

Medical Interventions (PLTW) YAG

PEIMS N1302094 | One Elective Credit | Full Year | 36 Weeks | Grades 9–12 | Project Lead The Way Biomedical Science

Course Information: MI is a Texas state-approved innovative course focused on interventions used to prevent, diagnose, and treat disease. Recommended prerequisite: at least one credit in a Level 2 or higher Biomedical Science course. The YAG follows the PLTW Medical Interventions progression: How to Fight Infection; How to Screen What Is in Your Genes; How to Conquer Cancer; and How to Prevail When Organs Fail. Students investigate immunology, microbiology, genetics, pharmacology, diagnostic testing, cancer, medical devices, surgery, transplantation, biotechnology, clinical trials, and emerging interventions through patient-centered scenarios. Experimental design, critical thinking, biomedical tools, ethics, collaboration, communication, and career awareness spiral throughout. ACCESS supports career and postsecondary planning.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated EKS	Extension Activities
1	1–2	Unit 1 – MI Launch: Medical Interventions, Professionalism & Outbreak Investigation	- Classify interventions used in prevention, diagnosis and treatment - Establish laboratory notebook, protocol, teamwork, communication, privacy and ethics expectations - Investigate connections among fictional patients in an infectious-disease outbreak - Determine appropriate evidence/tests and outline treatment/containment steps - Explore biomedical careers and global/societal impacts of interventions	- MI1(A–F) - MI2(A–D) - MI3(A–D) - MI4(A–D) - MI5(D–F, J–M) - MI6(A–E, G) - MI8(A, F–G)	- ACCESS: biomedical careers - Outbreak case map - Career portfolio launch
1	3–4	Unit 2 – Identifying Infection: DNA, PCR, Bioinformatics & ELISA	- Use bioinformatics concepts to identify a pathogen from genetic evidence - Explain PCR applications/reagents and analyze amplified DNA information - Model/perform ELISA concepts and interpret quantitative antigen results - Apply serial dilution/concentration calculations and display experimental data - Communicate evidence-based identification of the infectious agent	- MI5(A–M) - MI6(A–H) - MI7(E) - MI8(A–B, F–G) - MI10(A) - MI13(A–D)	- PCR/bioinformatics investigation - ELISA simulation/lab - Diagnostic laboratory careers
1	5–6	Unit 3 – Antibiotic Treatment & Antibiotic Resistance	- Relate bacterial structures to antibiotic targets - Compare four major antibiotic classes and biological pathways - Investigate bacterial gene transfer and antibiotic resistance - Analyze how antibiotic misuse affects bacterial populations - Apply aseptic technique/culturing concepts & experimental design to treatment evidence	- MI5(A–M) - MI6(A–H) - MI7(B, C, J) - MI9(A–D) - MI8(F–G)	- Antibiotic susceptibility investigation - Resistance case analysis - Microbiology/ pharmacy careers
1	7–8	Unit 4 – Hearing Loss: Diagnostics, Cochlear Implants & Bioethics	- Relate ear anatomy/function to conductive and sensorineural hearing loss - Select appropriate hearing tests and interpret audiograms - Compare hearing-loss interventions including cochlear implant technology - Analyze bioethical considerations surrounding cochlear implants - Use professional communication to present an evidence-based recommendation	- MI2(D, H) - MI3(A–D) - MI6(B, G) - MI10(B–C) - MI11(A)	- Audiogram analysis - Cochlear implant ethics discussion - Audiology career connection
1	9	Unit 5 – Vaccination, Immunology & Disease Prevention	- Explain how vaccination protects individuals/populations - Analyze historical/current disease trends and vaccination impact - Describe laboratory approaches used in vaccine manufacturing - Connect recombinant DNA concepts to vaccine production - Evaluate disease-prevention strategies using epidemiologic evidence	- MI7(D) - MI8(C, G) - MI12(H) - MI13(C, F) - MI1(E–F)	- Vaccine/public-health analysis - Epidemiology connection - Immunology careers
2	10–12	Unit 6 – Genetic Testing & Screening	- Investigate genetic screening/testing available to individuals and prospective parents - Use DNA extraction/PCR/restriction-analysis concepts to identify SNPs - Use genetic databases and interpret genetic information - Analyze inheritance/family information and genetic risk - Communicate genetic-testing results and ethical considerations for a fictional family	- MI2(A–D, G) - MI3(A–D) - MI7(A, E) - MI11(D) - MI13(A–D) - MI14(A–C)	- Genetic counseling simulation - SNP/restriction analysis - ACCESS: genetics careers
2	13–14	Unit 7 – Gene Therapy, Gene Editing & Personalized Medicine	- Explain molecular tools used to cut/paste DNA and select restriction enzymes - Evaluate promise, limitations and ethics of gene editing - Analyze how SNP profiles can inform medication response - Compare current/future genetic interventions - Defend an evidence-based position governing future gene-editing research	- MI2(D, G) - MI6(A–H) - MI12(B) - MI13(A–D) - MI14(A–C)	- Gene-editing ethics forum - Pharmacogenomics case - Biotechnology career research
2	15–17	Unit 8 – Reproductive Technology, Maternal/Child Health & Genetic Futures	- Explain reproductive technologies and associated medical interventions - Analyze genetic screening choices and potential outcomes in a fictional family - Evaluate ethical/social implications and multiple perspectives - Apply research, communication, collaboration and decision-making skills - Synthesize Semester 1 infection/genetics interventions in a family medical profile	- MI2(A–D, G) - MI3(A–D) - MI4(A–D) - MI6(A–H) - MI12(A–B) - MI14(A–C)	- Reproductive technology case - Family medical profile - Genetic counselor/reproductive medicine careers

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated EKS	Extension Activities
2	18	Semester 1 Exam – Medical Interventions	- Cumulative assessment: infection, diagnostics, antibiotics, hearing loss, vaccination, genetics and reproductive interventions - Laboratory/data-analysis component - Semester portfolio review	Cumulative MI1–14 as introduced	Targeted review/remediation
3	19–21	Unit 9 – Detecting Cancer: Cell Cycle, Imaging, Pathology & Gene Expression	- Analyze differences between normal and cancer cells and connect regulatory-gene mutations to cancer - Compare X-ray, bone scan, CT and MRI applications - Analyze cancerous tissue/cell evidence using microscopy - Explain DNA microarrays and gene-expression comparisons - Use microarray/family evidence to evaluate cancer risk	- MI7(C,H–J) - MI10(D–E) - MI11(B–D) - MI8(F) - MI5(A–M)	- Cancer pathology/microscopy - Diagnostic imaging career study - Microarray data analysis
3	22–23	Unit 10 – Cancer Risk, Screening & Prevention	- Analyze behavioral, biological, environmental and genetic cancer risk factors - Design/perform a UV protection investigation using appropriate PLTW/district resources - Apply marker analysis to a simulated hereditary cancer-risk case - Research cancer-associated viruses and routine screening recommendations - Develop an evidence-based cancer-prevention communication product	- MI5(A–M) - MI6(A–H) - MI11(C–D) - MI8(G) - MI14(A–C)	- UV/sunscreen investigation - BRCA-style marker analysis - Cancer prevention campaign
3	24–25	Unit 11 – Treating Cancer: Pharmacology, Rehabilitation, Prosthetics & Biofeedback	- Compare benefits/side effects of cancer treatment options - Explain myoelectric prosthetic technology and apply design thinking to restore function - Differentiate physical and occupational therapy - Use probes/sensors/software to investigate biofeedback/physiological response - Develop an integrated rehabilitation plan for a fictional patient	- MI7(F) - MI12(C–E,G) - MI6(A–H) - MI3(A–D) - MI4(A–D)	- Prosthetic design challenge - Biofeedback investigation - PT/OT/prosthetics careers
3	26–27	Unit 12 – Building a Better Cancer Treatment: Clinical Trials & Innovation	- Evaluate personalized/emerging cancer interventions, including nanotechnology/immunotherapy concepts - Explain ethical regulation of clinical trials - Explain why randomized, controlled, double-blind designs are highly valued - Design a fictional cancer-treatment clinical trial with safety/efficacy measures - Present and peer-review the proposed intervention and study design	- MI2(I) - MI5(A–M) - MI6(A–H) - MI8(E) - MI12(C) - MI3(A–D) - MI4(A–D)	- Clinical trial design - Cancer innovation presentation - Pharmaceutical/ research careers
4	28–30	Unit 13 – Manufacturing Human Proteins: Recombinant DNA & Biomanufacturing	- Connect diabetes treatment to production of human proteins such as insulin - Use restriction enzyme/ligase concepts to design recombinant DNA - Perform/interpret bacterial transformation with district/PLTW-approved materials - Use column chromatography to isolate protein and vertical electrophoresis to verify protein fractions - Analyze experimental error and communicate biomanufacturing results	- MI5(A–M) - MI6(A–H) - MI7(A–B) - MI13(C–H)	- Transformation/ protein purification lab - Protein electrophoresis - Biomanufacturing careers
4	31–32	Unit 14 – Organ Failure: Diabetes, ESRD & Dialysis	- Investigate a fictional patient's symptoms and medical evidence to identify ESRD - Connect diabetes, renal damage and homeostatic disruption - Compare hemodialysis, peritoneal dialysis and kidney transplantation - Analyze benefits, risks, lifestyle impacts and treatment tradeoffs - Recommend an evidence-based treatment path for the fictional patient	- MI8(F) - MI11(E) - MI12(F) - MI6(A–H) - MI3(A–D)	- Renal failure case conference - Dialysis comparison - Nephrology careers
4	33–34	Unit 15 – Transplantation, Surgery & Bioethics	- Apply blood typing/HLA evidence to identify compatible donors - Use federal policy concepts to analyze organ allocation - Practice PLTW/district-approved simulated laparoscopic/general surgery skills - Explore transplant-team roles and rejection/immunologic considerations - Debate ethical issues in organ donation, xenotransplantation and tissue engineering	- MI2(D–F) - MI7(G) - MI8(D) - MI6(E,G) - MI1(A–F)	- Transplant allocation case - Surgical skills simulation - Transplant-team career study
4	35	Unit 16 – Building a Better Body & Medical Interventions Capstone	- Evaluate replacement organs/tissues, medical devices and emerging body-enhancement technologies - Analyze pros/cons and ethical implications of future interventions - Create a resilience/health profile synthesizing prevention, diagnosis and treatment across the course - Present an integrated intervention proposal to a defined audience - Finalize biomedical career/postsecondary portfolio	- MI1(A–F) - MI2(A–I) - MI3(A–D) - MI4(A–D) - MI6(A–H) - MI12(D–F) - MI1–14	- Bionic human/future intervention design - ACCESS: pathway planning - Capstone presentation
4	36	Semester 2 Exam & Medical Interventions Showcase	- Cumulative assessment across all Medical Interventions EKS - Laboratory/data/medical-evidence analysis component - Final portfolio and PLTW-aligned showcase	Cumulative MI1–14	- Targeted remediation - Biomedical showcase

Medical Interventions EKS Coverage Checklist

Coverage verification: All 14 Texas innovative-course knowledge and skills strands and all 94 student expectations are intentionally addressed in the 36-week PLTW-aligned sequence.

Strand	SEs	Knowledge & Skills Focus	YAG Placement	Coverage
MI1	A-F	Career awareness, education/licensure, lifelong learning, professional standards, societal/global impact	Units 1, 15-16; career connections throughout	100%
MI2	A-I	Professionalism/ethics: integrity, privacy, teamwork, organ allocation, xenotransplantation/tissue engineering, gene editing, cochlear implants, clinical trials	Units 1, 4, 6-8, 12, 15-16	100%
MI3	A-D	Audience-specific professional communication, citations and written conventions	Units 1-16	100%
MI4	A-D	Respect, team contribution, conflict resolution and peer review	Units 1-16	100%
MI5	A-M	Experimental design: protocol, variables, controls, notebook, research, equipment, error/redesign, data/calculations/conclusions	Units 1-3, 9-10, 12-13; spiraled throughout	100%
MI6	A-H	Critical/analytical thinking, credible information, persistence, interdisciplinary solutions, risk, pros/cons, productive failure	Units 1-16	100%
MI7	A-J	DNA/protein electrophoresis, aseptic technique, microscopy, vaccine manufacturing, PCR, physiological sensors, surgical skills, microarrays	Units 2-5, 9, 11, 13, 15	100%
MI8	A-G	Outbreak evidence, antigen assay, vaccine impact, donor matching, clinical trials, fictional diagnosis, epidemiology	Units 1-5, 12, 14-15	100%
MI9	A-D	Bacterial structures, antibiotic classes, gene transfer/resistance, antibiotic misuse	Unit 3	100%
MI10	A-E	ELISA, hearing tests/audiograms, normal vs cancer cells, diagnostic imaging	Units 2, 4, 9	100%
MI11	A-E	Hearing-loss physiology, cancer mutations/risk, genetic cancer risk, ESRD symptoms	Units 4, 9-10, 14	100%
MI12	A-H	Reproductive technology, gene editing, cancer treatment, prosthetics, PT/OT, ESRD treatments, biofeedback, vaccination	Units 5, 7-8, 11, 14, 16	100%
MI13	A-H	Bioinformatics, restriction enzymes/ligase, recombinant DNA, vaccine/protein production, transformation, chromatography/protein electrophoresis	Units 2, 5-7, 13	100%
MI14	A-C	SNP laboratory identification, pharmacogenomics, genetic testing/disease-trait correlations	Units 6-7, 10	100%

Implementation Notes

- The sequence preserves the four-unit PLTW Medical Interventions progression: How to Fight Infection; How to Screen What Is in Your Genes; How to Conquer Cancer; and How to Prevail When Organs Fail.
- The TEA-approved activities specifically include infectious-disease outbreak investigation, hearing-loss diagnosis/management, vaccination/public-health analysis, genetic testing and reproductive technology, cancer diagnostics/risk/screening, cancer-treatment clinical trial design, human-protein production/purification, organ-failure diagnosis, transplantation, and simulated surgical techniques.
- Teachers with access to PLTW should use the current myPLTW activity/project/problem sequence and instructional resources while ensuring every Texas EKS remains addressed. This YAG provides annual pacing and standards coverage rather than replacing proprietary PLTW teacher materials.
- Laboratory and simulated clinical procedures must follow district safety requirements, teacher qualifications, approved materials, and PLTW protocols. Patient scenarios should remain fictional/de-identified.
- ACCESS should support career exploration, education/licensure research, postsecondary planning, and connections to microbiology, genetics, audiology, oncology, pharmacology, rehabilitation, biomanufacturing, nephrology, surgery, transplantation, and biomedical engineering.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary.