Samuel A. McLaren

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EDUCATION

University of Arizona: Tucson, AZ
Doctorate in Applied Mathematics — August 2016-Present
Minor in Optical Science
Master's in Applied Mathematics — August 2019

Western New England University: Springfield, MA
Bachelor of Science in Mechanical Engineering — May 2016
Bachelor of Science in Applied Mathematics

PUBLICATIONS

- "Microscopic modeling of non-normal incidence vertical external cavity surface-emitting laser cavities", Appl. Phys. Lett. 118, 121103 (2021).
- "Microscopic charge carrier dynamics within non-normal incidence VECSEL cavities", SPIE 11704, Vertical-Cavity Surface-Emitting Lasers XXV (2021).
- "Microscopic modeling of transverse mode instabilities in mode-locked vertical external-cavity surface-emitting lasers", Appl. Phys. Lett. 116, 031102 (2020).
- "Microscopic modeling of transverse non-equilibrium dynamics in mode-locked VECSELs", SPIE 11263, Vertical External Cavity Surface Emitting Lasers (VECSELs) X (2020).

HONORS AND AWARDS

National Defense and Science Engineering Graduate Fellowship — Fall 2017
Received four year fellowship sponsored by the Air Force Office of Scientific Research.

Allen E. Anderson Department of Mathematics Award — Fall 2015
Awarded for academic excellence and service to the university mathematics department

Western New England Skookum Award — Spring 2015
Awarded for excellence in academics, service, and leadership in.

Tau Beta Pi Inductee — Fall 2014
Inducted into engineering honor society.

Omicron Delta Kappa Inductee — Spring 2014
Inducted into national leadership society.

Pi Mu Epsilon Inductee — Spring 2014
Inducted into mathematics honor society.

Tau Beta Pi Inductee — Spring 2014
Inducted into engineering honor society.

RELATED WORK AND RESEARCH EXPERIENCE

Applied Mathematics Program, University of Arizona: Tucson, AZ

Researcher working within the VECSEL group — 2017-Current

- Developed the transverse Maxwell Semiconductor Bloch Equations model which couples numerical electromagnetic wave propagation to a first principles description of laser gain media.
- Extended large parallelized C++ codebase
- Processed large data sets in MATLAB
- Published two first author peer-reviewed articles
- Presented at two national conferences to approximately forty people

Department of Mathematics, University of Arizona: Tucson, AZ

Graduate Teaching Assistant 2016-2017
- Taught four sections of College Algebra.
- Designed and delivered lectures.
- Created and graded assignments and proctored exams.
- Held regular one-on-one meetings with students.

Mathematics Department, Western New England University: Springfield, MA

Research in Applied Origami and Combinatorial Geometry 2014-2015
- Examined single vertex crease patterns for flat fold patterns.
- Developed algorithms for minimal forcing functions for flat folds.
- Collaborated with undergraduate colleagues.
- Presented findings at regional and national conferences for MAA and WIMIN to over twenty people.

Research in Numerical Analysis 2015
- Modeled Bose-Einstein Condensates utilizing nonlinear Schroedinger equation with dynamic nonlinearity.
- Analyzed stability under varying environmental properties
- Ran simulations in MATLAB
- Presented results to at university event to twenty people

Peer Tutor for Calculus, Differential Equation, and Engineering Analysis 2015
- Coordinated weekly meetings, provided supplemental instruction and maintainedrecords of student progress.

Assignment Grader for Calculus and Differential Equations 2014-2015
- Graded weekly homework assignments for multiple mathematics courses
- Maintained records of student grades for multiple classes

Physics Department, Western New England University: Springfield, MA.

Laboratory Assistant for Physical Mechanics 2013-2014
- Attended and actively participated in weekly labs
- Provided supplemental instruction on pendulum motion and conservation of momentum principles.

Laboratory Assistant for Electricity and Magnetism 2013-2014
- Attended and actively participated in weekly labs
- Delivered supplemental laboratory lectures

Peer Tutor for General Physics 2013-2014
- Guided students understanding in course materials

Engineering Department, Western New England University: Springfield, MA

Laboratory Assistant for Electrical Engineering I 2014
- Attended and actively participated in weekly labs
- Provided supplemental instruction in circuit construction and primary oscilloscope operations
- Graded lab reports and provided instruction outside of class

FloDesign Sonics: Wilbraham, MA

Research Intern in Acoustophoresis Technologies 2013-2014
- Examined flow pattern response to subsonic acoustic waves.
- Modeled and tested novel setups.
- Prepared reports and presented findings to staff.

SELECTED PRESENTATIONS

SPIE Photonics West 2021

- Presented results related to nonequilibrium microscopic dynamics related to non-normal incidence effects within modelocked VECSELs.

SPIE Photonics West 2020

- Presented results related to transverse charge carrier dynamics influence in modelocked VECSELs.

Arizona Center for Mathematical Sciences Conference Poster Session

- Presented past and future work related to a transverse Maxwell Semiconductor Bloch Equations model of a VECSEL cavity

Western New England University Senior Engineering Project: Springfield, MA

- Developed a data acquisition system for a jet engine built from a modified automobile turbocharger
- Selected transducers and other system elements based on theoretical and FEA analysisof operational parameters
- Presented to university Mechanical Engineering department and attending sponsors
- Presented results of Origami research at regional conference

Mathematical Association of America National Conference 2015: Washington D.C.

- Presented results of Origami research at national conference

Women in Mathematics in New England Conference 2015: Northampton, M.A.

- Presented results of Origami research at WiMiN conference at Smith College.A

Mathematical Association of America Regional Conference 2015: Wenham, M

- Presented results of Origami research at regional conference

Joint Mathematics Meeting Undergraduate Poster Session 2015: Seattle, WA

- Presented results of Origami research at national conference
- Nominated as an Outstanding Poster

LEADERSHIP ACTIVITIES

Graduate Student Mentoring Program Coordinator (2019-2021)

- Mentored first and second year graduate students
- Recruited and retained graduate mentors
- Organized events and communicated needs with faculty

President of SIAM Student Chapter (2019-2021)

- Organized and planned meetings and events
- Recruited professional speaks

Graduate Student Representative (2019)

- Communicated student needs to faculty
- Organized social functions

Camps Coordinator for S.Y.STEM Coalition (2018)

- Organized and planned meetings
- Trained counselors and other volunteers

President of Mathematics Club (2015)

- Organized and planned meetings

President of SIAM Student Chapter (2015)

- Organized and planned meetings and events
- Budgeted meetings and events

President and Co-Founder of Ultimate Frisbee Club (2015)

- Wrote club constitution
- Defended constitution to student activities administration
- Organized practices and equipment purchases

Vice President of Omicron Delta Kappa Honor Society Student Chapter (2015)

- Organized and planned meetings

Solar Decathlon Supporting Teams Leader: Western New England University (2013-2014)

- Duties included managing communications, marketing, public relations, and all other supporting personnel
- Wrote significant contribution to project proposal for Department of Energy grant.
- Assisted in important decisions as key Executive member.
- Planned meetings and outings.

COURSEWORK

Mathematics: Recurrent Neural Networks, Numerical Analysis, Methods of Applied Mathematics, Analysis in Applied Mathematics, Partial Differential Equations, Numerical Partial Differential Equations, Introduction to Soliton Theory, Probability and Statistics, Topics in Actuarial Science, Creative Problem Solving, Foundations of Mathematics I/II, Calculus I/II/III

Optical Science: Semiconductor Quantum Theory, Photonics, Electromagnetic Waves, Solid State Physics, Beam Propagation Methods, Modern Physics

Engineering: Engineering Analysis, , Differential Equations, Mathematical Modeling, Real Analysis, Introduction to Modern Algebra, Mechanical Vibrations, Fluid Mechanics, Mechanical Physics, Electricity and Magnetism, Electrical Engineering, Computer Programming for Engineers, Data Acquisition and Processing, Statics, Dynamics, Thermodynamics I/II, Materials Science, Measurement Computing, Mechatronics, Mechanical Laboratory I/II, Heat Transfer, Product Development and Innovation, Design of Machine Elements.

American Society of Mechanical Engineering Student Section President (2013-2014)

- Planned events and coordinated efforts
- Ran annual automobile show

Student Design Competition Team Leader, Western New England University (2013-2014)

- Coordinated group efforts
- Designed and prototyped fully functional quad-rotor aerial RC vehicle
- Competed in yearly American Society of Mechanical Engineers Student Design Competition

Alternative Spring Breaks Team Leader, Western New England University (2013-2014)

- Performed extensive research on the American Civil Rights Movement
- Organized meetings and planned pre-service volunteer trips
- Led team through four cities in multiple Southern States

Introduction to Engineering Project Team Leader, Western New England University (2013)

- Designed and prototyped interactive drink tab monitor to promote safer bar experiences for customers
- Coordinated efforts of teammates
- Utilized engineering programming software and techniques

Campus Activities Board Films Chair, Western New England University (2012-2013)

- Planned and orchestrated multiple film events
- Collaborated with a group to develop ideas
- Communicated with various vendors and professionals outside of the campus

VOLUNTEER EXPERIENCE and OUTREACH

S.Y.STEM Coalition Camp Coordinator and Instructor (2016-2018)

- Led multiple summer robotics camps where students learned engineering practices
- Recruited and taught counselors curriculum

Alternative Spring Breaks Program (2012-2014)

- Volunteered for two independent trips, leading the second one
- Worked to restore homes damaged by Hurricane Sandy in Jamaica Queens, NY
- Worked at multiple civil rights advocate groups in multiple Southern states

Martin Luther King Jr. Day of Action Participant (2015)

- Stocked boxes for distribution at Massachusetts Food Bank

Sandwich Ministries (2015)

- Prepared and distributed meals to local residents in need

OTHER SKILLS AND ACTIVITIES

Computer Skills: MATLAB, C, C++, OpenMP, MPI, LabVIEW, LaTex, SolidWorks, LateX, Visual Basic Studio, Visual Basic for Applications, Nastram NX, CES EDuPack, Engineering EquationSolver, Mathematica, and Microsoft Word, Powerpoint, Publisher, Excel, Outlook, and Visio

Hobbies: Backpacked for three months through 30 cities in 10 different European countries before entering college. Studied abroad and traveled for two months in China, Vietnam, Cambodia, and Thailand. Developed cultural and communicative knowledge andadaptiveness, resourcefulness, and self-reliance. Rafted through the Grand Canyon in the middle of winter teaching me resilience and confidence in my abilities.