# Biomedical Innovation Course No. 14255 Credit: 1.0

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Biomedical (14.0501)

Course Description: **Application Level:** In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century by working through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from industry. Throughout the course, students are expected to present their work to an adult representative from the local business and healthcare community.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Demonstrate research & problem-solving skills

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | List the health challenges of the 21st Century. |  |
| 1.2 | Describe the design of an effective oral presentation. |  |
| 1.3 | Demonstrate how to locate a research journal articles using the Internet. |  |
| 1.4 | Explain emergency room procedures used to triage and rank patients. |  |
| 1.5 | Analyze medical website content and assess the overall credibility of the information. |  |
| 1.6 | Propose solutions to the health-related problems of the 21st century. |  |
| 1.7 | Demonstrate an understanding of the different research study designs by designing a study. |  |
| 1.8 | Critique science data presented in popular media and compare with science data presented in scientific journals. |  |
| 1.9 | Apply knowledge of statistical analysis methods to analyze the results of experimental studies analysis methods to analyze the results of experimental studies. |  |
| 1.10 | Design and conduct an experimental study. |  |
| 1.11 | Reflect on various biomedical career fields involved in the topics covered in this class. |  |
| 1.12 | Use the design process to create a model, prototype, or schematic for a chosen solution. |  |
| 1.13 | Identify a biomedical problem related to a medical condition you or someone you know has experienced and design a new or better product. |  |

## Benchmark 2: Demonstrate understanding of global biomedical concerns related to water quality

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | List multiple sources of water contamination. |  |
| 2.2 | Explain why water quality is a global issue. |  |
| 2.3 | Interpret the results of various chemical assays and identify specific contaminants. |  |
| 2.4 | Interpret maps indicating land use to determine possible sources of water contamination. |  |
| 2.5 | Analyze and evaluate a local water source. |  |
| 2.6 | Develop an action plan to prevent or treat water contamination. |  |
| 2.7 | Describe how to set up case control and cohort studies. |  |
| 2.8 | Interpret evidence such as laboratory data, imaging results, disease maps, and molecular data to determine source of a mystery illness. |  |
| 2.9 | Apply what has been learned about epidemiology, human body systems, and laboratory testing to deduce the source of a mystery infection. |  |
| 2.10 | Investigate the medical conditions of a foreign country and discuss how culture, geographical location, and access to care affect health. |  |

## Benchmark 3: Understand sickle cell anemia and the human body

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Describe the differences in the appearance of normal and sickle red blood cells. |  |
| 3.2 | List the symptoms and complications of sickle cell disease. |  |
| 3.3 | Explain how sickle cell disease is transmitted genetically. |  |
| 3.4 | Define and describe the structure of a chromosome. |  |
| 3.5 | Outline the DNA code. |  |
| 3.6 | Explain how karyotypes are used to diagnose medical conditions. |  |

## Benchmark 4: Understand signs and implications of cholesterol disease

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Explain the differences between saturated and non-saturated fats. |  |
| 4.2 | Define stearic acid, oleic acid, linoleic acid. |  |
| 4.3 | Describe how the polymerase chain action amplifies DNA. |  |

## Benchmark 5: Understand how infectious disease is spread

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Explain what bacteria are. |  |
| 5.2 | Describe bacterial reproduction. |  |
| 5.3 | Summarize antibiotic resistance, and explain why it is a major health problem today. |  |
| 5.4 | Describe the general structure of a virus. |  |
| 5.5 | Explain the structural and functional differences between bacterial cells and virus particles. |  |

## Benchmark 6: Understand categories of medical interventions

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Define and explain types of medical interventions. |  |
| 6.2 | Explain how biomedical engineers apply engineering principles to design and produce medical devices. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

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