

**Florida Department of Education
Student Performance Standards**

Course Title: Medical Interventions
Course Number: 8708130
Course Credit: 1

Course Description:

Students investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the lives of a fictitious family. The course is a “How-To” manual for maintaining overall health and homeostasis in the body as students explore: how to prevent and fight infection; how to screen and evaluate the code in human DNA; how to prevent, diagnose and treat cancer; and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

36.0	Investigate the variety of interventions involved in the prevention, diagnosis and treatment of infectious disease. – The student will be able to:
36.01	Research various medical interventions and explain how these interventions help prevent, diagnose, and treat disease.
36.02	Define bioinformatics and explore how it is used in the collection, classification, storage, and analysis of biochemical and biological information.
36.03	Explain how bacteria can be identified using DNA sequencing.
36.04	Investigate the roles of diagnostic tests for infectious diseases.
36.05	Graphically organize connections between individuals in a fictitious disease outbreak.
36.06	Determine the concentration of infectious bacteria in simulated body fluids and identify infected patients using antibody-based diagnostic tests, such as ELISA assay.
37.0	Explore the factors that contribute to the effectiveness of antibiotics against infectious diseases. – The student will be able to:
37.01	Analyze and describe the structure of a bacterial cell.
37.02	Investigate how antibiotics disrupt the physiological pathways that bacteria need to survive.
37.03	Explain how bacteria use adaptations to gain resistance to antibiotics.

37.04	Demonstrate one of the pathways through which bacterial cells transfer genes.
37.05	Use a model to simulate the effects of antibiotics on the population of bacteria during an infection.
38.0	Investigate the pathology of hearing loss as a detrimental effect of infectious disease. – The student will be able to:
38.01	Distinguish the properties of sound waves; including frequency and amplitude.
38.02	Explain the anatomy of the ear and create a model of the ear demonstrating how its structure relates to its function.
38.03	Identify diagnostic tests that assess and evaluate hearing loss.
38.03.01	Perform diagnostic tests to assess and evaluate hearing loss.
38.04	Research interventions and services available to aide those with hearing loss.
38.05	Investigate and debate the bioethical concerns related to the use of cochlear implant technology.
39.0	Explore vaccination as a mode of infectious disease prevention. – The student will be able to:
39.01	Explain how vaccines act as medical interventions to defend the body against infectious invaders.
39.02	Explore laboratory methods in which vaccines are produced.
39.03	Describe the structure and function of plasmids and explain their significance in genetic engineering.
39.04	Investigate the importance of epidemiologists and their impact on public health.
39.05	Describe how vaccines interact with the human immune system.
39.06	Interpret data from a disease outbreak to determine the course of the infection.
39.07	Explore general perspectives on the use of vaccinations.
40.0	Investigate the available types of genetic testing/screening and their ethical implications. – The student will be able to:
40.01	Describe genetic testing and how it is used to determine if someone has a genetic disorder.
40.02	Explain how genetic counseling impacts a patient's health outcome.
40.03	Amplify a segment of DNA in the laboratory using the Polymerase Chain Reaction (PCR) procedure.
40.04	Use laboratory techniques such as DNA extraction, PCR, and restriction analysis to identify single base pair differences in DNA.
40.05	Utilize laboratory results to analyze the relationship between genotype and phenotype.
40.06	Analyze prenatal genetic screening results.
40.07	Describe the basics of proper prenatal care as well as specified medical interventions used to monitor a pregnancy.
40.08	Investigate how a person's ability to taste the chemical PCT, their phenotype, relates to their results from laboratory genetic testing their genotype.
41.0	Examine the current reproductive and genetic technology and discuss the future of medical interventions. – The student will be able to:
41.01	Explore how gene therapy can be used to treat genetic disorders.
41.02	Discuss and debate the safety and effectiveness of gene therapy.
41.03	Explore the various medical interventions parents have available to choose the sex of their future child, including sperm sorting and embryo selection by pre-implantation genetic diagnosis (PDG).
41.04	Discuss the possibility of reproductive cloning and the ethical concerns.
41.05	Evaluate and debate the potential impact of reproductive technology from moral, ethical and scientific perspectives.
42.0	Explore the diagnostic techniques and technology being used to better diagnose and understand cancer. – The student will be able to:
42.01	Investigate the physiology of cancer and discuss how cancerous cells differ from healthy cells.
42.02	Describe the different uses of x-rays, CT scans, and MRI scans.

42.03	Investigate what DNA microarrays measure and how this information is used to determine differences in gene expression between differing tissues samples.
42.04	Using statistical analysis, determine the similarities between gene expression patterns of multiple patients.
43.0	Explore the potential risk factors associated with cancer and the various situations which cause changes to DNA. – The student will be able to:
43.01	Describe the potential risk factors for different types of cancer as well as the ways to reduce the risk.
43.02	Explore some of the various cancer screening techniques that can be used to predict risk for developing cancer.
43.03	Investigate the risk factors of viruses and explain the role viruses' play as a risk factor for certain cancers.
44.0	Investigate the treatments and therapies available to treat the physical, mental, and emotional effects of cancer. – The student will be able to:
44.01	Identify the major differences between chemotherapy and radiation therapy.
44.02	Describe how chemotherapy drugs interact with and destroy cancer cells.
44.03	Explore biofeedback therapy and how it is utilized to treat cancer and its symptoms.
44.04	Synthesize designs that advances and benefit prosthetic technology for those who have lost their limbs.
44.05	Explain how physical and occupational therapists help patients with disabilities and those recovering from surgery/injury.
45.0	Explore future medical interventions for cancer. – The student will be able to:
45.01	Discuss reasons why therapy drugs do not produce the same effect in all individuals.
45.02	Explain how SNP profiles factor into the decision to prescribe a specific medication.
45.03	Explore the field of pharmacogenetics and its contributions to the improvement of individualized patient treatment.
45.04	Research and present how cases of misuse and abuse have led to strict regulations of human participation in clinical trials.
45.05	Describe the importance of nanomedicine, particularly for cancer research and the development of medical interventions.
46.0	Explore the medical implications of proteins produced and purified in a laboratory setting. – The student will be able to:
46.01	Discuss the evolution of diagnosis and treatment of diabetes from the 1800s through today.
46.02	Explain the various aspects of the bacterial transformation process.
46.03	Define chromatography and how it is used to separate items in a mixture.
46.04	Interpret electrophoresis results to determine the molecular weight of specific proteins in a mixture.
46.05	Explore and discuss specific biomedical careers in the manufacturing of therapeutic proteins.
47.0	Investigate the epidemiology and therapeutic interventions of kidney failure. – The student will be able to:
47.01	Describe End Stage Renal Disease (ESRD) and how it is diagnosed.
47.02	Describe the physiological effects on the body when kidneys do not function properly and its impact on the production of red blood cells.
47.03	Explore the medical options for treatment for persons with ESRD including hemodialysis, peritoneal dialysis and kidney transplant.
48.0	Explore the process, policies and procedures involved in organ transplantation. – The student will be able to:
48.01	Discuss factors to consider when deciding who should receive an organ transplant.
48.02	Describe the importance of blood and tissue matching for a successful organ transplant.
48.03	Describe the general steps involved in a live donor laparoscopic nephrectomy.
48.04	Compare the major similarities and differences between a heart and a kidney transplant.
48.05	Explain the most common ways members of the surgical transplant team work together to ensure a successful transplant.

49.0	Investigate how advances in medical knowledge and technology can aid in building a better human body for the future. – The student will be able to:
49.01	Explore how a variety of tissues and organs can be transplanted from one organism to another.
49.02	Describe the general process of how xenotransplantation and tissue engineering works, as well as potential risks, benefits, challenges and ethical/moral concerns.
49.03	Reflect on how current methods of medical intervention can be improved.
49.04	Describe how advancing medical knowledge and technology will enable scientists to delay the effects of aging and disease by enhancing the functions of the human body.
49.05	Design a potential “super” human using knowledge of the human body and available medical interventions.