B. AUDREY NGUYEN, PHD

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EDUCATION

The Ohio State University

Ph.D. Biomedical Engineering — Aug 2019
Advisor: Cynthia J. Roberts, Ph.D.
Co-advisor: Matthew A. Reilly, Ph.D.
Thesis: "The Role of the Sclera and Orbital Tissues on the Biomechanical Deformation Response of the Cornea and Whole Eye Under Loading by Dynamic Scheimpflug Analyzer"

Master of Science, Biomedical Engineering — May 2017
Bachelor of Science, Biomedical Engineering — May 2013

UNIVERSITY TEACHING EXPERIENCE

Department of Biomedical Engineering, the University of Akron, Akron, OH

Intro to Biomedical Engineering Design – Visiting Assistant Professor — Spring 2021
Introductory design course for freshmen sequence, application of FDA design process to BME applications

- Developed new course materials for purely online delivery
- Collaborated with co-instructors to improve course materials and align content with FDA design process
- Introduced student surveys via Microsoft Forms as low-stakes student assessment
- Implemented new design project – Toy Adaptation – student goal was to modify the design of an existing toddler toy for 3D printing for toddlers with visual impairment considerations

Experimental Techniques in Biomechanics – Visiting Assistant Professor
Laboratory-based course for upperclassmen biomechanics-track students to apply principles of biomechanics

- Developed new lecture content to review proper experimental design and statistical analysis of data using MatLab built-in functions
- Collaborated with co-instructor to redesign course materials and content for purely online delivery
- Successfully provided access to students to remotely perform laboratory experiments
- Developed and introduced new mini-project to introduce students to COMSOL finite-element modeling

Tools for Biomedical Engineering (Lecture and Lab) – Visiting Assistant Professor — Fall 2020
Introductory course for incoming Biomedical Engineering majors, MatLab & SolidWorks intensive course

- Presented and prepared weekly lectures with co-instructor regarding career pathways and skills for BMEs
- Responsible for SolidWorks instruction for 70 students, focusing on technical communication and design

Introduction to Biophysical Measurement (Lecture and Lab) – Visiting Assistant Professor
Upperclassmen level course covering the working principle behind medical device design and signal measurement

- Presented and prepared 2 weekly lectures with co-instructor
- Supplemented new lecture content, developed novel assignments, developed assessments based on student learning outcomes
- Co-taught labs portion in purely online format, assisted students with troubleshooting circuits, developing critical thinking skills in hands-on labs

Department of Biology & Biomedical Engineering, Rose-Hulman Institute of Technology, Terre Haute, IN

Systems Accounting and Modeling II – Visiting Assistant Professor Spring 2020

Conservation of extensive properties, constitutive relations, constraints, and equilibrium modeling assumptions

- Online asynchronous delivery due to COVID-19
- Created online-compatible lecture recordings, annotated notes packets, and held extensive office hours
- Used Panopto for video editing and integration of concept checks for student learning

Biomechanics – Visiting Assistant Professor Winter 2020

Introduction to biomechanics primarily focusing on musculoskeletal biomechanical systems

Biomedical Engineering Lab – Visiting Assistant Professor

Emphasis on fundamental concepts in biomechanics and biomaterials through hands-on experience with standard testing equipment

- Designing and implementing a new laboratory experiment to explore biomechanical testing of soft tissues, specifically ocular tissues

Problem Solving in the Biological Sciences and Engineering – Visiting Assistant Professor Fall 2019

Computational problem-solving for Biomedical Engineering (BE) majors, Matlab programming-intensive course

- Engaged with students in flipped classroom, graded assignments, held office hours for 40 BE freshmen
- Introduced proper technical communication of data, effective use of spreadsheet tools (Excel) in data analysis, and mathematical modeling of biological systems

Department of Biomedical Engineering, The Ohio State University, Columbus, OH

Numerical Simulations in Biomedical Engineering – Graduate Teaching Assistant Spring 2017

Mathematical modeling using Matlab and Comsol for incoming BME majors, programming-intensive course

- Engaged with students in flipped classroom alongside instructor, graded assignments, held office hours for 70 BME sophomores
- Developed new lecture material and assignment to cover basic statistical analysis using JMP

Introduction to Biomedical Engineering – Graduate Teaching Assistant Fall 2016

Introduction to general concepts and domains of biomedical engineering for incoming BME majors

- Held office hours, proctored exams, and graded assignments for 70 BME sophomores

Department of Engineering Education, The Ohio State University, Columbus, OH

Paperless Exams Software Pilot Course – Lead Graduate Teaching Assistant 2015-2016

- Translated multiple exams into ExamSoft system, organized TA trainings, and assisted proctoring exams for 5 sections of Fundamentals of Engineering (350+ students)
- Outcome: Pilot results used to assess fairness and difficulty of exams, improve exam creation process

Engineering Education Innovation Center, The Ohio State University, Columbus, OH

Fundamentals of Engineering Course Sequences – Graduate Teaching Assistant 2013-16

Introductory sequence for engineering pre-majors consisting of programming basics, engineering drawings, visualization, CAD, design projects, problem-solving

- Actively engaged with students as part of teaching team in the class and lab, graded assignments
- Managed multiple sections of 72 students each semester

Math for Engineers – Graduate Teaching Assistant Fall 2015

Mathematics course with laboratory applications for engineering pre-majors missing math prerequisites

- Taught weekly laboratory portion, graded assignments, proctored exams, held office hours for 24 students
- Designed new assignment to introduce students to basics of Matlab programming
- Adapted and introduced "Spot Speed" traffic study as new lab activity

Fundamentals of Engineering for Honors Course Sequence – Undergraduate Teaching Assistant 2011-13

Introductory sequence for engineering pre-majors at the Honors level

- Worked with 30+ Honors engineering students as part of teaching team in class and lab, graded assignments, staffed open office hours for all students in FEH courses

Additional Teaching Experience

University Center for the Advancement of Teaching, The Ohio State University, Columbus OH 2016-17

New Graduate Teaching Assistant Orientation - Facilitator

- Introduced new teaching assistants to active learning strategies, best practices for teaching in lab and recitation contexts, and university resources for teaching support and professional development

Modeling Workshop with Kathleen Harper, Ph.D, The Ohio State University, Columbus, OH June 2013

- Organized classrooms, collected materials, and assisted with modeling workshop for science teachers (grades 7-12) to improve teaching practices and develop educational materials using evidence-based techniques

Kaplan Test Prep, Columbus, OH Spring 2012

MCAT Preparation Course – Instructor

- Prepared and gave lectures to class of 30 students over MCAT test materials, provided feedback on sample writing exercises, focused on test-taking strategies to improve student outcomes

Professional Service and Development

Panelist – Surviving and Thriving at UA: Advice from Early Career Faculty – New Faculty Orientation 2021 Summer 2021

- Served as a panelist to provide early career advice to the new faculty joining the University of Akron for the AY 2021-22
- Discussed the transition from Visiting Assistant Professor to NTT Assistant Professor of Practice, seeking and providing mentorship, and effective teaching strategies

Biomedical Engineering Society, Advisor – the University of Akron, Akron, OH Summer 2021 -Present

- Advisor for student chapter of BMES at the University of Akron
- Collaborated with student officers to meet student organization goals for recruitment, retention, mentorship, and development of student community

Instructional Skills Workshop, Institute for Teaching and Learning, the University of Akron, Akron, OH Summer 2021

- ISW program is an internationally recognized program for the development of university instructors
- Participated in intensive workshop to develop teaching skills and strategies

Panelist – Career Advice for Academia – Ophthalmic Engineering Journal Club – Ohio State University Fall 2020

- Invited panelist to provide early career advice for graduate student members of the Ophthalmic Engineering Journal Club at the Ohio State University
- Answered questions and provided advice on the academic job hunt and resources for those interested in teaching at the college level

Computational Science Steering Committee – Rose-Hulman Institute of Technology, Terre Haute, IN Fall 2019

Committee for the Computational Science second major at RHIT, multidisciplinary degree emphasizing the development of numerical models and/or simulations of physical phenomena

- Assisted with development of student learning outcomes for the Computational Science degree
- Aligned student learning outcomes with institute and ABET accreditation outcomes

Preparing Future Faculty Program – Mentor: Nestor Matthews, Ph.D., Dennison University, Granville, OH 2017-Present

Mentorship and development program that helps graduate students from any discipline discern whether they are interested in pursuing faculty careers in liberal arts colleges or small universities

- Met with mentor to discuss advantages and challenges of faculty careers at liberal arts institutions
- Attended multiple professional development workshops to continue advancement of teaching abilities

Ophthalmic Engineering Journal Club, The Ohio State University, Columbus, OH 2017-Present

President, Founding Member

- Organized weekly meetings of biomedical engineering graduate students to present and discuss scientific literature relating to ophthalmology and ophthalmic engineering, practiced oral presentation skills, developed a network of peers

Exam Committee Lead, Engineering Education Innovation Center, The Ohio State University, Columbus, OH Spring 2015

- Led committee to create exam materials for Fundamentals of Engineering Course Sequence (14 sections)
- Generated multiple choice, short-answer, and extended response questions, and corresponding keys
- Contributed to, and organized database of exam questions

PUBLICATIONS

Bussett, K., Goebel, K., Lee, V., Alumbaugh, L., Calhoun M., Nguyen, B.A., Dosmar, E. TN hydrogels as a potential anti-inflammatory drug delivery system targeted to osteoarthritic knees. *Biomed Sci Instrum* (2021), 57(2).

Pappa, C.S., Nguyen, B.A., Mahmoud, A.M., Agarwal, G., Roberts, C.J. Effect of penetration enhancer with novel corneal cross-linking using recombinant human decoron in porcine eyes. *Experimental Eye Research* (2021), 206:108542

Nguyen, B.A., Roberts, C.J., & Reilly, M.A. Biomechanical contribution of the sclera to dynamic corneal response in air-puff induced deformation in human donor eyes. *Experimental Eye Research* (2019), 191:107904

Nguyen, B. A., Roberts, C. J., & Reilly, M. A. (2018). Biomechanical impact of the sclera on corneal deformation response to an air-puff: a finite-element study. *Frontiers in Bioengineering and Biotechnology*, *6*.

TEACHING PRESENTATIONS

Applying the framework of Fink's taxonomy to the design of a holistic culminating assessment of student learning in biomedical engineering, Emily Dosmar, Ph.D., B. Audrey Nguyen, Ph.D. Paper Presentation, ASEE Annual Conference. 2021

Implementing the Engineering Design Process, Patrick Herak, Ph.D. B. Audrey Nguyen**.** Session Presentation, NSTA Area Conference on Science Education. 2016

Implementing the Engineering Design Process in Your Classroom, Patrick Herak, Ph.D., Audrey Nguyen. Session Presentation. SECO Ohio Science Institute. 2016

RESEARCH EXPERIENCE

Department of Biomedical Engineering, The Ohio State University, Columbus, OH.

Ophthalmic Engineering Research – Cynthia J. Roberts, Ph.D., co-advised by Matthew A. Reilly, Ph.D. 2017-Present

Graduate Research Assistant

- Conducting basic science studies in field of ophthalmology with focus on clinical translation
- Developed ex vivo protocol to evaluate impact of corneal and scleral tissue properties on corneal deformation response in human donor eyes
- Generated COMSOL finite-element model to explore impact of scleral stiffness on corneal biomechanical response
- Developed a nonlinear viscoelastic model mathematical model of corneal motion and whole-eye motion under air-puff loading
- Developed in vitro protocol to explore impact of varying orbital tissue properties on whole-eye movement

- Coordinated with regional LIONS Eye Bank to acquire donor tissues
- Assisted with new ophthalmic equipment training

Orthopaedic Biomaterials Research – Alan S. Litsky, M.D., D.Sc. 2013-15

Student Research Assistant

- Developed novel functional prototype of system to measure grip force of otologic surgeons during bone milling to improve haptic feedback on surgical simulation system
- Aided in generating protocol for generating repeatable facial fractures in cadaveric specimens

RESEARCH PRESENTATIONS

A nonlinear viscoelastic model of corneal and whole-eye motion under air-puff loading by a dynamic Scheimpflug analyzer, B. Audrey Nguyen, M.S., Matthew A. Reilly, Ph.D., Cynthia J. Roberts, Ph.D., Poster Presentation. ISER Biennial Meeting. 2018

Preliminary study on biomechanical contribution of the sclera to dynamic corneal response in air-puff induced deformation, B. Audrey Nguyen, M.S., Matthew A. Reilly, Ph.D., Cynthia J. Roberts, Ph.D., Poster Presentation. ARVO Annual Meeting 2018

Biomechanical impact of the sclera on corneal deformation response to an air-puff: a finite-element study, B. Audrey Nguyen, M.S., Mohammad Arif Hossain, M.S., Jun Liu, Ph.D., Cynthia J. Roberts, Ph.D., Poster Presentation. ARVO Annual Meeting. 2017

Measuring Hand Forces During Bone Milling to Improve Haptic Feedback of an Otologic Surgical Simulator, B. Audrey Nguyen, Alan S. Litsky, M.D., D.Sc., Poster Presentation. BMES Annual Meeting. 2014

AWARDS AND HONORS

2nd place, Graduate Research Presentations, Ophthalmology Research Day Symposium, The Ohio State University. 2019

2nd place, Engineering Oral Presentations, Edward F. Hayes Graduate Research Forum, The Ohio State University. 2018

Diane M. Hunn Service Award, Science Education Council of Ohio 2016

PROFESSIONAL SOCIETY MEMBERSHIPS

ARVO Association for Research in Vision and Ophthalmology

BMES Biomedical Engineering Society

ISER International Society for Eye Research