

# Future Fundi – Curriculum Concept Note

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Concept Note — Internal (Curriculum Development Team)

## Summary

*From “Robotics and code-only” to a Future Fundi STEM system that spans the full scope of science, technology, engineering and math, connects student lessons → student artifacts → skills → credentials → work, and is deliverable anywhere (schools, community centres, franchise pods) with low overhead, high visibility and exceptional outcomes.*

## 1) Why we’re shifting (problem & opportunity)

### What’s not working (old model):

- Robotics = strong hook, but too narrow; parents ask “what next?” and we’ve been vague/open-ended about the child’s future potential.
- Limited mapping from lesson modules to **career pathways** and **industry exposure**.
- Teacher development depends on in-house staff; scale stalls when we need breadth.
- Visibility relies on “cool demos” instead of **verified community impact**.
- Parents are overwhelmed by the rapid evolution of technology.
- Increase in competitors doing the basics from Fundi Bots in 2016.
- Low public visibility for impact – overshadowed by flashier, but shallow competitors.

### What we’re building instead:

- A **Future Fundi system** that tracks a learner (6–21) across **interests, skills, artifacts, outcomes and career**. We are invested in the child’s future.
- A framework for parents to understand the 4IR future and align themselves and their children for this future.
- Breadth and depth across **Sciences (e.g Earth/Env/Health), Technology/AI, Engineering/Manufacturing, Mathematics/Data**.
- Clear **pathways** (Technician • Practitioner • Researcher • Entrepreneur) with **stackable, verifiable micro-credentials**.
- **Teacher/Instructor development pipeline** (Fundi staff • affiliates • government clusters) with **pods, tool libraries, and open badges**.
- **Community impact** as the core proof: results and verified proof of knowledge and skills, not just optics.
- Strong industry connections for **exposure, skills, mentorship and careers**.
- **Integration of AI tools** to provide exposure to generative AI tools while facilitating **independent, accelerated learning**.

## 2) Vision & outcomes (2026–2030)

**Vision:** Every Future Fundi learner graduates each year with **(a)** a portfolio of verified artefacts, **(b)** at least one **market-relevant credential**, and **(c)** a **clear next step** (e.g shadow day, internship, job trial, franchise pod leadership, or scholarship), and **(d)** **continued learning pathways** (depending on age, stage)

**Outcomes we'll measure (termly, roll-up annually):**

- **Learning:**  $+\Delta$  attendance,  $+\Delta$  formative assessments in science/math.
- **Skills:** # artifacts per learner; # micro-credentials earned; safety score.
- **Careers:** # shadow days/internships/placements; employer engagement hours.
- **Community impact:** asset **uptime↑**, cost **savings↑**, households served.
- **Equity:** girls' participation, disability access, low-bandwidth reach.
- **Scale efficiency:** student: teacher ratios, technology usage, pod utilization, kit unit costs, tutor/helpdesk availability (SLA)

## Q: Terminology

### Artifacts

These are concrete, **verifiable work products** or **portfolio pieces** a learner creates that show what they can do—not just what they know. They're portable evidence that ties **skills → process → result → impact**.

#### Examples (by type)

- **Hardware/prototype:** sensor circuit, solar charger, hand-washing station
- **Software/data:** code repo, dashboard, trained model, analysis notebook
- **Geo/field:** map, survey, water-quality log, maintenance checklist
- **Process/SOP:** safety procedure, repair guide, bill of materials
- **Communication:** 1-page brief, poster, 60-sec demo video, reflection
- **Impact proof:** before/after photos, uptime/savings metric, resident sign-off

Note: Quizzes and evaluations feed into learning, but the **artefact** is the thing someone can inspect, run, or reuse to confirm solid learning outcomes.

### Minimum “artefact pack”

Title • date • domain tags • skills demonstrated • link(s) (repo/docs/video) • test results/metrics • reflection (5 lines) • safety checklist • verification (teacher/mentor or community).

### Pods

A Pod is a small, repeatable unit of delivery with 10–30 learners or 10–20 teachers meeting on a fixed cadence (usually weekly, perhaps 90 minutes) to run a hands-on module with pre-bagged kits, a simple run-of-show, and light data capture. Pods are the building blocks that let us scale fast without heavy headcount.

### **3) Curriculum architecture (the Future Fundi Growth Tree)**

The Future Fundi Growth Tree is a living learner-analogous model (ages 6–21) that turns curiosity into projects, projects into skills, and skills into pathways while staying safe, inclusive, and exam-aligned.

#### **Anatomy of the Growth Tree (what it is)**

- **Roots (Wellbeing & Values / SEL):** motivation, (SEL) Social & Emotional Learning, safety, ethics, regulation, safety, collaboration, purpose.
- **Trunk (Durable Skills):** literacy, numeracy/logic, communication/storytelling, digital/data fluency, making/safety.
- **Rings (Time):** weekly/termly snapshots that show growth, not just point scores, includes micro-rubrics that track additional levels (Initiate • Practice • Transfer).
- **Branches (Domains) (examples:)**
  - Water/WASH
  - Energy/power/Renewables
  - Health/Bio
  - Software/Data/AI
  - Mechatronics/Manufacturing
  - GIS/Geo
  - Agri-tech
  - Climate/Environment
  - Math/Applied Stats.
- **Leaves (Artifacts):** verifiable outputs per week (*artifact packs – weekly 1–1–1: one concept → one skill rep → one artifact (+5-line reflection)*).
- **Fruit (Outcomes):** micro-credentials, showcases, shadow days, internships, paid micro-contracts, competitions, etc.

**Roots (Wellbeing & Values):** motivation, (SEL) Social & Emotional Learning, safety, ethics.

**Trunk (Durable Skills):** literacy, numeracy/logic, communication/storytelling, digital/data fluency, making/safety.

**Rings (Time):** term-by-term growth; simple 0–3 micro-rubrics (Initiate • Practice • Transfer).

**Guidance & Scoring Engine (transparent):**

Recommends **Explore / Deepen / Bridge / Showcase** with cognitive-load gates (Green/Amber/Red).

## 4) Program pillars & delivery models

(mapped to current Fundi Bots delivery avenues for clarity, subject to change/review)

**Fundi @School (intra-curricular):** 6-week modules aligned to national curriculum; 1 lab block/week; ready-to-teach bags.

**Fundi @Home (after-school/weekend):** 90-min learning/pod sessions; parent broadcasts; home kits; artifact development.

**Fundi @Work (transition):** credentials, shadow days, micro-internships, employer challenges.

**Community Learning Pods (CLPs):** 12–20 teachers; tool libraries; monthly repair days; verified community projects.

**Franchise/Affiliate pods:** licensed delivery of modules with QA audits and data-sharing.

**Government clusters:** CPD-aligned ToT → cluster coaches → school champions.

## 5) Sample curriculum ladder (6–18, breadth to depth)

(example for reference per stage, detailed version to be shared and expanded on by team)

### Ages 6–8 (Playful breadth):

- **Maker Seeds:** paper circuits, water filters, wind-powered toys.
- **Artifacts:** projects, photos + 5-line reflections; count **experiences** not scores.

### Ages 9–12 (Explore & sample):

- **Modules:** *Solar Basics, Water Quality & Hygiene, Intro Coding + Sensors, Agri-Tech Growbox.*
- **First micro-credentials:** basic computing, safety, first aid.

### Ages 13–15 (First specialization):

- **Modules:** *Mechatronics 1, PV Design & Install (Level 1), GIS & Field Mapping, Health Tech Basics (signals).*
- **Shadow day** each term; mini-internships with local artisans/SMEs.

### Ages 16–18 (Pathway runway): choose 1–2 tracks

- **Technician:** Water systems maintenance, Lab tech, Machinist, etc.
- **Practitioner:** Robotics/Automation projects, GeoAI mapping, Data/ML projects.
- **Researcher:** field investigations (water/climate/health), structured reports.
- **Entrepreneur:** micro-utility (lighting, handwashing), repair services, maintenance contracts.

## 6) Example Pathways: Learn → Skill → Employment/Entrepreneurship

(example for reference per stage, detailed version to be shared and expanded on by team)

### Pathway 1: Solar Energy Technician

- **What they learn:** Solar basics → how to design and install small systems → batteries and safe wiring → how to care for and fix systems.
- **What they make (artifacts):** A solar phone charger → a simple device that records how well a panel works → a check-up of a small school solar setup.
- **Certificate:** Solar Basics (Term 2); Solar Maintenance (Term 4).
- **First steps:** Spend a day with a local installer → help on weekend installations → join a school/clinic maintenance route.
- **Possible first jobs:** Junior solar technician, assistant installer, entry to technical college credit.

### Pathway 2: Water & Hygiene Technician

- **What they learn:** Testing clean water → how pumps and boreholes work → finding and fixing leaks → handwashing and hygiene systems.
- **What they make:** A simple cloudiness (turbidity) tester → a basic chlorine test kit → a tap-repair guide → a handwashing station with a simple use counter.
- **Certificate:** Water Systems Maintenance.
- **First steps:** Join a monthly community repair day → short paid repair/maintenance tasks with the town or local partners.
- **Possible first jobs:** Water-point technician, contractor for community organisations.

### Pathway 3: Mapping & Satellite Imagery Assistant

- **What they learn:** Map making and GPS → reading satellite images → beginner computer-aided mapping → field surveys and simple reports.
- **What they make (artifacts):** A land-use map → a flood-risk map for the neighborhood → a list and map of water points with simple ID codes.
- **Certificate:** Mapping Basics.
- **First steps:** Create maps for a district office or local group → internship in a planning or survey office.
- **Possible first jobs:** Mapping technician, survey assistant.

### Pathway 4: Mechatronics & Automation (Factory Basics)

- **What they learn:** Sensors and motors → simple control systems → basic camera counting (machines that “see”) → safety and quality on the factory floor.
- **What they make (artifacts):** A small conveyor that sorts items → a line-following cart → a camera counter that tallies products.
- **Certificate:** Mechatronics Level 1 + short manufacturer trainings.
- **First steps:** Spend a day in a local factory → maintenance internship.
- **Possible first jobs:** Junior automation technician, plant maintenance assistant.

## Pathway 5: Data & Everyday AI

- **What they learn:** Understanding data → beginner coding for data → simple AI on phones or small devices (images or text) → how to put a model into daily use.
- **What they make (artifacts):** An attendance predictor for a class → a demo that flags faulty products → a small community dashboard (simple charts).
- **Certificate:** Data and Cloud Fundamentals.
- **First steps:** Do a small analysis project for a local business or community group.
- **Possible first jobs:** Junior data analyst, assistant developer.

## Health / MedTech — Digital Health Coordinator

- **What they learn:** How clinics record patient information, good data habits, privacy and consent, basic reporting for managers.
- **What they make:** A clear clinic workflow map, a step-by-step guide for staff, a simple health dashboard (counts and charts).
- **Certificate:** Digital Health Basics (records, privacy, reporting).
- **First steps:** Help a local clinic set up cleaner records and monthly reports; train staff on the guide.
- **Possible first jobs:** Clinic data assistant, digital health support officer.

## AgriTech & Food Systems — Post-Harvest & Food Safety Assistant

- **What they learn:** How harvests spoil, safe handling and storage, simple ways to keep food dry and cool, basic quality checks.
- **What they make:** A low-cost solar dryer plan, a temperature/log book for storage, a food-safety checklist for a small shop or co-op.
- **Certificate:** Food Safety & Storage Basics.
- **First steps:** Support a farmer group or school garden to dry, store, and label produce safely.
- **Possible first jobs:** Packhouse assistant, small-scale food safety officer.

## Civic / UrbanTech — Community Transport & Safety Analyst

- **What they learn:** How to count traffic and passengers, map trouble spots, and suggest simple fixes (signs, crossings, lighting).
- **What they make:** A short transport survey, a safety map for busy paths or stops, a one-page brief with clear actions.
- **Certificate:** City Data & Safety Basics.
- **First steps:** Work with a school or town office to collect counts for 2–4 weeks and present the findings.
- **Possible first jobs:** Planning office helper, community safety and transport assistant.

## FinTech — Payments Support & Fraud-Watch Assistant

- **What they learn:** How digital payments work, safe customer checks, simple rules to spot risky activity, basic customer support.
- **What they make:** A step-by-step guide for agents, a small tracker for customer issues, a simple “risk flags” report.
- **Certificate:** Digital Payments Basics.

- **First steps:** Assist mobile-money agent network or a local business that takes digital payments.
- **Possible first jobs:** Payments support agent, risk monitoring assistant.

## Sports / MediaTech — Performance & Highlights Analyst

- **What they learn:** Keeping clean match stats, basic video tagging, turning numbers into easy charts coaches can use.
- **What they make:** A match stats sheet, a simple “where play happened most” chart, a short highlights reel for one team.
- **Certificate:** Sports Data & Video Basics.
- **First steps:** Support a school or local club for one season; share a weekly report and a highlights clip.
- **Possible first jobs:** Team analyst helper, media production runner or stats assistant.

## Pilot — Aviation Starter (with a Drone On-Ramp)

- **What they learn:** How airplanes fly, safety rules, radio talk, weather basics, map reading, and careful decision-making. Starts on drone flying to lower costs.
- **What they make:** A flight-log book, a simple flight plan, a short drone video showing safe flying, and a study pack for ground school.
- **Certificate:** Aviation Basics (ground school + safe drone flying).
- **First steps:** Hours on a flight simulator → a “discovery flight” with a local flying club → pass a beginner theory test → help at the airfield on weekends.
- **Possible first jobs:** Ground crew helper, flight operations/dispatcher assistant, junior drone operator.

## Architect — Built-Environment Designer (Early Track)

- **What they learn:** Sketching by hand, model making, how spaces work for people, basic building safety, and computer drawing (beginner design software).
- **What they make:** A room layout, a small shelter model, a neighborhood walkability map, and a simple design portfolio.
- **Certificate:** Design & Drawing Basics (studio skills + site-visit safety).
- **First steps:** Shadow a local design or construction firm → help measure rooms and draw simple plans → join a community build or school makeover project.
- **Possible first jobs:** Junior drawing assistant, site assistant, interior/design studio helper.

## Game Developer — Game-Making Starter

- **What they learn:** Story ideas, simple game rules, beginner coding, basic art and sound, and how to test and improve a game.
- **What they make:** A tiny playable game (1 level), a trailer video, a page with screenshots and “how to play,” and a list of player feedback.
- **Certificate:** Game-Making Basics (beginner coding + design).
- **First steps:** Join a weekend “game jam” → publish a simple game online → help a school club with art, sound, or testing.
- **Possible first jobs:** Junior game tester, content/level creator, assistant developer.

## 7) Outlier projects (wow-factor for showcases)

*Examples of real-world projects. Each one shows: Problem → Prototype (what we build) → Acceptance test (how we prove it) → Verified result (what we share)—plus the core STEM skills it grows.*

### Solar Logger

- **Problem:** The school's solar charging station is slow or unreliable.
- **Prototype:** A small meter that records how strong the panel is during the day; we test different angles and clean the panel.
- **Acceptance test:** Record a reading every few minutes for one school week; make a simple chart; compare “before” vs “after” changes.
- **Verified result:** Charging becomes faster/more reliable (goal: noticeably quicker charge times after angle/cleaning). Share the chart on the noticeboard.
- **STEM skills:** Measurement, data charts, problem–solution testing, safe wiring.

### Smart Handwashing Station

- **Problem:** Students skip soap and waste water.
- **Prototype:** A tap with a simple use-counter and friendly reminders (“Use soap!”), plus a slow-flow nozzle.
- **Acceptance test:** Count handwash uses and water used in one week; compare to a normal tap.
- **Verified result:** Soap use goes up and water use goes down (target: 20–30% less water). Share numbers with the health club.
- **STEM skills:** Behavior science, basic sensors/counters, simple data tracking.

### Agri GrowBox

- **Problem:** Plants dry out or are over-watered; harvests are uneven.
- **Prototype:** A small garden box that checks soil moisture and waters only when needed; optional SMS/phone alert.
- **Acceptance test:** Keep soil moisture in a healthy range for two weeks; compare plant growth with a normal bed.
- **Verified result:** Fewer wilted days and steadier growth. Share photos and a growth chart.
- **STEM skills:** Biology, simple automation, data logs, fair comparisons.

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### Trash-to-Tool

- **Problem:** E-waste piles up while the lab lacks safe power tools.
- **Prototype:** Salvage safe parts to build a bench power source in a proper box with a fuse and on/off switch.

- **Acceptance test:** Delivers steady power for small classroom projects without heating up; passes a safety checklist.
- **Verified result:** Powers student builds; fewer new parts bought. Post a “hours of use” tally.
- **STEM skills:** Repair culture, safe electronics, budgeting, recycling.

## **Bike-Powered Microgrid**

- **Problem:** Community stalls need lights and phone charging at night.
- **Prototype:** A pedal generator connected to a battery, a strip of lights, and a small charging hub. Moving parts are covered for safety.
- **Acceptance test:** Run lights and charge several phones for an hour without overheating; no shocks; sturdy mount.
- **Verified result:** Used at market night; phones charged and area lit. Share the count of phones charged and fees saved/earned.
- **STEM skills:** Energy, mechanics, safety design, real-world testing.

## **Cold-Chain Guardian**

- **Problem:** Vaccines and medicines spoil if the fridge gets too warm.
- **Prototype:** A temperature logger with a simple alarm if the fridge warms up; backup battery included.
- **Acceptance test:** Record temperatures every 10 minutes for a week; simulate a power cut; alarm must trigger; print a trend chart.
- **Verified result:** Fewer “too-warm” times; staff adjust door use and storage. Share the “out-of-range” count (goal: near zero).
- **STEM skills:** Health basics, careful data, alarms, report writing.

## **Low-Cost Spectrometer**

- **Problem:** Families need cheap first-checks on water quality before sending samples to a lab.
- **Prototype:** A simple light-splitter in a box (uses common materials) plus a phone camera to compare color changes in water samples.
- **Acceptance test:** Can tell the difference between clean water and water with safe test dyes; repeat the same reading three times with similar results.
- **Verified result:** A quick “screening” tool that suggests when to get full lab tests. Share a clear “not a lab replacement” note.
- **STEM skills:** Light and color, careful comparisons, making low-cost tools.

## **Deforestation Watch**

- **Problem:** Tree loss happens quietly and isn't reported in time.
- **Prototype:** Maps made from free satellite images, showing "then vs now," plus a handful of photos taken on the ground.
- **Acceptance test:** Mark changes across two dates; check at least 10 spots in person; accuracy noted.
- **Verified result:** A one-page brief sent to local leaders; actions assigned (e.g., inspect, enforce bylaws). Share the map at school assembly.
- **STEM skills:** Mapping, satellite images, field verification, civic reporting.

## **E-Textile Health Patch**

- **Problem:** Coaches want a safe way to watch student heart rates during training.
- **Prototype:** A soft fabric patch with a snap-on heart-rate module; data shown to the student and coach only; strong privacy rules.
- **Acceptance test:** Records steady readings for a full practice; patch is washable; safe battery; no skin irritation.
- **Verified result:** Coaches adjust training better; students learn pacing. Share an opt-in, anonymized trend graph with parents.
- **STEM skills:** Body science, soft materials, privacy and consent, safe testing.

## **Repair Day 50**

- **Problem:** Homes throw away items that could be fixed cheaply.
- **Prototype:** A one-day event with labeled repair tables (electrical, plumbing, carpentry, sewing), spares, and safety leads.
- **Acceptance test:** Fix 50+ items in one day; every item gets a sign-off card and an estimated "value saved."
- **Verified result:** Publish the "items fixed" and "money saved" totals; set the next date; enroll new volunteers.
- **STEM skills:** Diagnostics, tool use, teamwork, cost/benefit math.

## **Flood Early-Warn Kit**

- **Problem:** Sudden floods catch people by surprise.
- **Prototype:** A rainfall measure and a river-level stick with a sensor; a loud siren and clear "when to warn" rules; weekly test routine.
- **Acceptance test:** Siren triggers at the agreed level; can be heard 100 meters away; test log kept.
- **Verified result:** Community drills completed; clear roles during heavy rain; warnings recorded and reviewed each term.

- **STEM skills:** Weather and water, thresholds, safety planning, checklists.

## **Factory Vision Counter**

- **Problem:** Small factories make counting mistakes and miss obvious defects.
- **Prototype:** A camera above the line that counts items and flags simple defects; results shown on a small screen; safe mounting.
- **Acceptance test:** Counts with at least 90% accuracy on a test run; staff confirm the count; privacy notice posted.
- **Verified result:** Fewer mistakes, faster shifts; the factory keeps the counter running. Share “manual vs camera” numbers.
- **STEM skills:** Computers that “see,” measurement accuracy, workplace safety.

## **8) Teacher development & support (tiers and cadence)**

**Priority tiers:** 1) Fundi instructors, 2) Affiliates, 3) Government teachers.

Area	Tier 1: Fundi	Tier 2: Affiliates	Tier 3: Gov't Teachers
Training	Weekly micro-lessons + monthly workshop + quarterly intensive	Bi-weekly micro + bi-monthly workshop	WhatsApp nuggets + quarterly cluster ToT + annual bootcamp
Evaluation	Monthly learning walk + termly observation	Termly learning walk	Semi-annual observation via cluster coach
Access	Kits priority, 48h helpdesk, early releases	Standard kits, 72h SLA	Tool library pooled, 5-day SLA
Credential	Fast-track to L3–L4	L2→L3 on performance	L1→L2 via ToT & portfolio

**Certification ladder:** L1 Facilitator → L2 Instructor → L3 Master Trainer (runs pods) → L4 Program Lead.

**Artifacts required:** lesson videos, observation scores, student artifacts, reflections.

**Supports:** WhatsApp bot (office hours, micro-content), printable 1-pagers, SD-card packs, helpdesk KB.

## **9) Geographic decentralisation (community centres & franchises)**

- **Community Learning Pods (CLPs):** hosted in schools, faith centres, CBOs; 10–20 teachers; monthly meetups.
- **Tool libraries:** QR check-in/out; Saturday maintenance; spare parts buffer.
- **Franchise/Affiliate pods:** license modules; revenue share or per-student fee; QA audits each term; brand & safeguarding compliance.

- **Government clusters:** MoUs; CPD credit; district cluster days; pooled budgets for tool libraries.
- **Logistics loops:** pre-bagged kits → weekly courier swap → refurb bench.

## 10) Visibility, marketing & sales (evidence-first)

**Drumbeat (weekly):**

- **Metric Monday** (one graph: learning gain or uptime/savings),
- **Workshop Wednesday** (60-sec build/test video),
- **Fix Friday** (verified community repair, before/after + resident quote).

**Monthly:** School Impact Brief (2 pages) + market-day showcase.

**Termly:** District roll-up + partner forum; top artifacts reel.

**Core assets:** value calculator, proof tiles (attendance ↑, scores ↑, uptime ↑, cost ↓), consented photo grids, sponsor pack.

**CTAs:** 30-day Proof-of-Value pilots (limited slots), join a Pod (teachers), sponsor a tool library (CSR), submit a community problem (public).

## 11) Operations & QA (to scale without heavy headcount)

- **Tiny Core, Massive Edge:** 6–10 FTE core (curriculum, QA, data/ops, partnerships/helpdesk) → hundreds of instructors at the edge.
- **Ratios:** 1 QA coach : 40–60 instructors; 1 helpdesk : 250–300 instructors; 1 kit-ops : 80–100 active classes.
- **SOPs:** run-of-show, safety (RAMS), incident response, kit QC, learning walk rubric (Clarity • Safety • Making Time • Reflection).
- **Data pulses:** weekly (attendance/artifacts), termly (pre/post, equity metrics).
- **Red-flag workflow:** any safety incident → pause → coach → re-certify.

## 12) Parent engagement (prioritize the student, not money)

- **Auto-portfolios** each module (photos, skills gained, reflections) → WhatsApp link/PDF.
- **Monthly 45-min showcase** (student-led, local artisan guest).
- **Parent learning path:** micro-lessons (how to help at home), simple value calculator, bursary guidance.
- **Growth Tree view:** parent dashboard with strengths, supports, next steps.

# **Appendix: STEM Careers**

## **SCIENCE**

### **Physical Sciences**

- Physics (theoretical, applied, astro/space, nuclear, optical/photonics, acoustics)
- Chemistry (analytical, organic, inorganic, physical, biochem, polymer, materials)
- Materials Science & Nanoscience
- Astronomy & Astrophysics

### **Earth & Environmental Sciences**

- Geology, Geophysics, Geochemistry
- Meteorology & Climate Science
- Oceanography & Marine Science
- Hydrology & Water Resources
- Environmental Science & Toxicology
- Remote Sensing & GIS

### **Life & Health Sciences**

- Biology (botany, zoology, ecology, evolution)
- Microbiology, Virology, Immunology
- Genetics & Genomics, Bioinformatics
- Neuroscience & Cognitive Science
- Physiology & Pharmacology
- Conservation Biology & Wildlife Science

**Typical roles:** researcher/scientist, lab/field technician, conservation officer, environmental consultant, scientific analyst, science educator, museum/science-centre curator.

## **TECHNOLOGY & COMPUTING**

### **Core Software & Systems**

- Software Engineering (backend, frontend, full-stack, mobile)
- Cloud/DevOps/SRE, Platform & Infrastructure
- Databases & Data Engineering
- High-Performance Computing

### **Data, AI & Security**

- Data Analysis/BI, Data Science, Machine Learning, MLOps
- AI specialisations: NLP, Computer Vision, RL, GenAI

- Cybersecurity (blue team, red team, incident response, GRC)
- Cryptography & Privacy Engineering

### **Human–Computer & Digital Media**

- Human–Computer Interaction (UX Research/Design)
- Product Design/Design Engineering, Technical UX Writing
- AR/VR/XR, Game Development

### **Embedded, Edge & Web3**

- Embedded Systems, IoT/IIoT
- Robotics Software/Controls/Perception
- Blockchain/Web3/Smart Contracts
- Quantum Software (algorithms, error mitigation)

**Typical roles:** software/dev engineer, data/ML engineer, data scientist, cybersecurity analyst, UX researcher, solutions architect, game developer, product manager (tech), TPM.

## **ENGINEERING**

### **Foundational Disciplines**

- Mechanical, Electrical/Electronics, Civil/Structural, Chemical
- Industrial & Systems, Manufacturing, Mechatronics

### **Sector-Specific**

- Aerospace & Aeronautical
- Automotive & Motorsports
- Biomedical & Clinical Engineering
- Environmental & Sustainability Engineering
- Agricultural & Food Process Engineering
- Mining, Petroleum & Georesources
- Marine/Naval Architecture
- Nuclear, Power Systems & Grid
- Microelectronics & Semiconductor (VLSI, EDA)
- Photonics & Optoelectronics

### **Modern/Frontier**

- Renewable Energy & Storage (solar, wind, hydro, batteries)
- Additive Manufacturing (3D printing), Advanced Composites
- Robotics & Automation (industrial, service, surgical)

- Smart Cities/Urban Systems, Transportation Systems
- Nanotech, Lab-on-Chip, MEMS
- Space Systems (satellites, launch, mission ops)

### **Quality & Delivery**

- Reliability/Safety, Quality Engineering, Validation
- Project Engineering/Management, Construction Management

**Typical roles:** design/controls/test engineer, field/commissioning engineer, manufacturing engineer, process engineer, quality/reliability engineer, project engineer/manager.

### **MATHEMATICS & APPLIED STATISTICS**

- Pure & Applied Mathematics
- Statistics, Biostatistics, Epidemiology
- Actuarial Science & Risk
- Operations Research & Optimization
- Econometrics & Quantitative Finance
- Game Theory & Decision Science
- Mathematical Biology/Neuroscience
- Cryptography & Coding Theory

**Typical roles:** statistician, actuary, OR/optimization specialist, quant analyst, biostatistician, risk modeler, research mathematician.

### **INTERDISCIPLINARY & APPLIED “X-TECH”**

- **Health/MedTech:** health informatics, digital health, clinical trials data, medical devices
- **FinTech:** payments, risk/fraud, trading systems, DeFi
- **AgriTech & Food Systems:** precision ag, post-harvest tech, aquaculture, food safety
- **ClimateTech:** carbon measurement/markets, adaptation & resilience, climate risk
- **Water & Sanitation (WASH):** treatment, distribution, monitoring
- **Geo/SpaceTech:** Earth observation, satellite ops, GeoAI, mapping
- **EdTech:** learning platforms, AR labs, assessment analytics
- **Civic/UrbanTech:** transport, energy, housing, public safety analytics
- **Supply Chain & LogisticsTech:** routing, warehousing automation, cold-chain
- **Sports/MediaTech:** performance analytics, broadcast/streaming tech
- **Humanitarian/Development Tech:** last-mile connectivity, crisis informatics

**Typical roles:** product engineer, domain data scientist, implementation specialist, solutions/field engineer, sector consultant.

### TECH-ADJACENT & ENABLER ROLES (often great fits for STEM talent)

- Product Management (technical), Technical Program Management
- Technical Sales/Pre-Sales, Solutions Architecture
- Standards/Compliance, Regulatory Affairs, Safety/ERT
- IP/Patents (patent engineering/agent), Tech Transfer
- Science/Technical Communication, UX Writing
- Policy for Tech/AI, Data Protection/Privacy, AI Safety/Ethics
- Education & Outreach (teachers, trainers, curriculum designers)
- Entrepreneurship: founder, CTO, R&D lead, venture builder, VC/impact investing
- Skilled Trades/Technician Paths: CAD/CAM, CNC, instrumentation, electricians, solar installers, network technicians, lab technologists

### EXAMPLE CAREER PATHS BY EDUCATION LEVEL

- **Certificate/Diploma/Apprenticeship:** lab technician, solar PV installer, CNC machinist, network tech, GIS technician, field service tech.
- **Bachelor's:** software/EE/ME/CE engineer, data analyst, environmental scientist, product designer, process engineer, actuarial analyst.
- **Master's/PhD:** research scientist, ML scientist, biostatistician, semiconductor/device R&D, aerospace structures, climate modeller.
- **Certifications (stackable):** cloud (AWS/Azure/GCP), security (Security+, CISSP), data (DBT, Databricks), PM (PMP), QA (ASQ), GIS (Esri).

### HOW TO CHOOSE (quick fit guide)

- **Love code & abstract problem-solving?** Software, data/ML, crypto, security, OR.
- **Love building physical things?** Mech/Mechatronics, manufacturing, robotics, aerospace.
- **Love nature & the planet?** Environmental/climate, conservation, hydrology, WASH.
- **Love health/people impact?** Biomedical, biostatistics/epidemiology, medtech/health informatics.
- **Love maps & space?** GIS/remote sensing, EO/space systems, geomatics.
- **Love business & users?** Product management, solutions architecture, tech consulting.