

# HANNAH KIM, M.S.

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## WHO AM I?

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- A passionate bioinformatician with 3+ experience in evolutionary genomics and 3+ experience in cancer research.
- Initiated and facilitated interdisciplinary collaborations with hospitals and cancer centers.
- Interested in the interface of computational biology and medicine: method development and evolutionary genomics.
- An avid learner and open-source enthusiast.

## EDUCATION

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**PhD in Bioinformatics**, Temple University 2019 - present

Advisor: Dr. Sergei L Kosakovsky Pond

Dissertation Topic: PProperty-Informed Models of Evolution (PRIME) and their applications

**MS in Computational Biology**, Carnegie Mellon University 2015 - 2016

Relevant Coursework: Computational Genomics, Machine Learning, and Algorithms & Advanced Data Structures

**BS in Chemistry**, Carnegie Mellon University 2010 - 2013

Relevant Coursework: Principles of Computing, and Modern Analytical Instructions

## PROFESSIONAL EXPERIENCE

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**Bioinformatics Engineer** Oct 2021 - Jan 2022

Lifetime Omics

*Remote*

- Automated cutting-edge methods and analyzed COVID-19 metagenomics data in the Google Cloud environment.
- Developed detailed standard operating procedure for reproducibility.
- Took initiatives to solve problems and demonstrated dedication for the project in the startup environment.

**Bioinformatics Analyst/Software Engineer** Jul 2017 - Jun 2019

Children's Hospital of Philadelphia – Kai Tan lab

*Philadelphia, PA*

- Investigated RNA-Seq and microarray data from B-Cell Acute Lymphoblastic Leukemia subtypes using differential gene expression analysis, Gene Ontology enrichment analysis, and other relevant bioinformatics methods.
- Identified cancer-specific genetic interactions that led to publications in high-impact journals.
- Facilitated communication in the interdisciplinary environment of doctors and wet-lab and dry-lab researchers.

**Research Programmer** Feb 2017 - Jun 2017

Carnegie Mellon University – Russell Schwartz lab

*Pittsburgh, PA*

- Investigated clinical and genomic data to create a cancer progression analysis pipeline using machine learning.

**MS Graduate Researcher** Jan 2016 - Dec 2016

Carnegie Mellon University – Ziv Bar-Joseph lab

*Pittsburgh, PA*

- Curated and analyzed single-cell gene expression data.

### Post-Baccalaureate Researcher (Chemistry/Biology)

Aug 2013 - Jun 2014

Carnegie Mellon University – Drs. Fred Lanni, Aaron Mitchell, and Luisa Hiller

Pittsburgh, PA

- Tested various polymer surface coatings for the prevention and destruction of biofilms using red/NIR light.

### Undergraduate Student Researcher (Chemistry)

Jan 2012 - Aug 2013

Carnegie Mellon University – Kevin Noonan lab

Pittsburgh, PA

- Characterized pyrylium and pyridinium salts by modifying functional groups.

### Student Researcher (Biology)

Jun 2011 - Aug 2011

Carnegie Mellon University – 2011 Summer Research Institute

Pittsburgh, PA

- Analyzed interactions among three ribosomal assembly factors in *Saccharomyces cerevisiae*.
- 1 of 12 student researchers selected for the program.

## PUBLICATION

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[7] Huzar, J., **Kim, H.**, Kumar, S., Miura, S. (2022). MOCA for integrated analysis of gene expression and genetic variation in single cells. *Frontiers in Genetics*, 13:831040. doi:[10.3389/fgene.2022.831040](https://doi.org/10.3389/fgene.2022.831040)

[6] Ding, Y., **Kim, H.**, Madden, K., Loftus, J., Chen, G., Allen, D., Zhang, R., Xu, J., Chen, C., Xu, Y., Tasian, S., Tan, K. (2021). Network Analysis Reveals Synergistic Genetic Dependencies for Rational Combination Therapy in Philadelphia Chromosome-like Acute Lymphoblastic Leukemia. *Clinical Cancer Research*, 27(18). doi:[10.1158/1078-0432.CCR-21-0553](https://doi.org/10.1158/1078-0432.CCR-21-0553)

[5] Tarca, A. L., Pataki, B. Á., Romero, R., Sirota, M., Guan, Y., Kutum, R., Gomez-Lopez, N., Done, B., Bhatti, G., Yu, T., Andreoletti, G., Chaiworapongsa, T., **The DREAM Preterm Birth Prediction Challenge Consortium**, Hassan, S. S., Hsu, C., Aghaeepour, N., Stolovitzky, G., Csabai, I., Costello, J. C. (2021). Crowdsourcing assessment of maternal blood multi-omics for predicting gestational age and preterm birth. *Cell Reports Medicine*, 2(6). doi:[10.1016/j.xcrm.2021.100323](https://doi.org/10.1016/j.xcrm.2021.100323)

[4] Ichikawa, Y., Bruno, V. M., Woolford, C. A., **Kim, H.**, Do, E., Brewer, G., Mitchell, A. P. (2021). Environmentally contingent control of *Candida albicans* cell wall integrity by transcriptional regulator Cup9. *Genetics*, 218 (3). doi:[10.1093/genetics/iyab075](https://doi.org/10.1093/genetics/iyab075)

[3] Tao, Y., Rajaraman, A., Cui, X., Cui, Z., Chen, H., Zhao, Y., Eaton, J., **Kim, H.**, Ma, J., Schwartz, R. (2021). Assessing the Contribution of Tumor Mutational Phenotypes to Cancer Progression Risk. *PLOS Computational Biology*, 17(3). doi:[10.1371/journal.pcbi.1008777](https://doi.org/10.1371/journal.pcbi.1008777)

[2] He, B., Gao, P., Ding, Y., Chen, C., Chen, G., Chen, C., **Kim, H.**, Tasian, S. K., Hunger, S. P., Tan, K. (2020). Diverse noncoding mutations contribute to deregulation of cis-regulatory landscape in pediatric cancers. *Science Advances*, 6(30). doi:[10.1126/sciadv.aba3064](https://doi.org/10.1126/sciadv.aba3064)

[In preprint] Tao, Y., Rajaraman, A., Cui, X., Cui, Z., Eaton, J., **Kim, H.**, Ma, J., Schwartz, R. (2019). Improving personalized prediction of cancer prognoses with clonal evolution models. *bioRxiv*. doi:[10.1101/761510](https://doi.org/10.1101/761510)

[1] Lin, C., Jain, S., **Kim, H.**, Bar-Joseph, Z. (2017). Using neural networks for reducing the dimensions of single-cell RNA-Seq data. *Nucleic Acids Research*, 45(17). doi:[10.1093/nar/gkx681](https://doi.org/10.1093/nar/gkx681)

## PRESENTATION

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### Posters

- **Kim, H.\***, Shank, S., Kosakovsky Pond, S. L. (2022). PRoperty Informed Models of Evolution (PRIME). Poster: The 31st KSEA Northeast Regional Conference, Hybrid.
- Hu, Y., Chen, C., Ding, Y.\*, **Kim, H.**, Tan, K. (2019). Synergistic Control Genes in Cancer Gene Networks as Targets for Combination Therapy. Poster: Children's Hospital of Philadelphia Research Poster day and Scientific Symposium, Philadelphia, PA.

## Talks

- **Kim, H.\***, Kosakovsky Pond, S. L. (2022). PRIME Evolutionary Imputation (PREI). Flash Talk: International Conference on Intelligent Biology and Medicine, Philadelphia, PA.

## AWARDS, FELLOWSHIPS, & GRANTS

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**2022 Selected Attendee Support**, Scientists and Engineers Early Career Development Workshop

**2022 KSEA Excellent Poster Award**, The 31st KSEA Northeast Regional Conference

**2022 CST Three-Minute Thesis Competition 2nd Place Award**, Temple University (College-level)

**2015 Departmental Merit Fellowship**, Carnegie Mellon University

**2013 Mellon College of Science Research Honors**, Carnegie Mellon University

**2012 Summer Undergraduate Research Fellowship**, Carnegie Mellon University

## TEACHING EXPERIENCE

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### Course Completion

Aug 2022 - Dec 2022

Temple University

*Teaching in Higher Education (EPSY-8985)*

- Developed syllabi, assignments, and assessments using the principles of integrated course design.
- Applied the current theories of teaching in different contexts.
- Used a variety of effective teaching methods to address learners universally.
- Discussed a reflective and purposeful approach to teaching with other instructors.
- This course is a pre-requisite to obtaining *Teaching in Higher Education Certificate for Graduate Students*.

### Teaching Assistant

Aug 2020 - Dec 2020

Temple University

*Genomics in Medicine (BIOL-3111/5111)*

- Generated formative and summative assessment materials and provided timely feedback ([Youtube/Introduction](#)).
- Class size: 150.

### Teaching Assistant

Aug 2019 - May 2020

Temple University

*Wet Lab Courses (BIOL-2112 and BIOL-1012)*

- Gave a short lecture in the beginning of every lab, monitored student performance, and provided guidance.
- Graded lab reports and generated quizzes.
- **[Spring 2020]** BIOL-1012 General Biology II was an introductory course for non-biology majors.
- **[Fall 2019]** BIOL-2112 Introduction to Cellular and Molecular Biology was a lab course for biology majors.
- Class size: 20 (x 2 sections).

### Course Developer

Feb 2016 - Aug 2016

Carnegie Mellon University

*Programming for Scientists (02201/02601)*

- Generated open-source course materials (codes and instructions) with Drs. Phillip Compeau and Carl Kingsford for Go-lang beginners.

## LEADERSHIP EXPERIENCE

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### Secretary

Feb 2023 - Apr 2023

2023 KITEE-FELIX Hackathon

- Organized the hackathon in the committee meeting held regularly.
- Outreached to universities and engineer communities in the Philadelphia region.

### Philadelphia Young Generation Director

Jan 2023 - Apr 2023

The 32nd KSEA Northeast Regional Conference

- Planned the conference in the bi-weekly committee meeting with PIs from academia and industry.
- Operated as the public relations and promotion chief for the pre-networking event before the conference.

### DEI Representative

Dec 2021 - present

Temple University College of Science and Technology-Graduate Student Organization (CST-GSO)

- Identified potential DEI topics within the organization and suggested appropriate strategies.
- Facilitated the success of the yearly PhD/MS alumni panelist event with the other board members.

### Student Representative

Nov 2021 - present

Temple University College of Science and Technology Diversity, Equity, and Inclusion Committee

- Discussed the promotion of DEI within college at the bi-weekly committee meetings.
- Provided feedback for a wide array of DEI topics.

### Vice President

Sep 2021 - present

Temple University Biology Graduate Student Society (BGSS)

- Facilitated communication between the department and the graduate school.
- Led action plans to address diverse career needs within the department of biology and organized regular meetings with the graduate school directors.
- Planned and oversaw activities for departmental retreat.

## COMMUNITY INVOLVEMENT

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**Frontiers in Oncology (2021 IF=5.738)**, Ad Hoc Reviewer (1x/year), 06/2022

- Commented as a reviewer for an academic journal using my experience in cancer research and bioinformatics.

**George Washington Carver Science Fair**, Science Fair Judge, 03/2022 & 03/2023

- Judged science fair projects done by students in grades 6 to 12.

## PROFESSIONAL MEMBERSHIPS

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**Korean American Society in Biotech and Pharmaceuticals (KASBP)**, 10/2022-

**Korean-American Innovative Technology Engineers and Entrepreneurs (KITEE)**, 04/2022-

**Society for the Study of Evolution (SSE)**, 04/2022-

AnitaB.org, 09/2021-

Society for Molecular Biology and Evolution (SMBE), 01/2021-

– SMBE IDEA (Inclusion, Diversity, Equity and Access) Working Group, 11/2022-

Korean-American Scientists and Engineers Association (KSEA), 02/2020-

Philadelphia Korean Scholars Association (PKSA), 06/2019-

## DOCTORAL COURSEWORK

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Fall 2020 **Genomics and Infectious Disease Dynamics** *BIOL-5128*

Fall 2020 **Seminar: "Ecoevo discuss"** *BIOL-8210*

Fall 2020 **Applied Statistics and Data Science** *STAT-8109*

Spring 2020 **Genomics and Evolutionary Biology of Parasites** *BIOL-5241*

Spring 2020 **Data-Intensive and Cloud Computing** *CIS-5517*

Spring 2020 **Knowledge Discovery and Data Mining** *CIS-5523*

Fall 2019 **Genomics in Medicine** *BIOL-5111*

Fall 2019 **Topics in Bioinformatics** *BIOL-5466*

Fall 2019 **Seminar Biol 8210 at Center for Computational Genetics and Genomics** *BIOL-8210*

## CERTIFICATES

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**The Inclusive STEM Teaching Project**, InCLU1x 11/2022

**Business Foundations**, UBCx 10/2022

**Cancer Biology Specialization** (Introduction to the Biology of Cancer, Understanding Cancer Metastasis & Understanding Prostate Cancer), Coursera 09/2022

**Matrix Algebra for Engineers**, Coursera 03/2022

**Viruses & How to Beat Them: Cells, Immunity, Vaccines**, IsraelX 02/2022

## PERSONAL PROJECTS

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[Colorblindness Image Enhancer](#), "Most Technically Impressive" in OwlHacks 2023, 02/2023

## CODING LANGUAGES

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python, R, MATLAB, bash, JavaScript, Go-lang