



# MATT SHA

INTEGRATED SCIENCE  
AMBASSADOR

3RD YEAR, MAJOR

## THEME OF MY INTEGRATION:

Understanding the relationship between the human body and disease through knowledge in genetics and medical microbiology.

## WHAT I AM INTEGRATING:

### DISCIPLINE #1

#### Genetics:

The study of Genetics is pertinent to the current clinical field and the discovery of new treatments for hereditary diseases and other chronic diseases. As modern technological innovations develop, the scientific community moves closer to understanding and overcoming serious medical conditions, such as cancer. In the past twenty years alone, research on genetics and the human genome has advanced monumentally and allowed for the introduction of gene-editing tools. The Human Genome Project sequenced the entire euchromatic human genome. This work jumpstarted several databases and gave rise to much of what we know today about genomics. Additionally, the recent developments of CRISPR Cas9 have shown the potential of genetic research and invention.

### DISCIPLINE #2

#### Medical Microbiology:

From taking an introductory course in medical microbiology, I realized how microorganisms play a large role in the human body—as friendly and potentially mutualistic microbiota or harmful pathogenic microbes. Understanding the relationship between healthy body systems and invasion and/or infection by dangerous microorganisms will provide strong background knowledge before entering the medical field. Another topic about the relationship between the human body and microorganisms (such as bacteria and viruses) is the gut-brain axis. This bidirectional link has recently been described as the ability for gut microbiota to influence processes in the brain, even influencing neurotransmitters in the brain.

## SAMPLE CURRICULUM RATIONALE

### MEDG 419 – Developmental Origin of Human Disorders

This course explores the developmental biology behind congenital genetic disorders and pregnancy complications, using genetic and epigenetic determinants. Studying genetics has become the forefront of understanding hereditary disease and diseases/disorders caused by developmental defects and/or childbirth health complications. The course also places a spotlight on research papers and presentations on the aforementioned topics, pushing for analysis of scientific literature and excellence in student presentations. These assignments will be extremely beneficial for case studies and research in the medical field and the research industry.

### MICB 402 – Advanced Immunology

This course builds upon the in-depth understanding of the immune system developed from previous years and is taught with two main segments, innate and adaptive immunology, with a focus on the organization of the overall immune system. The course goes into immunogenetics and current scientific research and experimental methods used to investigate the ideas of immunology. The latter half of the class also explores key genes, genetic diversity, the major histocompatibility complex, and how pathogens hide from immune recognition. Genetic factors are key in defense against developing a disease, whether that is genetic diversity or essential genes controlling the immune response. My integration in genetics will be very helpful in understanding the topics in this course and applying them to research in medical genetics and/or immunogenetics.

## CONTACT

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