Asal Rabiee

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Research Interests

Drug Discovery, Systems Biology, Genomics, Machine Learning

Education

B.Sc. in Animal Biology (Concentration: Bioinformatics) **2021–2026**

University of Tehran - GPA: 18.46/20(3.84/4.00)

- Coursework: Molecular Genetics, Cell and Molecular Biology, Epigenetics and Gene Regulation, Genetic Engineering and Biotechnology, Structural Biochemistry, Metabolic Biochemistry
- Thesis: Benchmarking Protein–Ligand Binding Site Prediction with Pseq2Sites, **GitHub**

Minor in Computer Science **2022–2026**

University of Tehran - GPA: 16.39/20 (3.33/4.00)

- Coursework: Introduction to Programming, Database Systems, Bioinformatics

Experience

Research Assistant **2025–2026**

School of Biology, College of Science, University of Tehran

- Conducted a feasibility study of **Pseq2Sites**, assessing its applicability for protein–ligand binding site prediction, involving large-scale dataset preprocessing and CNN + attention model training, while identifying key limitations and methodological improvements.
- Performed an independent bioinformatics study on **co-expression networks between ion channels and lncRNAs in gastric cancer**, utilizing RNA-seq (TCGA-STAD), differential expression analysis, WGCNA, and survival modeling, to uncover novel biomarkers and therapeutic targets. (Manuscript in preparation.)

Research Assistant **2023–2024**

University of Tehran (with collaboration of IAU, Uskudar Univ., Semnan Univ., SUT, KMU, TMU)

- Collaborated on a bioinformatics investigation of **Leishmaniasis**, contributing literature review and biomarker-driven drug discovery analyses. Supported integration of QSAR modeling, molecular docking, and molecular dynamics simulations. (Published as preprint)

Research Assistant **2022–2023**

Protein Biotechnology Research Laboratory (PBRL), University of Tehran

- Explored the **therapeutic potential of Cannabidiol (CBD)** via modulation of the Endocannabinoid System (ECS) in Alzheimer's disease, focusing on neuroprotection and synaptic regulation.
- Authored a scholarly review on the **historical and mechanistic exploration of blood sugar homeostasis** through the pioneering work of Nobel laureates Gerty and Carl Cori. (Published in internal scientific journal)

Teaching Assistant **2023–2025**

University of Tehran

- **Bioinformatics (Fall 2025, Prof. Kavousi):** Assisted students with coding assignments and biological data analysis, integrating computational and biological understanding. Led review sessions and provided individualized feedback, strengthening communication and problem-solving skills.
- **Neurophysiology and Endocrinology (Winter 2025, Prof. Rezayof):** Evaluated research-based assignments and guided students in interpreting scientific literature. Enhanced mentoring and analytical abilities through detailed feedback and concept clarification.
- **Molecular Genetics (Fall 2024, Prof. Inanloo Rahatloo):** Designed and coordinated the course project in collaboration with the instructor. Guided students through project development and evaluation, improving leadership and teamwork.
- **Invertebrate Biology (Fall 2024, Prof. Rahimian):** Taught literature review, essay writing, and presentation preparation to enhance students' academic communication. Designed and graded quizzes and supported exams, refining organizational and feedback skills.
- **Metabolic Biochemistry (Winter 2024, Prof. Habibi Rezaei):** Guided students in presentation projects, quizzes, and exams while clarifying biochemical concepts. Strengthened leadership and critical-thinking skills in a demanding academic setting.

- **Structural Biochemistry (Fall 2023, Prof. Habibi Rezaei):** Reviewed lecture materials, assisted with quizzes and exams, and clarified advanced biochemical mechanisms. Developed instructional clarity and collaboration in one of the program's most rigorous courses.
- **Biostatistics (Fall 2023, Prof. Malek):** Prepared assignments, explained statistical principles, and graded analytical reports. Reinforced quantitative reasoning and instructional communication skills.
- **Calculus II (Winter 2023, Prof. Hosseini):** Managed assignments for 90+ students, creating problem sets and grading submissions. Strengthened multitasking and precision while assisting first-year students with core concepts.

Laboratory Assistant **2024–2025**

University of Tehran

- **Genetics Laboratory (Winter 2025, Prof. Minaei):** Supported a highly demanding lab course of 80+ students. Guided experiments on *Drosophila* genetics, blood group typing, pedigree analysis (GenoPro), Barr body detection, and polytene chromosome observation. Assisted students with experimental setup, data interpretation, and report writing, and served as exam invigilator.
- **Molecular Genetics Laboratory (Fall 2024, Prof. Minaei):** Assisted a high-enrollment lab course (80+ students) in DNA extraction (salting-out), quantification (Nanodrop), primer design (Oligo7), PCR, and electrophoresis. Designed a bioinformatics project on ORF detection and guided students in creating instructional videos on primer design and sequence analysis.

Publications

- Farahzadeh, G., Rezaeirad, A., Hassani, S., Farajzadeh Tarani, M., Peymankar, A., **Rabiee, A.**, & Roohparvar Basmenj, E. (2024). QSAR, docking and molecular dynamic simulation studies of leishmanial inhibitors using a bioinformatics approach. *Authorea*. https://doi.org/10.22541/au.172464590.09500449/v1
- **Rabiee, A.**, & Habibi-Rezaei, M. (2023). Deciphering the mechanisms of blood sugar homeostasis: The story of Gerty and Carl Cori. *Science Cultivation*. https://www.sciencecultivation.ir/article_705829.*html*

Skills

Programming:	Python, R, Bash, SQL, C++, LaTeX
Software Tools:	Oligo7, GenoPro, SnapGene, Cytoscape, IGV, Open Babel, UCSF Chimera, Endnote, SPSS
Bioinformatics:	RNA-Seq, Genome Assembly (SPAdes, Quast), Multiple Sequence Alignment (Clustal Omega), Pairwise/Local Alignments (BLAST+), Reference Mapping (BWA, SAMtools), Systems Biology (WGCNA), QSAR, Docking (AutoDock), MD Simulation (GROMACS)
ML and AI:	PyTorch, Scikit-Learn, Transformers
Version Control:	Git, GitHub
Laboratory:	Standard PCR, PCR Primer Design, DNA Electrophoresis, Genomic DNA Extraction (Salting-out), Spectrophotometry, Nanodrop, Centrifugation, Blood Smear Preparation, ELISA, Aseptic Technique, Gram Staining, Streak Plate Method
Personal Skills:	Communication, Team Leadership, Teamwork, Problem-Solving, Critical Thinking, Creativity

Projects

- **Benchmarking Protein–Ligand Binding Site Prediction with Pseq2Sites:** Bachelor thesis project benchmarking deep learning approaches (CNN with attention mechanisms) for sequence-based prediction of protein–ligand binding sites. Focused on large-scale preprocessing of scPDB and PDBbind datasets, implementation of ProtTrans embeddings, and comparative evaluation to highlight strengths, challenges, and opportunities for improving drug discovery pipelines. **GitHub**
- **Exploring Relationships Between Ion Channels and lncRNAs in Gastric Cancer:** Ongoing research project using TCGA-STAD RNA-seq data to investigate gene co-expression networks. Applied differential expression analysis (DESeq2), WGCNA, and survival modeling to identify lncRNA–ion channel modules correlated with clinical traits, aiming to uncover novel biomarkers and therapeutic targets. **GitHub**
- **Genetic Database:** Designed and implemented a normalized relational database (up to BCNF) for efficient genetic data management. Built a complete pipeline including entity–relationship modeling, schema design, and SQL implementation in PostgreSQL (via pgAdmin4). The system supports storing and querying of genes, RNAs, proteins, organisms, and users, with role-based access control and example datasets. **GitHub**

- **Read Mapping and Genome Assembly:** Implemented a full NGS workflow on *E. coli* short-read data, including quality control (FastQC), de novo assembly (SPAdes, Quast), and read mapping (BWA, SAMtools). Validated results by visualizing alignments in IGV and assessing concordance, mapping rates, and read depth, providing hands-on experience with genome assembly and evaluation. **GitHub**
- **Identification of Xylanase Genes:** Designed and implemented a bioinformatics pipeline to identify thermostable xylanase genes from rumen metagenomic datasets. The workflow included sequence similarity searches (BLAST+), clustering at 97% identity with CD-HIT to generate non-redundant representatives, multiple sequence alignment (Clustal Omega) to detect conserved motifs, and HMM-based filtering to refine candidates. Produced a curated set of high-confidence xylanase gene sequences. **GitHub**
- **Hierarchical Data Structure for Genetic Diseases:** Developed a Python-based tree system to organize genetic diseases and associated genes. Implemented search and insertion functions with hash tables for gene attributes (location, exons, type, name) and a menu-driven interface, enabling efficient hierarchical representation of biomedical data. **GitHub**

Honors

- Ranked 1st in Cumulative GPA among undergraduate students, University of Tehran, 2025.
- Awarded a full scholarship for the Computer Science minor, University of Tehran, 2022.
- Awarded a full scholarship for undergraduate studies, University of Tehran, 2021.
- Top 8.5% in National University Entrance Exam among more than 500,000 participants, Tehran (2021).

Conferences Attended

- Attended the Healthcare Bioinformatics and Computational Biology (HBC2025) Conference, Online, February 2025, Certificate of Participation

Extracurricular Activities

Volunteer Tour Guide **2022–2024**

Zoological Museum, University of Tehran

- Led interactive tours for diverse audiences, introducing fundamental concepts of general biology, evolution, and biodiversity in an engaging and accessible way.Enhanced communication, teaching, and leadership skills by explaining complex biological topics clearly and fostering curiosity among visitors.Contributed to the museum's educational mission by promoting scientific literacy and public interest in biology and research.