CHRISTINA K.E. BAEK

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EDUCATION

Carnegie Mellon University

Ph.D. in Machine Learning. *From Fall 2021.*

University of California, Berkeley

5th Year M.S. in Electrical Engineering and Computer Science. *Advised by Yi Ma.* 2020 –2021
Mathematics Breadth

B.S. in Electrical Engineering and Computer Science *with High Honors.* 2016 –2020
Minor, Bioengineering.

FELLOWSHIPS

2021 **CMU Presidential Fellowship in Machine Learning** *Awarded to 1 student per application cycle.*

RESEARCH EXPERIENCE

UC Berkeley Artificial Intelligence Research Lab Jan. 2020 –
Research Assistant | Advised by Professor Yi Ma

- Focus: dictionary learning, generalization, continual learning
  Studied deep learning from an information-theoretic perspective. Worked on several global convergence proofs of functions over the Steifel manifold.

UC Berkeley Automation Lab Jun. 2019 – Aug. 2019
Research Assistant | Advised by Professor Ken Goldberg

- Implemented a particle filter algorithm to tackle the mechanical search problem of grasping a target object in a cluttered bin.

UC Berkeley Molecular Cell Biomechanics Lab Jan. 2019 – Jun. 2019
Research Assistant | Advised by Professor Mohammad Mofrad

- Designed convolutional neural networks to predict the punctual stress during unfolding in molecular dynamics simulations of double globule tethered proteins. Discovered patterns between punctual stress and a protein's secondary structure during protein unfolding.

Harvard Medical School, *Dep. Of Biomedical Informatics* Jun. 2017 – Aug. 2017
Intern for Summer Institute of Bioinformatics | Advised by Professor Chirag Patel

- Created a database of annotated microbiome studies that use whole-genome sequencing (https://microbial-genes.bio).
- Built a pipeline in R that conducts a metagenome-wide association study of microbiome data and outputs significant genetic/functional markers.

UC San Diego, *Dep. Of Medicine* Jun. 2016 – Jan. 2017
Research Assistant | Advised by Professor John Chang

- Studied the role of TGF-beta pathway in cancer. Showed that modulating USP11 expression altered the stability of TGFβ receptor type 2 (TGFBR2) and TGFβ downstream signaling in human breast cancer cells.

BOOKS & PAPERS

Author (* denotes equal contribution)

2020 Incremental Learning via Rate Reduction
Z Wu*, **C Baek***, C You, and Y Ma
Conference of Computer Vision and Pattern Recognition (CVPR) 2021. arxiv.org/abs/2011.14593.

2019 The Landscape of Genetic Content in the Gut and Oral Human Microbiome
B Tierney, Z Yang, J Luber, M Beaudin, M Wibowo, **C Baek**, C Patel, and A Kostic
Cell Host and Microbe, 26(2): 283-295.

2018 Ubiquitin specific peptidase 11 (USP11) enhances TGF-b-induced epithelial-mesenchymal plasticity and human breast cancer metastasis
D Garcia, **C Baek**, MV Estrada, T Tysl, EJ Bennett, J Yang, and JT Chang.
Molecular Cancer Research, 16(7): 1172-1184.

2014 Inhibition of Spontaneous and Experimental Lung Metastasis of Soft-Tissue Sarcoma by Tumor-Targeting Salmonella typhimurium A1-R
S Miwa, Y Zhang, **KE Baek**, F Uehara, S Yano, M Yamamoto, Y Hiroshima, Y Matsumoto, H Kimura, K Hayashi, N Yamamoto, M Bouvet, H Tsuchiya, R Hoffman, and M Zhao.
Oncotarget, 5(24): 12849-12861.

Editor

2020 High-Dimensional Data Analysis with Low-Dimensional Models: Principles, Computation, and Applications
Y Ma and J Wright.
Cambridge University Press.

Misc. Projects

2016 Life Cycle of a Lytic Phage (T4 Bacteriophage)
C Baek
Wolfram Demonstrations Project.

TEACHING

GSI. **CS189/289A Introduction to Machine Learning** Spring 2021

Project-Lead GSI **C.S189/289A Introduction to Machine Learning** Fall 2020

Head uGSI. **CS189/289A Introduction to Machine Learning** Spring 2020

uGSI. **CS189/289A Introduction to Machine Learning** Summer 2019

Reader. **CS170 Efficient Algorithms and Intractable Problems** Fall 2019

Mentor. **CS70 Discrete Mathematics and Probability Theory** Spring 2018

- For UC Berkeley's Computer Science Mentors club.

HONORS & SCHOLARSHIPS

2021 **Outstanding GSI Award** Awarded by UC Berkeley for outstanding work in teaching on campus.

2020 **Koret Research Scholarship** *Received $4000 from UC Berkeley to conduct my proposed research with Professor Yi Ma over Summer 2020.*

2016-2020 **Thermo Fisher Scientific Scholarship** *Received $20,000 for scholastic excellence.*

2018 **Eta Kappa Nu Honors Society** *National Electrical Engineering and Computer Science honors society.*

2017 **Tau Beta Pi Engineering Honors Society** *National Engineering honors society.*

2016 **Regents' and Chancellor's Scholarship** *Awarded to <2% of entering class for creativity and leadership.*

COURSEWORK

Relevant Coursework

STAT 240: Robust Statistics
STAT 210: Theoretical Statistics
EE 229: Information Theory
EE 227C: Convex Optimization
CS 285: Deep Reinforcement Learning
CS 288: Natural Language Processing
CS 270: Combinatorial Algorithms
MATH 140: Differential Geometry
MATH 104: Intro to Real Analysis
BIOE 145: Intro to Machine Learning in Computational Biology