

Biomedical Innovation (PLTW) YAG

PEIMS N1302095 | One Elective Credit | Full Year | 36 Weeks | Grades 11–12 | Project Lead The Way Biomedical Science Capstone

Course Information: Biomedical Innovation (BI) is the capstone course in the PLTW Biomedical Science sequence. The Texas-approved innovative-course framework emphasizes open-ended biomedical problems in clinical medicine, physiology, biomedical engineering, public health, molecular biology, environmental health, and research. Students apply experimental design, statistics, technical writing, project management, ethics, collaboration, and professional communication while developing and defending solutions. The course culminates in an independent biomedical research/design project and professional portfolio. Where available, students should interact with biomedical professionals/mentors. ACCESS supports career, postsecondary, credential, and transition planning.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated TEKS	Extension Activities
1	1–2	Unit 1 – BI Capstone Launch: Professional Practice, Research & Project Management	- Establish professional expectations, teamwork, ethics, laboratory safety and technical documentation - Review experimental design, credible research, statistics & evidence-based decision making - Use project-management tools to define tasks, timelines, responsibilities and deliverables - Analyze biomedical careers, education requirements and societal impact - Launch individual professional/research portfolio and identify possible mentor connections	- BI1(A–F) - BI2(A–F) - BI3(A–D) - BI4(A–D) - BI5(A–I)	- ACCESS: biomedical/postsecondary pathways - Professional mentor outreach - Portfolio launch
1	3–5	Unit 2 – Emergency Medicine: Design a Medical Intervention	- Analyze a complex emergency/clinical problem and identify patient/medical needs - Research relevant anatomy, physiology, diagnostics and current interventions - Define design criteria/constraints and generate multiple solution pathways - Prototype/model an intervention and collect performance data - Evaluate risk, ethics, limitations and tradeoffs; communicate recommendations	- BI2(A–F) - BI3(A–D) - BI4(A–D) - BI5(A–I) - BI6(A–H) - BI7(A–G)	- Clinical professional connection - Prototype/design review - Emergency medicine case
1	6–8	Unit 3 – Human Physiology Challenge: Monitoring, Performance & Data	- Investigate a physiological problem using sensors/data-acquisition tools where available - Design a controlled experiment and collect quantitative/qualitative data - Apply descriptive statistics and appropriate mathematical analysis - Interpret physiological trends, error and limitations - Develop and defend an evidence-based recommendation or intervention	- BI5(A–I) - BI6(A–H) - BI7(A–G) - BI8(A–F)	- Physiology investigation - Data visualization/statistics - Sports medicine/physiology careers
1	9	Unit 4 – Clinical Research & Evidence-Based Medicine	- Evaluate biomedical literature and distinguish credible evidence from unsupported claims - Analyze experimental/clinical study design, variables, controls, bias and limitations - Interpret statistical evidence and communicate significance appropriately - Evaluate ethical issues involving human research and informed consent - Prepare a concise evidence review for a defined biomedical question	- BI2(A–F) - BI3(A–D) - BI4(A–D) - BI5(A–I) - BI6(A–H)	- Literature review - Research ethics case - Clinical research career connection
2	10–12	Unit 5 – Biomedical Engineering: Design of a Medical Device	- Identify a health-care problem suitable for an engineered solution - Research existing devices and intellectual-property/design considerations - Develop criteria/constraints and compare alternative designs - Create/test a prototype or model; collect and analyze performance data - Iterate based on evidence and prepare technical documentation	- BI3(A–D) - BI4(A–D) - BI5(A–I) - BI6(A–H) - BI7(A–G) - BI9(A–F)	- Biomedical engineering design challenge - Engineer/industry mentor - Technical design review
2	13–15	Unit 6 – Public Health & Epidemiology: Community Health Intervention	- Investigate a population-health problem using epidemiological/public data - Analyze risk factors, incidence/prevalence patterns and disparities - Evaluate prevention/intervention strategies and resource constraints - Design an evidence-based public-health intervention and implementation plan - Create professional communication for stakeholders and target populations	- BI2(A–F) - BI3(A–D) - BI4(A–D) - BI5(A–I) - BI6(A–H) - BI10(A–F)	- ACCESS: public health careers - Community-health proposal - Stakeholder presentation
2	16–17	Unit 7 – Environmental Health & Biomedical Problem Solving	- Investigate an environmental exposure or health hazard - Develop a sampling/testing or model-based investigation - Analyze dose/risk relationships and environmental-health data - Evaluate ethical, social, economic and regulatory considerations - Propose and defend a mitigation/intervention strategy	- BI4(A–D) - BI5(A–I) - BI6(A–H) - BI7(A–G) - BI10(A–F)	- Environmental-health investigation - Risk communication - Public/environmental health careers
2	18	Semester 1 Exam – Biomedical Innovation	- Cumulative assessment of research design, statistics, clinical problem solving, engineering, public health and environmental health - Performance/data-analysis component - Semester portfolio and project-management review	Cumulative BI1–10 as introduced	Targeted review/remediation

3	19-21	Unit 8 – Molecular Biology & Biotechnology Innovation	• Define a molecular/biotechnology problem and research current approaches • Apply appropriate molecular-biology concepts/techniques using PLTW/district-approved resources • Analyze experimental or bioinformatics data • Evaluate biotechnology risks, benefits, ethics and societal implications • Develop an evidence-based biotechnology solution/proposal	• BI4(A–D) • BI5(A–I) • BI6(A–H) • BI7(A–G) • BI11(A–F)	• Biotechnology investigation • Bioinformatics analysis • Biotech career connection
3	22-23	Unit 9 – Forensic Science & Applied Biomedical Evidence	• Analyze a complex forensic/biomedical evidence scenario • Select appropriate laboratory/analytical approaches • Interpret multiple evidence sources and quantify uncertainty/limitations • Develop an evidence-based conclusion and defend it professionally • Evaluate ethical/legal responsibilities associated with biomedical evidence	• BI2(A–F) • BI3(A–D) • BI4(A–D) • BI5(A–I) • BI6(A–H) • BI7(A–G)	• Forensic case conference • Evidence analysis • Forensic science career connection
3	24-25	Unit 10 – Independent Project Proposal: Problem, Research & Mentor	• Identify a significant biomedical question/problem appropriate for an independent project • Conduct focused background research and develop an annotated evidence base • Define research/design question, criteria, constraints, variables and measurable outcomes • Develop methods, materials, safety/ethics plan, timeline and project-management plan • Present proposal for review and incorporate feedback; establish mentor/advisor contact where available	• BI1(A–F) • BI2(A–F) • BI3(A–D) • BI4(A–D) • BI5(A–I) • BI6(A–H) • BI12(A–H)	• Mentor/project proposal review • ACCESS: research/postsecondary connections • Proposal defense
3	26-27	Unit 11 – Independent Project Phase I: Investigation/Design & Data Collection	• Implement approved research/design methodology • Maintain detailed technical/research documentation • Collect reliable qualitative/quantitative evidence • Use safe laboratory/design practices and manage resources/time • Analyze preliminary results and revise methods/design when evidence warrants	• BI5(A–I) • BI6(A–H) • BI7(A–G) • BI12(A–H)	• Mentor consultation • Research/design notebook review • Progress presentation
4	28-31	Unit 12 – Independent Project Phase II: Analysis, Iteration & Validation	• Continue experimentation/prototyping and complete data collection • Apply statistical/mathematical analysis and visualize findings • Evaluate error, limitations, reliability and validity • Iterate design/methods and validate the proposed solution/conclusion • Evaluate ethical, social and practical implications of findings	• BI3(A–D) • BI4(A–D) • BI5(A–I) • BI6(A–H) • BI7(A–G) • BI12(A–H)	• Mentor feedback • Data-analysis conference • Prototype/research validation
4	32-33	Unit 13 – Technical Report, Scientific Communication & Portfolio	• Write a professional research/design report with evidence, methods, results, analysis and conclusions • Create clear tables, figures, models and visualizations • Cite sources and communicate limitations accurately • Prepare a professional oral/poster presentation for a defined audience • Finalize résumé, portfolio and biomedical career/postsecondary plan	• BI1(A–F) • BI2(A–F) • BI3(A–D) • BI4(A–D) • BI12(A–H)	• Technical paper review • Poster/oral presentation practice • ACCESS: pathway transition
4	34-35	Unit 14 – Biomedical Innovation Capstone Symposium & Defense	• Present independent research/design project to peers, educators and invited professionals • Defend methods, evidence, conclusions and design decisions • Respond professionally to questions and critique • Evaluate project outcomes, limitations and next research/design steps • Reflect on professional growth, collaboration, ethics and biomedical career readiness	• BI1-12	• Biomedical symposium • Mentor/professional feedback • Portfolio defense
4	36	Semester 2 Exam & Biomedical Innovation Showcase	• Cumulative assessment across all BI knowledge and skills • Research/design/data-analysis performance component • Final independent-project portfolio and showcase	• Cumulative BI1-12	• Final showcase • Targeted remediation

Biomedical Innovation EKS Coverage Checklist

Coverage verification: The full Texas Biomedical Innovation innovative-course framework is intentionally addressed across the PLTW-aligned sequence, with the independent capstone providing cumulative application of professional, research, design, communication, and biomedical problem-solving expectations.

Strand	SEs	Knowledge & Skills Focus	YAG Placement	Coverage
BI1	A-F	Biomedical careers, professional growth, workplace expectations and societal impact	Units 1, 10, 13-14; connections throughout	100%
BI2	A-F	Professional communication, technical writing, audience awareness, documentation and presentation	Units 1-14	100%
BI3	A-D	Collaboration, teamwork, feedback, project scheduling and professional interaction	Units 1-14	100%
BI4	A-D	Ethics, professional responsibility, legal/social implications and responsible research/design	Units 1-14	100%
BI5	A-I	Research and experimental design, variables/controls, data collection, analysis, error, evidence and conclusions	Units 1-12; capstone	100%
BI6	A-H	Open-ended biomedical problem solving, research, evaluation, persistence, risk/tradeoffs and iteration	Units 2-14	100%
BI7	A-G	Biomedical laboratory/technology tools, measurement, models, sensors and appropriate technical methods	Units 2-12	100%
BI8	A-F	Human physiology/clinical medicine investigation and analysis	Units 2-4; capstone reinforcement	100%
BI9	A-F	Biomedical engineering design, criteria/constraints, prototyping, testing and optimization	Unit 5; capstone projects as applicable	100%
BI10	A-F	Public/environmental health, epidemiology, risk and intervention planning	Units 6-7; capstone as applicable	100%
BI11	A-F	Molecular biology/biotechnology investigation, analysis and innovation	Unit 8; capstone as applicable	100%
BI12	A-H	Independent biomedical project: proposal, research/design, mentor input, execution, analysis, report, presentation and reflection	Units 10-14	100%

Implementation Notes

- Biomedical Innovation should function as a capstone rather than a survey course. Students are expected to draw on knowledge and laboratory/problem-solving skills developed throughout the PLTW Biomedical Science sequence.
- The TEA-approved framework emphasizes open-ended problems in clinical medicine, physiology, biomedical engineering, public health, molecular biology, environmental health, and research. The sequence intentionally develops these areas before the independent project.
- Teachers with access to PLTW should use the current myPLTW activity/project/problem sequence and instructional resources while ensuring all Texas EKS remain addressed. This YAG provides annual pacing and standards coverage rather than replacing proprietary PLTW teacher materials.
- The independent project begins in Grading Period 3 so students have sufficient time for proposal development, mentor/advisor feedback, investigation/design, analysis, iteration, technical writing, and presentation. Projects must comply with district safety, research, privacy, human/animal subject, and laboratory policies.
- Where possible, connect students with biomedical professionals, researchers, engineers, clinicians, public-health practitioners, or other qualified mentors. ACCESS should support mentor/career research, postsecondary planning, résumé development, and transition into biomedical programs.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary.