coordinator, I am leading the development of new Program Learning Outcomes for our department majors (Biology, Biotechnology, and Botany). The development process includes revising current outcomes along with researching and implementing various assessment methodologies for annual data collection for each outcome. I also have a service role at the University level as the College of Science representative to the Academic Effectiveness Committee whose role is to assist with program review and assessment of university-wide learning outcomes. At Ferrum College, I was chair of the Student Assessment Committee for 4 years, providing peer-review of all academic program assessment plans on campus.

**ASM-NSF Biology Scholar.** In 2013 I was selected for the NSF-sponsored American Society of Microbiology Biology Scholars Research Residency Program. This year-long residency supports biologists in research and implementation of evidence-based teaching practices. Our cohort of 12 residents were trained on methodologies behind the scholarship of teaching and learning, including the development and testing of new strategies as well as data collection and analysis of implementation affects.

**Service to the Scientific Community.** I am actively involved with both the microbiology and teaching communities through presentation and mediating workshops at national conferences, attendance at professional development workshops, and participation in professional organizations. I am a consistent presenter at ASM Microbe National Meeting and ASM Conference for Undergraduate Research. I have served as the American Society of Microbiology Virginia branch president and am currently the Intermountain branch representative on the national Committee on Microbial Sciences.

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**Software Development Team Leadership:** At Bell Labs, developed software for telecommunication systems and for tools. Led project development teams. Designed and developed systems for automated testing. Led quality improvement efforts. Coordinated ISO 9001 certification activities.