



# Courtney R Armour PhD

## COMPUTATIONAL BIOLOGIST

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## Summary

I'm a computational biologist specializing in statistical analysis of complex datasets. I am experienced with multiple programming languages as well as a variety of data exploration and visualization techniques. I'm passionate about open science and reproducible research. I'm seeking the opportunity to work on cutting edge research at the frontier of human health.

## Skills and Expertise

Research	Computational	Laboratory
Machine learning – Data visualization Gut microbiome – Metagenomics Amplicon sequencing – Statistical analysis – Network analysis Reproducible research	R – R Markdown – Quarto Git/GitHub – Snakemake Conda/mamba – Bash Slurm – Perl – Python	DNA extraction – Library Preparation – Cell Culture – Cloning – Gel electrophoresis – Western blot – PCR

## Education

### PhD Molecular and Cellular Biology

DEPARTMENT OF MICROBIOLOGY

- Advisor: Thomas Sharpton

*Oregon State University*

*2014-2020*

### BS Biological Sciences

COLLEGE OF LIBERAL ARTS AND SCIENCES

- Minor: Mathematics

*Arizona State University*

*2008-2012*

## Experience

### Postdoctoral Research Fellow (remote)

SCHLOSS LAB

- Optimizing machine learning models to predict colorectal cancer based on gut microbiome taxonomic abundance
- Identifying early markers of colorectal cancer development in a large clinical cohort of individuals with genetic predisposition to cancer
- Developing curriculum and teaching computational skills to coding beginners in virtual workshops

*University of Michigan*

*2020-present*

### Graduate Research Assistant

SHARPTON LAB

- Metagenomic analysis of gut microbiome samples to quantify associations with health
- Assembly of metagenomic data from gut microbiome samples to build integrated gene catalogues of microbiome genomic diversity
- Collaborate with a diverse group to develop methodology for analyzing microbiome data

*Oregon State University*

*2014-2020*

### Research/Laboratory Assistant

DR. PAUL BOEHMER AND DR. JUI-CHENG HSIEH

- Creation of HSV-1 viral mutants to quantify impact on replication
- Mentor new members of the lab
- Maintain tissue culture and order supplies

*University of Arizona*

*2010-2013*

## Publications

\* Indicates co-first author

1. **Courtney R. Armour**, Kelly L. Sovacool, William L. Close, Beg<sup><U+00FC>m D. Top<U+00E7>uo<U+011F>lu</sup>, Jenna Wiens, Patrick D. Schloss. (2022). Streamlined implementation of a machine learning model to classify screen relevant neoplasia using reference-based OTU clustering. *bioRxiv preprint*. doi: 10.1101/2022.09.01.506299
2. **Courtney R. Armour**, Beg<sup><U+00FC>m D. Top<U+00E7>uo<U+011F>lu</sup>, Andrea Garretto, Patrick D. Schloss. (2022). A goldilocks principle for the gut microbiome: taxonomic resolution matters for microbiome-based classification of colorectal cancer. *mBio*. doi: 10.1128/mbio.03161-21
3. Zena Lapp, Kelly L. Sovacool, Nick Lesniak, Dana King, Catherine Barnier, Matthew Flickinger, Jule Kr<sup><U+00FC>ger</sup>, **Courtney R. Armour**, Maya M. Lapp, Jason Tallant, Rucheng Diao, Morgan Oneka, Sarah Tomkovich, Jacqueline Moltzau Anderson, Sarah K. Lucas, Patrick D. Schloss (2022). Developing and deploying an integrated workshop curriculum teaching computational skills for reproducible research *Journal of Open Source Education*. doi: 10.21105/jose.00144
4. Christopher A. Gaulke, Laura M. Beaver, **Courtney R. Armour**, Ian R. Humphreys, Carrie L. Barton, Robyn L. Tanguay, Emily Ho, Thomas J. Sharpton (2020). An integrated gene catalog of the zebrafish gut microbiome reveals significant homology with mammalian microbiomes *bioRxiv preprint*. doi: 10.1101/2020.06.15.153924
5. Christopher A. Gaulke<sup>\*</sup>, **Courtney R. Armour**<sup>\*</sup>, Ian R. Humphreys, Laura M. Beaver, Carrie L. Barton, Lucia Carbone, Emily Ho, Robyn L. Tanguay, Yuan Jiang, Thomas Sharpton<sup>”</sup> (2020). Interspecies comparative metagenomics reveals correlated gut microbiome functional capacities among vertebrates *bioRxiv preprint*. doi: 10.1101/2020.06.15.153320
6. Rufa L Mendez, Cristobal Miranda, **Courtney R Armour**, Thomas J Sharpton, Jan Frederik Stevens, Jung Yeon Kwon (2020). Supplementation with sea vegetables <sup>textsuperscript\*</sup>Palmaria mollis<sup>textsuperscript\*</sup> and <sup>textsuperscript\*</sup>Undaria pinnatifidat<sup>textsuperscript\*</sup> exerts metabolic benefits in diet-induced obesity in mice *Current Developments in Nutrition*. doi: 10.1093/cdn/nzaa072
7. Duo Jiang, **Courtney R. Armour**, Chenxiao Hu, Meng Mei, Chuan Tian, Thomas J. Sharpton, Yuan Jiang (2019). Microbiome Multi-Omics Network Analysis: Statistical Considerations, Limitations, and Opportunities *Frontiers in Genetics*. doi: 10.3389/fgene.2019.00995
8. **Courtney R. Armour**, Stephen Nayfach, Katherine S. Pollard, Thomas J. Sharpton (2019). A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome *mSystems*. doi: 10.1128/mSystems.00332-18
9. Thomas Sharpton, Svetlana Lyalina, Julie Luong, Joey Pham, Emily M. Deal, **Courtney R. Armour**, Christopher Gaulke, Shomyseh Sanjabi, Katherine S. Pollard (2017). Development of Inflammatory Bowel Disease Is pathed to a Longitudinal Restructuring of the Gut Metagenome in Mice *mSystems*. doi: 10.1128/mSystems.00036-17
10. Jui-Cheng Hsieh, Ryan Kuta, **Courtney R. Armour**, Paul E. Boehmer (2014). Identification of two novel functional p53 responsive elements in the herpes simplex virus-1 genome *Virology*. doi: 10.1016/j.virol.2014.04.019

## Presentations

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### Talks

#### **Comparative metagenomic investigations link the functional capacity of the gut microbiome to vertebrate physiology**

DISSERTATION DEFENSE

*Oregon State University*

MAR 2020

#### **The functional diversity of the gut microbiome in association with host physiology**

MICROBIOLOGY AND IMMUNOLOGY SEMINAR

*University of Michigan*

FEB 2020

#### **The power of poop: diagnostic potential of the gut microbiome in human disease**

CENTER FOR GENOME RESEARCH AND BIOCOMPUTING SPRING CONFERENCE

*Oregon State University*

APR 2019

#### **A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome**

MICROBIOLOGY SEMINAR SERIES

*Oregon State University*

NOV 2018

#### **A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome**

INTERNATIONAL SYMBIOSIS SOCIETY.

*Oregon State University*

JUL 2018

#### **Interaction between herpes simplex virus-1 DNA polymerase and uracil-DNA glycosylase. *awarded best undergraduate presentation***

BASIC MEDICAL SCIENCES RESEARCH RETREAT

*University of Arizona*

JUN 2013

## Posters

### Modeling the functional variation of the gut microbiome across vertebrates

ASM MICROBE

San Francisco CA

JUN 2019

### A metagenomic meta-analysis reveals functional signatures of health and disease in the human gut microbiome

LAKE ARROWHEAD MICROBIAL GENOMICS CONFERENCE

Lake Arrowhead CA

SEP 2018

### A Metagenomic Meta-Analysis Reveals Functional Signatures of Health and Disease in the Human Gut Microbiome. *awarded best graduate student poster*

FALL CENTER FOR GENOME RESEARCH AND BIOCOMPUTING CONFERENCES

Oregon State University

OCT 2018

### Large-scale analysis of human gut metagenomes reveals functional indicators of disease in the gut microbiome

EMSL/PNNL MULTI-OMICS FOR MICROBIOMES CONFERENCE

Pasco WA

AUG 2017

### Integrating clinical data reveals functional indicators of disease in the gut microbiome

OSU MICROBIOME INITIATIVE FORUM

Oregon State University

MAY 2017

### Integrating clinical metagenomic data reveals microbiome signatures of dysbiosis

META CENTER SYMPOSIUM

University of Oregon

AUG 2016

### An automated workflow for the quality control and functional analysis of host-associated metagenomes

META CENTER SYMPOSIUM

University of Oregon

AUG 2015

## Fellowships

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### Larry W. Martin and Joyce B. O'Neill Fellowship

\$25,000

Oregon State University

2018 - 2019

### Nicholas R. Tartar Graduate Student Fellowship

\$6,671

Oregon State University

Winter 2018

### Pacific Northwest National Lab Travel Grant

COST OF CONFERENCE REGISTRATION

EMSL/PNNL Multi-omics for  
Microbiomes Conference

AUG 2017

### ASM SIGHPC and Intel Data and Computational Science Fellowship

\$15,000 PER YEAR - \$60,000 TOTAL

Oregon State University

2016 - 2020

### President's Scholarship

\$9,000 PER YEAR - \$36,000 TOTAL

Arizona State University

2008 - 2012

## Specialized Training

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### Deep Learning for Life Scientists

CENTER FOR GENOME RESEARCH AND BIOCOMPUTING

Oregon State University

2019

### Specialized workshop courses

CENTER FOR GENOME RESEARCH AND BIOCOMPUTING

Oregon State University

2014 - 2019

- RNAseq I and II
- Computing in Life Sciences - Perl
- Python I and II
- Command-line Data Analysis
- Introduction to Unix and Linux

### Certificate in Applied Biostatistics

DEPARTMENT OF BIostatISTICS

University of Washington

2014

## Teaching and Mentorship

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### Teaching

**Teaching Assistant (ST599) *Introduction to Quantitative Genomics***

DEPARTMENT OF STATISTICS

*Oregon State University*

*Fall 2016*

**Teaching Assistant (BI211) *Principles of Biology for Life Science Majors***

DEPARTMENT OF STATISTICS

*Oregon State University*

*Fall 2016*

### Mentorship

**Austin Hammer (*PhD Student*)**

DEPARTMENT OF MICROBIOLOGY

*Oregon State University*

*2019 - 2020*

**Ian Humphreys (*Accelerated Masters Student*)**

DEPARTMENT OF MICROBIOLOGY

*Oregon State University*

*2017 - 2019*

**Ryan Kuta (*Undergraduate Student*)**

DEPARTMENT OF BASIC MEDICAL SCIENCES

*University of Arizona*

*2012 - 2013*