



Summer School Program Agenda: September 2026 – April 2027

1) Scientific Research

- a) Stages of Theoretical Scientific Research
 - i) Problem Stating, Goal Setting, Objectives Selecting
 - ii) Methods of Theoretical Scientific Research
 - (1) Methods Flowcharts
 - iii) Useful Tools for Theoretical Scientific Research
 - iv) Important Software for Theoretical Scientific Research in Bioinformatics
- b) How to Write a Scientific Paper
 - i) Types of Scientific Papers
 - ii) Structure of Scientific Paper
 - iii) References
 - iv) Plagiarism Detection

2) Biochemistry

- a) Basics
 - i) Organic Nomenclature
 - ii) Chemical Bonds (especially Hydrogen Bonds)
 - iii) Functional Groups (Definition: hydroxyl, methyl, carbonyl, carboxyl, amino, phosphate, sulfhydryl, etc.)
 - iv) Chemical Compounds of Living Systems
- b) Structure and Function of Important Biomolecules
 - i) Carbohydrates, Lipids, Nucleic Acids, and Proteins—Review
 - ii) DNA and RNA
 - (1) Nucleic Acids
 - iii) MicroRNAs
 - iv) Proteins
 - (1) Amino Acids
 - v) Signaling Pathways
 - vi) Metabolism and Metabolites
 - vii) Advanced Glycation End Products
- c) Epigenetics
 - i) DNA Methylation
 - ii) Histone Modification
 - iii) Various RNA-Mediated Processes

3) Biology

- a) Taxonomy
- b) Microbiota and Microbiome
 - i) Phages
- c) Virome
- d) Fungi

4) Artificial Intelligence and Machine Learning

- a) History of Artificial Intelligence
 - i) Definition

- ii) History
 - iii) Taxonomy
- b) Machine learning
 - i) Supervised Machine Learning
 - ii) Unsupervised Machine Learning
 - iii) Semi-Supervised Machine Learning
 - iv) Reinforcement Machine Learning
 - v) Learning-to-Learn Machine Learning
- c) Deep Learning
- d) Data Mining for Scientific Discovery
- e) Descriptors
- f) The AI Approach to Diagnosing and Curing Disease

Should you have any questions or require further information, please do not hesitate to contact Dr. Igor Tsigelny at it@biana.info.