

Julie J. Murphree

Lecturer- Wildlife & Animal Science
Science and Mathematics Faculty
College of Integrative Sciences and Arts
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My broad research interests focus on the application of cognitive ethology (the study of animal minds), behavioral ecology and ecological science to interpret the effect of animal behavior on the ecological space that an organism occupies as part of its habitat. My work fuses scientific understanding, emotional connection, and a moral call to action to determine the best course of action for biodiversity enhancement and species welfare in a rapidly changing world.

Research Specialties

Animal Science, Animal Welfare/Animal Rights, Wild Horse management, Equine Science, Animal Behavior, Cognitive ethology, Feeding ecology and wildlife nutrition, Companion animal nutrition and welfare, Environmental ethics, History & philosophy of conservation, Natural Resource policy, Environmental enrichment in captive species, and Human/non-human relationships.

Education

PhD –Biology – Animal Behavior/Animal Welfare College of Liberal Arts and Sciences-(Biology and Society)
Arizona State University – **2022**

- Dissertation: "The Mustang Dilemma: Facts, Values, and Decision Making in Arizona's Heber Wild Horse Territory"
- Committee chairs: Ben Minter, Biology and Society; Michael Schoon, School of Sustainability.4.0 Cumulative GPA

MS, Applied Biological Sciences, Arizona State University, 2012

- Concentration: Animal Nutrition and Wildlife Management
- Thesis: "The evaluation of the efficacy of DNA Sequencing and Micro histological analysis in determining diet in Wild Ungulates" –Committee Chair: Dr. William H. Miller 4.0 GPA

MEd, Secondary Education in Biology with Teacher Certification, Arizona State University,2010

- Concentration: Core concepts in Biology education: Bridging the gap between secondary and post-secondary Biology students, Inquiry based learning, Environmental and Agricultural Education
- Thesis: "Creating a model of interest: Increasing intrinsic motivation in science students" – Advisors: Dr. Barbara Huff, Dr. Mark Esch; Mary Lou Fulton College of Education -4.0 GPA

B.S. Wildlife Conservation Biology, Arizona State University, 1992

- Concentration: Wildlife Conservation, Population biology, Behavioral ecology, Environmental ethics & policy
- Capstone project: "Resource partitioning of two sympatric rodents in Oak woodland forests" –Advisors: Dr. Andrew Smith, Dr. W. L. Minckley
- Summa cum Laude, 3.92 GPA; **Recipient of outstanding Zoology student:** Jonathan Wade Psoras *Outstanding achievements in Academic pursuits*

Teaching and Curriculum Development

Lecturer- College of Integrative Sciences and Arts, Arizona State University **2022-present**

Instructor- College of Integrative Sciences and Arts, Arizona State University **2013-2022**

ABS 378: Animal Nutrition Developed and taught: Spring, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022

- This course incorporates an in-depth exploration of the need to feed, evolutionary concepts of form and function, plant and animal interactions, comparative digestive anatomy and feeding habits of domestic and free ranging wildlife. Emphasis is placed on an understanding of foraging behaviors for wildlife and nutrient enhancement for captive species. Controversial issues in domestic and wildlife animal nutrition, the role of nutrients in disease prevention, feeding of companion animals during various life stages and the ability to maintain stable ecosystems and feed the world are also explored.
- Pre-vet and wildlife Students have multiple opportunities for hands on activities through field trips and research experience including 1) Lower Salt River Riparian Ecosystem: Assessment of habitat and foraging behavior of wild horses; 2) Phoenix Zoo kitchen: Observation of daily meal prep for exotic species and handler methods for proper delivery of nutritional enrichment; 3) Individual and group research projects: Companion animal diet analysis (e.g., kibble verses raw diets); Observation and assessment of nutritional needs of wild animals.

ABS 378: Online Animal Nutrition – Developed and taught Spring 2022, 2023

- Online version of my face to face animal nutrition course- provides students with a virtual experience in the exploration of diet, foraging behavior and functional anatomy of the vertebrate digestive system.

ABS 372 – Captive Animal Behavior Management- Developed and taught -Fall 2018, 2019, 2020, 2021, 2022

- Through an investigation of cognitive development, sentience and communication, students analyze issues surrounding animal welfare and animal rights in wild and captive animals. Also explored, is the origin, interpretation and relationship of animal behaviors to core emotions and the misconceptions or controversial issues surrounding human interactions with both domestic and wild species. Through research projects and hands on activities, students examine the relationship between animal behavior and specific training methods as well as the use of various environmental enrichment techniques and proper habitat design in a Zoo or sanctuary setting.
- Pre-vet and wildlife students have multiple opportunities to take part in 1) Assisted interventions involving animals, humans and the environment;. 2) Field trip to wild horse off range training facility in Florence, AZ to observe training methods by inmates, off range captive environments and processing of wild horses and vaccination procedures by BLM staff veterinarians; 3) Field trip to Tonto National Forest to observe sustainable off range management of domesticated horses and the resultant connections between biodiversity, the environment and animal welfare.

ABS 394 Introduction to Equine Management- Developed and taught: 2020, 2021

- This course aims to give students an understanding of the evolutionary development and natural history of equids as well as the behavioral, nutritional, physiological and psychological concerns of both captive and wild species. In addition, the human/horse relationship is examined in order to provide a deeper understanding of the science needed to provide proper welfare and management.
- Pre-vet and wildlife Students take part in multiple field trips to BLM off range wild horse facilities, Salt River Riparian areas and horse rescue facilities in an effort to gain hands on research experience in the management of both wild and domestic horses.

ABS 274: Introduction to Wildlife Management 2014, 2022

- This course is designed to introduce important principles governing the conservation and management of wildlife resources. Through a combination of lecture and hands-on field activities, students investigate a wide range of topics involving the application of scientific principles to real wildlife issues.

ABS 302: Ethical and Policy Issues in Biology- Developed and taught: 2014, 2015, 2016, 2017. 2018, 2019. 2020, 2021, 2022, 2023

- This is an course aimed at tackling controversial ethical issues surrounding health, medicine, technology, animal welfare, and the environment. Through a framework designed for ethical decision making, students explore and defend various viewpoints, diverse values and interpretations surrounding: the capacities that are necessary for the right to Life, the facts that assist patients in making an informed decision with regard to stem cell treatment, bioengineering and cloning, the pros and cons of genetically modified food crops on health and the environment, the misconceptions involved in the development and regulation of GMOs and nutritional supplements and the pros and cons surrounding artificial intelligence and Bio Enhancement. Students further examine differences in human and nature-oriented outlooks, debate the various views on the value of wildlife and our roles as stewards of their environment, and discuss rights versus welfare views on management of captive and wild species.

Bio480: Methods of Teaching Biology – Developed and Taught 2013, 2015, 2016

- This course develops the knowledges and skills needed to implement student-centered science instruction for a culturally diverse population. It further explores how science education experiences impact our view of what good science teaching is, multiple views on how students come to understand science, the teaching strategies research has identified as most effective and various instructional methods that can be implemented within the contexts of current high school classrooms. In addition to learning how to teach biology to a diverse group of students, this course reconstructs our knowledge of biology to make it more contextual and conceptual with the goal of achieving equity in learning and inclusiveness in the classroom.

ABS 490 - Undergraduate seminar 2013, 2014, 2015, 2016, 2017, 2022

- This course exposes undergraduate students to a broad range of environmental and occupational research, practice, and policy areas in order to assist them with career exploring and planning within the Applied Biology major. The format for this class includes group discussions, short lectures, guest panelists, and strong student involvement. Students take part in active discussions, learn the elements of good presentations and share ideas and research experiences with their classmates.

Bio 100 The Living World – Developed and Taught: 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021,2022

- This course acquaints non-science majors with the process of science and enables them to develop a working understanding of the major biological concepts needed to make informed, ethical decisions regarding health and the environment. Students explore biological characteristics common to all organisms and correlate this to a definition of life, evaluate how DNA controls the cell and regulates form and function, examine animal adaptations and relate this to Darwinian evolution, discuss the science of aging and how nutrients affect the human body, analyze factors that lead to disease and dissect how the “truth” regarding health and nutrition changes with time. In addition, through in class debates and online discussion boards, students investigate and debate the technology surrounding GMOs, CRISPR technology, cloning and stem cells.

Bio 100 lab 2013, 2014,2015, 2016, 2017, 2018, 2019, 2020, 2021

- The goal of the BIO 100 lab is to provide hands-on experience with biological material and to enhance student abilities in scientific methodology and critical thinking. The activities performed by students illustrate and reinforce the concepts introduced in the lecture portion of the class.

Instructional Professional, College of Technology and Innovation, Arizona State University 2010-2013

- Bio100 lecture- summer 2010, 2011, 2012
- BIO 100- lab – summer: 2010, 2011, 2012
- Bio 181 lecture – fall 2010: portion of semester-assumed responsibility of instructor
- Bio 181 lab – 2009, 2010, 2011, 2012, 2013
- Bio 182 lab – 2009
- Bio 201 Anatomy and physiology- lab –summer: 2010, 2011

Faculty Associate, College of Technology and Innovation, Arizona State University 2009-2010

- Bio 100 lab – fall 2009, Bio 187 lab – fall 2009

Science Teacher- Cortina middle school, Queen Creek, AZ 2008-2009

- Created and implemented daily lesson plans for 190 7th and 8th graders.
- Managed research opportunities and outreach for students including field trips to ASU Algae research lab
- Directed and managed annual Science Fair

Courses Developed and taught:

- Life Sciences: Genetics, Anatomy and Physiology, Ecology and Environmental sciences
- Physical and Earth Sciences: Physics, Chemistry Astronomy, Geology

Research Experience

PhD – Dissertation Research – ASU School of Life Sciences -2016-2022

- Utilized a mixed methods/ ethnographic approach to investigate the ecological, behavioral, social and economic aspects of the management of free-roaming horses on public lands in the American West.
- Incorporated wild horse behavioral observations, habitat assessment and collaborative efforts with USFS, AZDA, BLM, NGOs and stakeholders to determine best management practices for captive and wild equids in lower Salt River Riparian areas of Tonto National Forest and Pinyon/ Juniper areas in Apache- Sitgreaves National Forest.

Outcomes:

- Brought clarity and a deeper sense of understanding to the wild horse management debate by highlighting trends in conservation biology including, movement away from traditional restoration to rewilding and the public's increased desire for compassionate conservation, as well as subsequent policy changes crucial for effective management of free-roaming horses.
- Provided wild horse management recommendations to US Forest Service and Bureau of Land Management that incorporates a concern for the horse's physiological and emotional welfare through the use of fertility control, nutrition enhancement and spatio-temporal distribution.
- Committee Chairs: Ben Minteer (School of Life Sciences) Michael Schoon (School of Sustainability)
- Committee members: Karen Bradshaw (Sandra Day O'Connor College of Law), Matthew Chew, (School of Life Sciences).

M.S. Thesis Research- College of Letters and Sciences, Arizona State University, 2010-2012

- Conducted groundbreaking research combining DNA sequencing and microhistological analysis with controlled feeding trials in pygmy goats to provide data for Arizona statewide study on Pronghorn population management and nutrition factors affecting fawn recruitment in collaboration with Desert Botanical Gardens and Arizona Game and Fish. Funded by Bureau of Land Management.
- Advisors- William H. Miller, ASU; Kelly Steele, ASU, Andrew Salywon, Desert Botanical Gardens

M.Ed. Thesis Research – Mary Lou Fulton College of Education, Arizona State University, 2009-2010

- Developed a model of Interest for Instructional methods in biology- coordinated outreach efforts and tour of Algae Research lab for 7th graders promoting situational interest. Advisor: Dr. M. Esch, Mary Lou Fulton Teachers College.
- Investigated research on motivation in secondary science students and post-secondary career choices utilizing data from Science fair projects and student surveys. Advisor: Bert Meyers Cortina Middle School

Graduate Research -Department of Environmental Resources, Arizona State University, 1992-1998-Advisor: Dr. W. H. Miller

- Executed research on factors affecting accuracy of micro- histological techniques for diet analysis in ungulates
- Assisted in field work/sampling of Elk populations in north central Arizona
- Assisted in Game and Fish Bighorn sheep radio-collar/ capture and release.

B.S. Undergraduate Research –Department of Zoology, Arizona State University, 1989-1992

- Conducted field research on habitat overlap of Kangaroo rats (*Dipodomys deserti*) and White throated Woodrat (*Neotoma albigula*) Workman’s Creek, AZ, - Advisor: Dr. W.L. Minckley, Emeritus professor of Zoology, school of Life Sciences, ASU
- Assisted in field research on population dynamics of American pika (*Ochonta princeps*) in Sierra Nevadas, Bodie, CA –Advisor: Dr. Andrew T. Smith, professor, School of Life Sciences, ASU
- Contributed to educational program for adaptations in desert wildlife in Desert Trails Exhibit for Phoenix Zoo concentrating on Sonoran Desert animals and their adaptations to desert environments.
- Assisted in field research for Game and Fish and assessment of Bonytail Chub (*Gila elegans*) on lower Colorado River, Arizona –Advisor: Dr. W.L. Minckley

Honors / Awards

- Jonathan Wade Psoras Award : "Outstanding achievements in Academic pursuits" presented to outstanding Zoology student, 1992
- Arizona Department of Education Distinguished achievement: Arizona Educator's Proficiency Biology Exam; Scored 100% in genetics and cells portion; 2010
- Arizona Department of Education: "Highly Qualified" Instructor of Advanced Placement Biology and Anatomy and Physiology through grade 12, 2010;
- Structured English Immersion certified, 2010

Publications:

- Murphree, J. J. 2014 Watchable Wildlife: Chasing Butterflies. Mountain Lines: Journal of McDowell Sonoran Conservancy. Winter 2014
- Murphree, J J. 2012. *"Water: The chemical context of Life"* in The Pearson custom Library for the Biological Sciences Pearson Learning Solutions, Boston, MA.
- Murphree, Julie J. 2012 *"The Effect of pH on our environment and health" "* in The Pearson custom Library for the Biological Sciences Pearson Learning Solutions, Boston, MA.
- Murphree, P. J , J.J. Murphree, J. G. Murphree 1996. "The Adventures of 100% Happy Shirt: An educational tool for agricultural outreach" Murphree Press, Maricopa, AZ.

Invited Talks / Interviews

- "The Wild Horse Fire Brigade: Equids as ecosystem engineers and decreasing fuel loads in California" National Public Radio- 3/3/2022
- "Wild horses Up for Adoption"- Staton, M. Cronkite News 2/9/2020 <https://www.youtube.com/watch?v=8-1FOmdN8Uk&feature=youtu.be>
- *Don't Fence Them Out – Pirehpur, K. Mesa Tribune – 2/16/2020-* https://www.eastvalleytribune.com/news/don-t-fence-them-out-horse-advocates-plea/article_4a97170c-54f6-11ea-a5cc-63ba18af68ab.html
- Murphree, J.J. *Innovations in Undergraduate Biology Teaching: Why we need a revolution.* Invited talk. Arizona State University, Mesa, AZ. November 2014

Professional Training/Workshops

- Mountain West Summer Institute –Undergraduate Education in Biology, Colorado State University – Boulder CO – Summer 2014

Graduate Student Mentoring

2022

- Daniela Soto Cabrera- M.S. –"Food preferences of the Salt River Wild Horses: Collaborative Management and Unintended consequences." (Thesis Director -in progress)
- Quiarrah Map-M.S. "Plastics: Societal Reaction and ethical implications for wildlife" (Thesis Director - In progress)
- Bradford Milbrandt – "The effect of nutrition on white nose syndrome in bats" – (committee member- initiated 2017
- Chyna Rendon- "Effect of Fertility control on movement patterns of Salt River Wild Horses." (Thesis Director- in progress)

Undergraduate Student Mentoring

2022

- Angela Agee and Aaron Kinney "Chronic Renal disease: Behavioral Indicators of a sick cat:" (Thesis Director)
- Shannon Gough – "Companion Animal Euthanasia: the ethics of affordable care" (Thesis Co-Director)
- Hayden Innes- "Horse Slaughter in the U.S.: Ethical Implications and unintended Consequences." (Thesis Director- in progress)
- Jennifer Kobs "Analysis of Seasonal Dietary Changes in Burrowing Owls at ASU's Polytechnic Campus and Long-Term Observational Analysis (Thesis Director – in progress)
- Aaron Kinney: "Effect of science Fiction on cultural perceptions of Bioengineering"

- Elisabeth Kirshner – “Importance of spaying and neutering pets: ethical implications, societal implications, and sterilization options” (Thesis Director- in progress).
- Samantha Lagasse – “Pet Food Trends: Kibble versus Raw diets”
- Spencer Lewis : “The Ethics of Egg Donation: Physiological and psychological consequences”
- Alyssa Crow: “Coprophagy: Insights into digestive adaptations, the gut microbiome and prevention of disease”
- Quiarrah Mapp: “Effect of taste receptors on dietary choice in Guinea pigs”
- Chyna Rendon – “The Efficacy of Fertility management on free-roaming horses within the Salt River Riparian Area”(Thesis director)

2021

- Vivian Bueno: “Environmental Enrichment in Captive Felids: Assessing the Five Freedoms” -**First generation graduate- Admitted to Vet school-**
- Kylee Thompson: “Equine Assisted Psychotherapy for the Treatment of PTSD in U.S. Service Members” (Thesis co-chair)
- Clarissa Yosik -: “Transhumanism: Living forever...or creating inequities?”
- Karl Tilleman: “An Ethical Analysis: Examining mandated Vaccinations for Covid-19”
- Jennifer Kobs: “An Assessment of the Nutritional and Environmental Enrichment Provided by the Phoenix Zoo Pertaining to the Critically Endangered Cotton-Top Tamarin (*Saguinus oedipus*)”

2020

- Sierra Hoover and Brittany Padayachee: “The Heber Wild Horses: Values and management approaches” (Thesis advisor)
- Caitlin West- Zoos: “Public opinion on ethics and welfare of captive species”
- Hannah Dickson- “The ethics of GMOS: Fear and public misconceptions”
- Brittany Padayachee- “The Therapeutic and Emotional Benefits of Horses”
- Aaron Kinney – “Controversies surrounding wild horse management”
- Angela Agee- “Proper welfare in wild horse management”
- Marcell Bandala- “The Effect of diet on bladder health: case study of a canine cystotomy”

2019

- Kelly Green – “GMOs: The gap between scientific understanding and public misconceptions”
- Sierra Hoover – “Comparison of Salt River and Heber horse Foraging behavior”
- Quiarrah Mapp – “Animal Rehabilitation: Techniques for captive and wild species”
- Katelyn Mason- “Interpreting behavior in captive species: How an understanding of animal emotions provides insight”
- Ryan Moony – “Animals Make us Human: Connecting to animal emotions through art”
- Chyna Rendon– “Foraging habits of ‘undomesticated’ horses in an Urban setting”
- Vasishta Somayaji- “Bioethics of Nanotechnology”
- Nadia Taylor – “The Spotted Hyena: Foraging techniques and misunderstood behavior”
- Kira Videan – “The Aquatic Ape Hypothesis: finding faith in mythology”

2018

- Hornsby, Cassidy Anne- “Social Pressures and eating disorders in High school students”
- Martinson, Hannah Marie- “Treating illness and disease: *Can we tap into the mind-body connection for answers?*”
- Mathew, Ethan- “The Ethics of Gene Editing”

2017

- Euguchi, Lillian “Ethical treatment of laboratory animals for consumer products” (Thesis adviser).
- Grewal, Harneet - “The Immortal life of Henrietta Lacks: the ethics of stem cell use”
- Kasle, Lauren – “The debate on decriminalization of prostitution”
- Pass, Lindsey- “Opioid addiction: What role do doctors play?”

2013-2016

- Hicks, Ruth "Ethics of Organ trafficking" Fall 2016.
- Jarrett, Jaqalyn – "Labeling in Pet foods: Is the monitoring process trustworthy?" spring 2015
- Locke, Regan – "Hypothyroidism: creating awareness and educating the public"- fall 2014
- Theilen, Bethany – "Evolution and Creationism: Is there room for both?" - fall 2014
- Bryan Eisen, Kristen Durfee, Matthew Arriaga, and Anthony Harden: "Adaptations in a changing world: What are the results of man's influences?" – Spring 2014
- Cooley, Haley – "GMOs, Monsanto and sustainable agriculture" – fall 2013

Professional Organizations/affiliations

- Wild Horse Fire Brigade- Science Advisor
- Institute for Compassionate Conservation- (Education Outreach)
- The National Wildlife Society
- National Science Teachers Association (NSTA)
- Society'for'the'Advancement'of'Biology'Education'Research'(SABER)

Community Outreach/Collaborative Efforts/Partnerships

U.S. Forest Service -2017-present

- Partnering with Tonto National Forest wild horse Liaison in efforts to provide student research opportunities surrounding habitat assessment, fertility control, nutritional needs and behavioral observations of wild equids within Tonto National forest and Lower Salt River Riparian Areas.
- Participated in collaborative working group to provide input into management plan for federally protected wild horses within the Heber wild horse territory (Black Mesa Ranger District Apache-Sitgreaves National Forest)-2017-2019

Arizona Department of Agriculture – 2021-present

- Collaborating in efforts to provide research and field experience for pre-vet students surrounding darting methods for fertility control utilizing Porcine Zona Pallucida on wild horse populations within the Tonto National Forest and Lower Salt River in Arizona.
- Providing recommendations on invasive weed species common in alfalfa hay and concerns surrounding equid feeding, movements and habitat degradation along Salt River Riparian Area- 2017-present

Bureau of Land Management – 2017-present

- Collaborating with director of Florence Wild Horse training Facility in Florence, AZ in efforts to provide pre-vet students with hands on experience concerning wild horses removed from the range- including observations of vaccination procedures and training methods for future wild horse adoptions
- Assisted in Pronghorn recruitment study- Perry Mesa, AZ 2010-2012

Salt River Wild Horse Management Group- 2017-present

- Collaborating with the president to assist with undergraduate student research on wild horse monitoring, supplemental feeding and concerns with population management.

Phoenix Zoo- 2014-present

- Partnering with Phoenix Zoo Kitchen to set up field trips for Animal Nutrition students
- Provided research opportunities for undergraduates in Captive Animal Behavior Course- (Asian Elephants) 2021
- Assisted with Arizona Trails Exhibit and demonstrations - 1992

Arizona Game and Fish 2017-present

- Assisting in efforts to manage free roaming horses in Tonto National Forest
- Coordinated training in wildlife techniques for introductory Wildlife management students – 2014

Wild Horse Fire Brigade- 2022-present

- Current science adviser on re-wilding efforts for free-roaming horse populations in Cascade-Siskiyou mountains in northern California.

Arizona Farm Bureau 2015-present

- Coordinating seminars on Animal Welfare for Livestock for Animal Nutrition course

Desert Botanical Gardens: 2010-2012

- Collaborated in DNA Barcoding for use in controlled feeding trials of Pygmy goats

McDowell Sonoran Research Institute – 2014

- Assisted in Butterfly count and tracking of migration patterns - coordinated undergraduate student involvement

AZ Cotton council -1998-2000

- illustrated children’s book to promote cotton and toured local elementary schools
- Toured local elementary schools in order to promote sustainable cotton farming practices

University Service

Pre-vet club Advisor- Polytechnic camps 2014 -present

- On the road to veterinary school, students are looking for advice on what classes to take, where to find an internship or gain animal experience, and what it takes to build a competitive application. As a pre-vet advisor, I assist students in finding the necessary experiences critical for making a stronger applicant including: shadowing and employment at a veterinary clinic, volunteering at a shelter or farm, working at a kennel, providing community service, seeking employment in non-veterinary related employment, participating in extracurricular activities, and conducting wildlife or domestic animal research in my animal nutrition or captive animal behavior courses (or in collaboration with other faculty members). Being well-rounded in all areas of experience is the key to getting a pre-vet student recognized.
- Further services provided to pre-vet students include: advising students on application requirements, assisting them in writing their cover letters and guiding them on what to do if they struggle in science classes.

Mentor- BIO 100 lab instructors 2020-present

- undergraduate student workers need proper guidance and support for instruction of BIO 100 labs including: clarification of core concepts in biology covered within the labs and tips for successful instructional strategies.

Hiring Committee: Biology Instructional Professional- Fall 2011

Task force for evaluating guidelines for Academic professional Duties – College of Letters and Sciences – Spring 2013

ASU Student Recruitment:

- High School Tours: two tours per semester; Developed "Skulls/Adaptation Activity Lab" specifically for high school students and hosted tours within the ABS labs. Focused on wildlife management and careers within ABS.-Spring 2011, Fall 2012, Spring 2012, Fall 2012
- Promotion of ASU wildlife program at local Chandler Elementary school: 2011, 2012.
- Promotion of Applied Biology and College of Technology and Innovation at the Graduate College rally and student career day at local high schools- F 2010, 2011.

Homecoming activities:

- "Separation of Plant pigments utilizing chromatography" representing College of Technology and Innovation Fall 2012.

Teacher outreach:

- Developed inquiry-based lesson plans in efforts to train 4th graders in the comparison of "special senses" ("Vision and hearing) within different species; Cortina Elementary -2011.
- Developed active learning strategies aligned with Arizona State Standards in efforts to instruct 5th graders on the skeletal and muscular system; Cortina Elementary -2011.

Judging: Science Fairs and Future Farmers of America

- Judge for Cortina Science Fair: 2010, 2011, 2012, 2013; Provided technical assistance and supplies, when needed.
- Judge for the Animal Science division for Future Farmers of America- 2011, 2012

Bio-Medical, Emergency Training, Instruction and Customer Related Professional Experience

Exercise Physiologist/nutritionist - Health-Waves Corporation, Tempe, AZ

1991-1993

- Administered cardiopulmonary stress tests, body fat composition, cholesterol testing, and blood pressure in a corporate environment.
- Traveled statewide to reach out to community and increase awareness of health and fitness
- Highly skilled phlebotomist

Flight Attendant - America West Airlines, Tempe, AZ

1988-1992

- Certified training in CPR, emergency procedures, scuba diving and fire safety
- Cross- trained in in-flight, ramp, and operations
- Ground school –Scottsdale Aviation Center; 22 hours private pilot training

Music Instructor/professional musician

1988 - present

- Violin/piano/guitar: Rock/jazz/bluegrass/country/Irish/classical – 1988- present
- Music major specializing in improvisational technique, composition and theory -Arizona State University 1988-1990
- Rock Point Church – Violin/piano/keys/guitar -2003-2008
- Mesa Symphony – (Fist Violin Section) 1988-1989