

BIOBRIDGE

Bio Innovation Hackathon Problem Statements

K.S. Rangasamy College of Technology (KSRCT), Namakkal

Overview

BioBridge presents 36 problem statements across six core biotechnology and allied-sector categories, together with an Open Bio Track. Each problem statement has a unique code for use during registration, Round 1 submission, evaluation and subsequent communication.

Problem statement codes follow the format BB-[TRACK]-[NUMBER]. Teams should use the exact code corresponding to their selected challenge.

Precision Biotherapeutics & Drug Discovery

Track Code: BB-PB

BB-PB-01 — Repurposing shortlist for drug-resistant TB

Rank approved molecules against validated mycobacterial targets instead of discovering from scratch.

BB-PB-02 — Protein structure and binding-site explorer

Visualisation and pocket annotation a college lab can run without a commercial licence.

BB-PB-03 — Last-mile cold chain integrity for biologics

Catch temperature excursions per vial before a compromised dose is administered.

BB-PB-04 — AMR surveillance from hospital antibiogram data

Turn routine culture and sensitivity records into a live local resistance picture for prescribers.

BB-PB-05 — Antimicrobial peptides from regional biodiversity

Screen and design peptide candidates in silico, then carry the best one to assay.

Diagnostics & Medical Devices

Track Code: **BB-DM**

BB-DM-01 — Non-invasive anaemia screening

Screening that works at an anganwadi without a blood draw or a lab behind it.

BB-DM-02 — Field test for water-borne pathogens

Confirm contamination at the source instead of waiting days for a district lab.

BB-DM-03 — Smartphone microscopy for slide screening

Optics plus an on-device model that flags suspect fields for a scarce microscopist.

BB-DM-04 — Oral and cervical cancer triage at PHCs

Decide who gets referred upward, and fail safe whenever the call is uncertain.

BB-DM-05 — Monitoring for high-risk pregnancy at home

Catch deterioration between monthly visits, with a named human to escalate to.

Bioinformatics, Genomics & Bio-AI

Track Code: **BB-BG**

BB-BG-01 — Variant file to a counsellor-ready report

Annotate and prioritise genomic variants, with stated confidence and explicit limits.

BB-BG-02 — Carrier screening guidance in regional languages

Explain inheritance risk accurately in Tamil, with a hand-off to a qualified counsellor.

BB-BG-03 — Biodiversity assessment from environmental DNA

Assign taxonomy from eDNA and handle sequences with no reference database match.

BB-BG-04 — Pharmacogenomic dosing for Indian populations

Map genotype to dosing for named drug-gene pairs using population-relevant frequencies.

BB-BG-05 — Catching hallucination in biomedical AI summaries

Detect unsupported claims and fabricated citations in model-generated biomedical text.

Climate-Resilient Agriculture & Agri-Biotech

Track Code: **BB-CA**

BB-CA-01 — Quality check for biologicals at point of sale

Verify viable count in minutes so one dead batch does not end a farmer's trust.

BB-CA-02 — Offline crop disease detection

Diagnose in the field without connectivity, while the spray window is still open.

BB-CA-03 — Microbial consortium from soil health data

Convert a soil test report into a specific consortium and an application protocol.

BB-CA-04 — Verifiable traceability for organic produce

Link farm practice to the produce a buyer receives, resistant to the obvious gaming.

BB-CA-05 — Contamination early warning in tissue culture

Detect contamination before it is visible and the whole batch is already lost.

Functional Foods, Nutrition & Smart Proteins

Track Code: **BB-FN**

BB-FN-01 — Alternative protein from a local substrate

Mushroom, insect, algal or fermentation protein grown on residue currently burned or dumped.

BB-FN-02 — Bio-based edible coatings for perishables

Extend shelf life with food-safe materials, measured against an uncoated control.

BB-FN-03 — Rapid adulteration detection

Catch named adulterants in milk, oil or spices outside a lab, at a trader's price point.

BB-FN-04 — Functional food for a defined deficiency

Deliver the nutrient through a food people already eat, not a tablet they forget.

BB-FN-05 — Low-cost fermentation monitoring

Track the parameters that actually decide batch outcome for a small producer.

Environmental, Industrial & Waste-to-Value Biotech

Track Code: **BB-EW**

BB-EW-01 — Bioremediation of textile dye effluent

Treat Erode-Tiruppur cluster effluent at a cost per kilolitre that beats the incumbent.

BB-EW-02 — Campus organic waste to insect protein and frass

Turn a hostel mess waste stream into protein and fertiliser, with a real mass balance.

BB-EW-03 — Microbial or enzymatic plastic degradation

Demonstrate degradation on a named polymer and report the rate honestly.

BB-EW-04 — Agro-residue valorisation instead of burning

Beat burning on economics at the farmer's gate, collection logistics included.

BB-EW-05 — Biosensor for heavy metals in groundwater

Detect at health-relevant concentrations, with a biological component that stays stable.

Open Bio Track

Track Code: **BB-OB**

BB-OB-01 — Biological life support for space missions

Closed-loop oxygen, water or food from engineered biology, with a mass and power budget.

BB-OB-02 — Biosafety compliance in college laboratories

Track cultures, constructs and waste against applicable Indian biosafety guidelines.

BB-OB-03 — Regulatory pathway navigator for founders

CDSCO, FSSAI, GEAC or BIS - which route applies, in what order, at what cost.

BB-OB-04 — Authentication of herbal raw material

Verify botanical identity and trace it from collection through to the formulation.

BB-OB-05 — Virtual lab for experiments students cannot access

Simulate a workflow where wrong choices produce realistic failures, not hints.

BB-OB-06 — Wildcard - your own bio-related problem

Any real biological problem outside these categories, approved at the application stage.