# Biomedical Innovation Course No. 14255 Credit: 1.0

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

Pathways and CIP Codes:Biotechnology

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: Emerging Trends in Biomedical Technolgies - Demonstrate research & problem-solving skills

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 1.1 | Research and identify health challenges of the 21st Century. |  |
| 1.2 | Research how current and emerging technologies are impacting health practices. |  |
| 1.3 | Demonstrate an understanding of the different research study designs by designing a study. |  |
| 1.4 | Create, design, and provide an oral presentation based upon biomedical innovation. |  |
| 1.5 | Propose solutions to the health-related problems of the 21st century. |  |
| 1.6 | Explain emergency room procedures used to triage and rank patients. |  |
| 1.7 | Apply knowledge of statistical analysis methods to analyze the results of experimental studies analysis methods to analyze the results of experimental studies. |  |
| 1.8 | Design and conduct an experimental study. |  |
| 1.9 | Research and report on various biomedical career fields involved in medicine. |  |
| 1.10 | Research diseases common in society and potential solutions to societal health issues. |  |
| 1.11 | Use the design process to create a model, prototype, or schematic for a chosen solution. |  |

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

Competencies

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

Benchmark 3: Demonstrate knowledge of 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: Demonstrate an understanding to the 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: Demonstrate an understanding to how infectious disease 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: Illustrate knowledge to the different 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. |  |

Benchmark 7: Culminating Project and Presentation

Competencies

| # | Description | RATING |
| --- | --- | --- |
| 7.1 | Develop a report, model, video/or presentation summarizing knowledge, results, conclusion of a project plan related to the biomedical industry. |  |
| 7.2 | Present project conclusions to industry profession/related real world audiences. |  |
| 7.3 | Enhance Individual Plan of Study (IPS) electronic portfolio with course outcomes and artifacts. |  |

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

Instructor Signature:

For more information, contact:

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[pathwayshelpdesk@ksde.org](mailto:pathwayshelpdesk@ksde.org)



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