

## Jessica Fitzgerald

Instructor  
Biomedical Engineering Program  
University of Colorado Boulder  
jessica.fitzgerald-1@colorado.edu

### EDUCATION

#### Northeastern University, Boston, MA

PhD in Bioengineering  
May 2020

**Dissertation Title:** Optical Sensing Techniques for Detection of Rare Circulating Tumor Cells and Disease Metabolites

**Brief Synopsis:** Under Principle Investigators Professors Hicham Fenniri and Mark Niedre, developing optical sensors for both in vitro and in vivo disease detection and diagnosis.

#### Oral Roberts University, Tulsa, OK

BS in Engineering Physics  
May 2014

Thesis: Synthesis of Silver Nanoparticles Toward Antimicrobial Medical Devices

### EMPLOYMENT

#### Instructor

University of Colorado Boulder (CU), Boulder, CO

Biomedical Engineering Program  
Fall 2020 - present

*Responsible for planning, developing and teaching new biomedical engineering courses at CU Boulder while also helping to guide and advise the curriculum as a whole to set students up for success and prepare for ABET accreditation of the program.*

#### Graduate Research Assistant

Northeastern University, Boston, MA

Biomedical Optics Group  
Summer 2018 – Summer 2020

*Developed a mouse cancer model to evaluate the effects of radiation on metastasis via detection of circulating tumor cells with Diffuse In Vivo Flow Cytometry*

Supramolecular Nanotechnology Lab  
Fall 2014 – Spring 2018

*Created “barcoded polymer” biomimetic sensors for detection of clinically relevant liquid and vapor analytes using Raman spectroscopy and multivariate data analysis*

#### Communications Laboratory Writing Fellow

Northeastern University, Boston, MA

2017 – 2019

*Consulting and partnering with bioengineering and chemical engineering graduate students and post-doctoral fellows to help develop and improve their technical writing skills for publications including journal articles, abstracts, theses, and others*

#### Book Co-editor

2018-2019

Springer Series *Methods in Molecular Biology*: Special Edition in Biomimetic Sensing

#### Course Instructor

Northeastern University, Boston, MA

Anatomy and Physiology I & II Lab (Spring 2016 – Fall 2017)

**Graduate Teaching Assistant**

Northeastern University, Boston, MA

Biomaterials (Spring 2018)

Bioengineering Research and Design (Fall 2015)

**SERVICE, OUTREACH, AND PROFESSIONAL DEVELOPMENT****Undergraduate Engineering Committee**

University of Colorado Boulder, Boulder, CO

Representative for the Biomedical Engineering Program

2020 - present

**Biomedical Engineering Program Committee**

University of Colorado Boulder, Boulder, CO

Committee member for the development of the program at CU

2020 - present

**Biomedical Engineering Society (BMES) Student Chapter**

University of Colorado Boulder, Boulder, CO

Faculty Advisor

2020-present

**Northeastern University Future Faculty Program**

Northeastern University, Boston, MA

Center for Advancing Teaching and Learning through Research

2019 - 2020

**Lab Safety Officer**

Northeastern University, Boston, MA

Biomedical Optics Group

2019 - 2020

**Undergraduate Research Mentor**

Northeastern University, Boston, MA

2015 - 2019

**Graduate Women in Science and Engineering (GWISE)**

Northeastern University, Boston, MA

2015 - 2019

Operations and Community Chair (2018-2019) Secretary (2015-2017)

*GWISE is a group of graduate students and postdocs designed to assist in the professional and personal advancement of women in science and engineering at Northeastern University. To achieve this, GWISE sponsors events covering a wide variety of topics including networking, career options, balancing work and personal life, and other issues affecting women in the sciences.*

**Student Research Engagement Committee (SREC)**

Northeastern University, Boston, MA

2015-2016

Public Relations Director

*SREC exists to support and promote undergraduate student involvement in research in a variety of different fields by hosting various poster sessions, networking events, and career development seminars and workshops.*

## PUBLICATIONS

Williams AL, Fitzgerald JE, Ivich F, Sontag ED, Niedre M. **Short-Term Circulating Tumor Cell Dynamics in Mouse Xenograft Models and Implications for Liquid Biopsy.** *Front. Oncol.*, Nov 06 2020; 10: 2447. doi: 10.3389/fonc.2020.601085.

Fitzgerald JE, Byrd BK, Patil RA, Strawbridge RR, Davis SC, Bellini C, Niedre M. **Heterogeneity of Circulating Tumor Cell Dynamics and Lung Metastases in a Subcutaneous Lewis Lung Carcinoma Model.** *Biomed. Opt. Express.* 2020 June; 11(7), 3633-3647. doi: 10.1364/BOE.395289

Bartosik PB, Fitzgerald JE, El Khatib M, Yaseen MA, Vinogradov SA, Niedre M. **Prospects for the Use of Upconverting Nanoparticles as a Contrast Agent for Enumeration of Circulating Cells in vivo.** *Int J Nanomedicine.* 2020 Mar; 15: 1709-1719. doi: 10.2147/IJN.S243157. PubMed PMID: 32210561

Fitzgerald JE, Shen J, Fenniri H. **A Barcoded Polymer-Based Cross-Reactive Spectroscopic Sensor Array for Organic Volatiles.** *Sensors (Basel).* 2019 Aug 24;19(17). doi: 10.3390/s19173683. doi: 10.3390/s19173683 PubMed PMID: 3145062.

Fitzgerald JE, Shokat Fadaee S, Sundaram R, Fenniri H. **Sensor arrays from spectroscopically-encoded polymers: Towards an affordable diagnostic device for biomolecules.** *Sensors and actuators. B, Chemical.* 2019 June; 288:332-336. doi: 10.1016/j.snb.2019.03.023

Sharafeldin IM, Fitzgerald JE, Fenniri H, Allam NK. **Computational Modeling for Biomimetic Sensors.** *Methods Mol Biol.* 2019;2027:195-210. doi: 10.1007/978-1-4939-9616-2\_16. PubMed PMID: 31309483

Fitzgerald JE, Fenniri H. **Cross-Reactive, Self-Encoded Polymer Film Arrays for Sensor Applications.** *Methods Mol Biol.* 2019;2027:1-13. doi: 10.1007/978-1-4939-9616-2\_1. PubMed PMID: 31309468.

**Biomimetic Sensing.** 1 ed. Fitzgerald JE, Fenniri H, editors. New York, NY: Humana (Springer); 2019. 213p. doi: 10.1007/978-1-4939-9616-2

Fitzgerald, J.E., Bui, E.T., Simon, N.M. and Fenniri, H., 2017. **Artificial Nose Technology: Status and Prospects in Diagnostics.** *Trends in Biotechnology*, 35(1), pp.33-42. doi: 10.1016/j.tibtech.2016.08.005.

Fitzgerald, J.E. and Fenniri, H., 2016. **Biomimetic cross-reactive sensor arrays: prospects in biodiagnostics.** *RSC Advances*, 6(84), pp.80468-80484. doi: 10.1039/C6RA16403J

Fitzgerald, J.E., Zhu, J., Bravo-Vasquez, J.P. and Fenniri, H., 2016. **Cross-reactive, self-encoded polymer film arrays for sensor applications.** *RSC Advances*, 6(86), pp.82616-82624. doi: 10.1039/C6RA13874H

Odom, P.W., Fitzgerald, J., Tryon T.G., Halsmer, D. 2013. **Implementation and Assessment of a Curricular Module on the History and Philosophy of Reverse Engineering in Biological Systems.** ASEE Annual Conference, Atlanta, GA, United States

Fitzgerald J., Halsmer, D., 2012. **The Problem of Evil and Suffering from an Engineering Perspective.** Engineering and Metaphysics Conference, Tulsa, OK, United States.

Fitzgerald, J., Halsmer, D., 2011. **Metaphysical Considerations Enhance Reverse Engineering Studies.** ASA Annual Meeting, Naperville, IL, United States.

## PRESENTATIONS

### Speaker

2019 Northeastern University Bioengineering Research Symposium: Boston, MA  
*In vivo Optical Measurement of Circulating Tumor Cell Count in Response to Radiation Therapy in Mice*

2018 Northeastern University Bioengineering Research Symposium: Boston, MA  
*Fabrication and Optical Properties of Dye Labeled SERRS-Encoded Au/Ag Alloy Nanoshells*

2017 Northeastern University Biomaterials Day: Boston, MA  
*A Cross-Reactive Array Based on Spectroscopically Encoded Polymers for the Classification of Biomolecules*

2016 American Institute of Chemical Engineering (AIChE) Annual Meeting: San Francisco, CA  
*An "Artificial Nose" for Disease Diagnosis Through Exhaled Breath Analysis*

### Poster

2019 Biomedical Engineering Society Annual Meeting: Philadelphia, PA  
*In vivo Optical Measurement of Circulating Tumor Cell Count in Response to Radiation Therapy in Mice*

2017 Northeastern University Research, Innovation, and Scholarship Expo (RISE): Boston, MA  
*An "Electronic Nose" for the Non-invasive Analysis of Volatiles in Alveolar Breath*

2016 World Biomaterials Congress: Montreal, Quebec, Canada  
*An 'Artificial Nose' for the Non-Invasive Diagnosis of Anxiety in Alveolar Breath*

2015 Materials Research Society (MRS) Meeting: Boston, MA  
*An 'Artificial Nose' for the Non-Invasive Diagnosis of Anxiety in Alveolar Breath*

2015 Northeastern University RISE: Boston, MA  
*An "Artificial Nose" for the Non-invasive Diagnosis of Anxiety in Alveolar Breath*

2014 AIAA/ASME Symposium: Oklahoma City, OK  
*Undergraduate Senior Project: "Synthesis and Utilization of Silver Nanoparticles for Use in the Medical Field"*

## SKILLS

Science writing  
Publishing  
Interdisciplinary Research  
Science Communication  
Peer mentorship  
STEM education  
Experimental Design  
Biomedical Optics  
Data Analysis  
Flow Cytometry  
Cell Culture  
Raman Microspectroscopy

Unscrambler

Origin

Multivariate data analysis

Spectral Signal Processing

Proficient in Microsoft Office Suite Scanning Tunneling Microscopy Atomic Force Microscopy

AutoCAD

SolidWorks

Some experience with Matlab and other programming languages

## **AWARDS**

Northeastern Distinguished Deans' Fellow (2014)