

Syed Muhammad Ali Shirazi

Bachelor of Science in Biosciences

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Profile

Biosciences graduate bridging wet-lab molecular biology and computational genomics. Demonstrated ability to design and execute traditional laboratory experiments (PCR, DNA extraction, genotyping) and bioinformatics pipelines (genome assembly, phylogenetics, pathway analysis). Completed two major research projects: case-control genetic study analyzing 104 patient samples, and viral genomics pipeline analyzing 100 SARS-CoV-2 genomes. Proven skills in experimental design, statistical analysis, and scientific communication through peer-reviewed protocols and technical blog posts. Seeking graduate opportunities in bioinformatics and computational biology.

Education

Bachelor of Science (BS) in Biosciences

COMSATS University Islamabad

February 2022 – February 2026

Islamabad, Pakistan

Developed strong theoretical knowledge and practical laboratory skills in molecular biology, genetics, biochemistry, and microbiology. Hands-on experience with DNA extraction, primer design, PCR (including TETRA-ARMS), gel electrophoresis, and spectrophotometry. Conducted experimental design, data collection, and statistical analysis (correlation, regression, ANOVA).

Relevant Coursework: Molecular Biology, Genetics, Biochemistry, Microbiology, Bioinformatics, Biostatistics, Cell Biology, Immunology, Epidemiology, Bioethics.

Final Year Project: Case-control study investigating ATP8B1 genetic variants in gallstone disease in Pakistani population (104 participants: 75 cases, 29 controls). Supervised by Dr. Nasir Masood and Dr. Muhammad Ajmal.

FSc Pre-Medical

Joint Staff Public School and College

April 2019 – August 2021

Rawalpindi, Pakistan

Achieved A+ grades. Focused on biology and chemistry with coursework in Biology, Chemistry, Physics, English, Urdu, History, and Islamic Studies. Developed foundational laboratory skills and academic preparation for bachelor's program.

Research Experience

Undergraduate Researcher – COMSATS University Islamabad September 2025 – February 2026

- **Project:** Assessment of the Role of ATP8B1 Gene in Gallstone Disease in the Pakistani Population
- Designed and executed case-control study with 104 participants (75 gallstone patients, 29 healthy controls) investigating SNP rs766737165 ($T > A$) association with disease risk.
- Performed DNA extraction (phenol-chloroform method), TETRA-ARMS PCR genotyping, and gel electrophoresis. Optimized primer design using Primer3 and BLAST validation.
- Conducted statistical analysis (chi-square, Hardy-Weinberg equilibrium testing) using R and Excel.
- Documented complete methodology and results in comprehensive thesis. Presented findings to department faculty and students.
- **Skills Applied:** PCR, DNA extraction, primer design, genotyping, statistical analysis, scientific writing, data visualization.

Self-Directed Bioinformatics Project

January 2026 – March 2026

- **Project:** SARS-CoV-2 Genomic Analysis Pipeline – From Assembly to Drug Target Discovery
- Completed UC San Diego's Applied Bioinformatics Specialization by building end-to-end analysis pipeline using real pandemic data (100 viral genomes, January 2020 – March 2023).

- Performed de novo genome assembly from raw Illumina reads using SPAdes (29,903 bp, single contig, N50: 29,903). Conducted quality assessment with QUAST and functional annotation with Prokka (11 ORFs identified).
- Built phylogenetic trees using FastTree (GTR+Gamma model) and performed molecular clock dating with LSD2. Estimated tMRCA: October-November 2019 (95% CI: September-December 2019, $R^2=0.96$).
- Identified guanylate kinase as potential antiviral drug target through BioCyc pathway analysis. Designed RT-PCR primers for N gene diagnostics with 100% specificity.
- Documented complete workflow in GitHub repository and published 3 technical blog tutorials (13,000+ words) on genome assembly, phylogenetics, and bioinformatics tools.
- **Skills Applied:** Genome assembly (SPAdes), sequence alignment (BLAST, MUSCLE), phylogenetics (FastTree, LSD2), pathway analysis (BioCyc), Python scripting, scientific communication.

Publications & Presentations

Oral Presentation: "Genetic Determinants of Gallstone Disease: Focus on ATP8B1 Variants in the Pakistani Population" – Undergraduate Research Presentation, COMSATS University Islamabad, February 2026.

Oral Presentation: "The Relationship Between Physical Activity and Mental Health Among Students" – Statistical Methods in Biology (BIO333), COMSATS University Islamabad, December 2024. Applied correlation analysis, regression modeling, and ANOVA to examine exercise-mental health relationships.

Blog Publications: Three technical tutorials published at alishirazi03.github.io/blog: (1) From Wet Lab to Code: Career transition guide, (2) Assembling a Pandemic: Genome assembly tutorial, (3) Tools I Learned: Bioinformatics toolkit reference (5,000+ words each).

Professional Development

Applied Bioinformatics Specialization – University of California San Diego (Coursera) March 2026

- 5-course specialization covering genome assembly, annotation, multiple sequence alignment, phylogenetic analysis, molecular clock dating, and metabolic pathway analysis. Applied skills using real SARS-CoV-2 datasets.
- Courses: (1) Genome Assembly Programming Challenge, (2) Genome Sequencing, (3) Comparing Genes, Proteins, and Genomes, (4) Molecular Evolution, (5) Genomic Data Science and Clustering.

Python for Genomic Data Science – Johns Hopkins University (Coursera) February 2026

Introduction to Genomic Technologies – Johns Hopkins University (Coursera) March 2026

Introduction to Clinical Data – Stanford University (Coursera) February 2026

Introduction to Healthcare – Stanford University (Coursera) March 2026

Professional Affiliations

Student Member 2026 – Present
International Society for Computational Biology (ISCB) Membership ID: 46230

Member of global community for computational biologists and bioinformaticians advancing scientific understanding through computation. Access to premier journals, conferences, and networking opportunities.

Member 2024 – 2025
BIOME – The Biosciences Society, COMSATS University Islamabad

Participated in departmental activities, event management, and coordinated scientific projects and seminars.

Event Organizer & Coordinator May 2025
WWF Endangered Species Day Seminar, COMSATS University Islamabad

Co-organized seminar on biodiversity conservation. Coordinated logistics, managed speaker invitations, and facilitated student participation. Event engaged 100+ students in environmental protection initiatives.

Active Volunteer 2023 – Present
sarreraah – Non-Profit Outreach

Actively involved in community service initiatives focused on providing essential resources and financial support to underprivileged populations.

Technical Skills

Wet-Lab Techniques: PCR (including TETRA-ARMS), DNA extraction (phenol-chloroform), gel electrophoresis, primer design (Primer3), genotyping, Sanger sequencing sample preparation, spectrophotometry, sterile technique.

Bioinformatics: Genome assembly (SPAdes, QUAST), sequence alignment (BLAST, MUSCLE, ViralMSA), phylogenetics (FastTree, LSD2, Taxonium), genome annotation (Prokka), pathway analysis (BioCyc, EcoCyc, MetaCyc), primer design validation.

Programming & Data Analysis: Python (BioPython, pandas, matplotlib), R (basic data analysis, ggplot2), Galaxy platform, command-line tools (bash).

Statistical Methods: Correlation analysis (Pearson, Spearman), regression modeling (linear, multiple), ANOVA, chi-square testing, Hardy-Weinberg equilibrium, basic epidemiological methods.

Software & Tools: Microsoft Excel, SPSS (basic), Git/GitHub, LaTeX, Microsoft Office Suite, reference managers (EndNote, Mendeley).

Data Visualization: Matplotlib, ggplot2, Excel charts, GraphPad Prism (basic).

Transferable Skills

Communication: Scientific writing (thesis, blog posts, protocols), oral presentations (departmental seminars), technical documentation, data visualization for diverse audiences.

Leadership & Management: Event organization (WWF seminar, 100+ participants), team collaboration on laboratory projects, mentoring junior students in lab techniques.

Problem-Solving: Troubleshooting experimental protocols, debugging bioinformatics pipelines, adapting methods based on literature review.

Adaptability: Successfully transitioned from wet-lab focus to hybrid wet-lab/computational skillset, self-directed online learning, quick adoption of new bioinformatics tools.

Languages

English (Fluent – Professional working proficiency), Urdu (Native), Punjabi (Fluent)

Interests & Hobbies

Reading (philosophy, poetry), ice skating, hiking, creative writing, palmistry, animal welfare (dogs and cats)

References

Dr. Nasir Masood – Tenured Associate Professor, Department of Biosciences, COMSATS University Islamabad – nasir.masood@comsats.edu.pk

Dr. Muhammad Ajmal – Tenured Assistant Professor, Department of Biosciences, COMSATS University Islamabad – muhammad.ajmal@comsats.edu.pk

Dr. Faraz Arshad Malik – Associate Professor, Department of Biosciences, COMSATS University Islamabad – famalik@comsats.edu.pk