

UMB CURE Connections (C2)

Anatomy Track Syllabus

2020-2021

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This project was supported by the National Institute of General Medical Sciences, the National Institutes of Health (NIH) under Award Number R25GM129875. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

Track Overview

Course Description and Track Rationale:	The C2 Anatomy curriculum track provides students with engaging and rigorous learning opportunities that immerse them in the study of metabolic diseases and their connection to lifestyle choice and genetics. Scholars are met with the real-world problem of rising diabetes cases across the country and apply principles of nutrition and biology to explore and develop solutions for the problem. Through community case studies and analysis of their own wellness practices, scholars assume the role of engineer to develop a product that can educate others, regulate, or decrease the occurrence of type 2 diabetes.
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Course Learning Objectives

After completing this course, students will be able to:

- Analyze the impact of consuming adequate and inadequate amounts of nutrients.
- Evaluate the effects of healthy nutrition on exercise.
- Articulate the health and academic benefits of physical activity
- Evaluate the role that media plays in our health decisions.
- Connect nutrition to metabolic diseases, specifically diabetes.
- Explain the role that insulin plays in regulating blood glucose.
- Analyze factors that influence type 2 diabetes, both in Baltimore and nationwide.
- Develop a product to help regulate or decrease the occurrence of diabetes.
- Explain the connection between metabolic diseases and cancer.

Unit Learning Objectives

Module 1: My Nutrition – What’s In My Food? (WCC)

After completing this module, students will be able to:

- Identify the differences between “Go, Slow, and Woah” foods.
- Explain how food is produced and some of the larger implications of the mass production of food.
- Compare different elements in food and describe how they contribute to whether a food is healthy.
- Analyze their own eating patterns in relation to MyPlate.

- Predict impact of consuming adequate or inadequate amounts of nutrients.

Module 2: My Nutrition – Recipe Makeovers (WCC)

After completing this module, students will be able to:

- Compare and analyze *Nutrition Facts* label.
- Cite evidence from Nutrition Facts labels useful for making informed and healthy choices.
- Reconstruct a favorite recipe using healthy alternatives.
- Contribute to a “C2 Healthy Eating Cookbook” after making healthy substitutions to favorite recipes.

Module 3: Components of Fitness

After completing this module, students will be able to:

- Analyze the effects of exercise on stress management
- Describe the different components of fitness.
- Evaluate the effects of healthy nutrition on exercise.
- Categorize physical activities according to performance results

Module 4: My Physical Activity – Fitness Plans (Sports Nutrition) (WCC)

After completing this module, students will be able to:

- Articulate the health and academic benefits of physical activity and the adverse health effects of too much sedentary time.
- Identify myths about fitness and exercise.
- Differentiate between the two types of physical activity (aerobic and strengthening)
- Describe personal, social, and environmental determinants of being physically active.
- Identify barriers to receiving adequate physical activity time in school and in the community.
- Evaluate a client’s fitness program.
- Develop a year-round sport specific exercise program.

Module 5: Physical Activity and Nutrition (WCC)

After completing this module, students will be able to:

- Demonstrate how to balance caloric intake with caloric expenditure to maintain, gain, or reduce weight in a healthy manner.
- Assess the effectiveness of various exercises in regard to the number of calories burned.
- Analyze and describe the relationship between nutritional choices, physical activity, and chronic diseases.
- Develop a fitness plan to burn a specific amount of calories based on a favorite fast food meal.

Module 6: Nutrition and Caloric Needs (WCC)

After completing this module, students will be able to:

- Recognize that caloric needs are impacted by lifestyle.
- Identify foods that are high in calories and low in nutrients.
- Predict the nutritional needs of various fictional characters based on their lifestyle.

Module 7: Our Physical Activity (WCC)

After completing this module, students will be able to:

- Develop a SMART goal for a personal health plan.
- Implement strategies to achieve a personal health goal.
- Construct a graph to represent physical activity using pedometers.

Module 8: Healthy Lifestyle Campaign (WCC)

After completing this module, students will be able to:

- Explain the role of media in adolescents' decision-making and health.
- Create a resource that outlines where and how students can access valid and reliable health information, products, and services.
- Collaborate with others to advocate for healthy eating at home, in school, or in the community.

Module 9: How Does Your Body Use Food? (GDMD, Unit 2)

After completing this module, students will be able to:

- Describe mechanical and chemical breakdown of food.
- Identify the steps of glucose metabolism and describe what they require and produce.
- Explain where energy is stored after a meal.
- Apply metabolism to real-life situations.
- Compare and contrast the function of insulin and glucagon in energy metabolism.
- Describe the symptoms, causes, and treatments of six different metabolic disorders.
- Describe which organs play a role in regulatory steps of maintaining glucose homeostasis.

Module 10: What is Metabolic Disease? (GDMD, Unit 3)

After completing this module, students will be able to:

- Define body composition and obesity.
- Explain how activity levels, muscle mass, and efficiency of caloric absorption contribute to basal metabolic rate.
- Compare and contrast drug and food addiction.
- Explain how the hypothalamus regulates hunger.

- Analyze a scientific article.
- Describe the mechanics of type 2 diabetes, type 1 diabetes, and atherosclerosis.
- Explain how unhealthy adipose may contribute to diabetes.
- Explain the primary cause of abnormal blood glucose concentrations.

OPTIONAL UNITS (approx. 1 week each, all go together):

- How do I Identify Good and Bad Food?
- How Does This Knowledge Apply to Me?
- PROJECT: Evaluate a Nutritional Claim Using Scientific Evidence
 - Public Health Brochure and presentation focusing on ONE of the following topics:
 - Paleo diet
 - Pregnancy: Dos and Don'ts
 - Muscle building supplements
 - South Beach diet
 - Adolescents: Dos and Don'ts
 - Weight loss supplements
 - Blood type diet
 - Infants: Dos and Don'ts
 - Other dietary supplements

Module 11: Digestive Disorders (DD)

After completing this module, students will be able to:

- Describe the physiological impact of improper nutrition.
- Discuss factors that lead to diabetes.
- Develop a brochure to teach the community about a specific digestive disorder that underlies diabetes.
- Predict about the health consequences of their digestive disorder.
- Describe the connections between insulin function and diabetes.

Module 12: Homeostasis: Glucose in Balance (DD)

After completing this module, students will be able to:

- Model where glucose is found in foods.
- Explain how feedback mechanisms maintain homeostasis.
- Identify the hormones and organs involved in blood glucose regulation.

Module 13: Modeling Type 2 Diabetes (DD)

After completing this module, students will be able to:

- Model blood glucose homeostasis using a game board and pasta pieces to illustrate the feedback mechanisms that maintain blood glucose, insulin, and glucagon levels.
- Demonstrate how blood glucose levels are impacted by eating, fasting, insulin resistance, beta cell damage, and exercise.

- Explain how type 2 diabetes is diagnosed.
- Identify the roles that liver, fat, muscle, and brain cells play in blood glucose homeostasis.

Module 14: Diabetes Detection and Treatment (DD)

After completing this module, students will be able to:

- Evaluate logical tests and treatments for diabetes.
- Analyze diabetes test results from healthy and diabetic individuals.
- Explore the UMB School of Medicine's Clinical Testing Laboratory and develop questions for faculty and students.

Module 15: Impacting Factors – Genes and Environment (DD)

After completing this module, students will be able to:

- Identify environmental, genetic, and social factors that influence type 2 diabetes.
- Explain how allele combinations lead to variations within a population.
- Simulate how high risk and low risk gene variants may be distributed through a population.
- Analyze patterns in personal environments and eating habits that may increase risk for type 2 diabetes.

Module 16: Diabetes in Baltimore (DD)

After completing this module, students will be able to:

- Investigate correlations between diabetes occurrences in Baltimore and access to food and recreational space access, obesity, race, and income.
- Compare and analyze maps showing the occurrence of diabetes nationwide versus Baltimore.
- Hypothesize risk factors that can contribute to diabetes incidence.
- Formulate strategies that can be used to reduce or prevent diabetes in Baltimore.

Module 17: Analyzing Solutions (DD)

After completing this module, students will be able to:

- Evaluate solutions to the complex problem of type 2 diabetes in our communities.
- Communicate prevention and treatment options for people with, or at risk for, type 2 diabetes.
- Develop an argument around the best treatments and preventative measures for type 2 diabetes.

Module 18: STEM Design Challenge (DD)

After completing this module, students will be able to:

- Formulate solutions that will help decrease the occurrence of type 2 diabetes.
- Develop a product that will help diabetic individuals regulate their diabetes.

Module 19: Community Outreach and Education (DD)

After completing this module, students will be able to:

- Develop virtual informational sessions to educate elementary and middle school scholars on nutrition, exercise, and health.
- Recommend best practices for individuals to reduce their chances of developing diabetes.

Module 20: Bringing Healthy Habits Home (DD)

After completing this module, students will be able to:

- Develop and conduct interviews of senior citizens in their lives to learn about their nutritional and exercise habits and histories.
- Analyze results of interviews to examine the relationship between nutritional/exercise habits and their current health status.
- Present results of their interviews to a panel of peers and professionals in a virtual setting.
- Discuss potential impact of scholars' own health as a results of their senior interviews and increased knowledge of nutrition.

Module 21: Research-Based Nutrition and Diabetes Literacy Resource

After completing this module, students will be able to:

- Develop a poster appropriate for both community education and professional conferences focusing on specific aspects from nutrition/diabetes unit.
- Analyze food journals and evaluate personal habits.
- Propose areas of improvement for self and community as a whole.

Course Schedule

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 1 Starts <hr/> 1 week	My Nutrition – What’s in My Food?	<ul style="list-style-type: none"> • Lesson 1.1 – What’s In My Food? • Components of MyPlate Review • Go, Slow, and Woah Food Review • Characteristics of Food • Investigation - How Much Sugar? • Discussion - What does McDonalds mean to you? • Activity - “Supersize Me in 7 Minutes” YouTube Video Analysis (7 minutes) • Discussion – What’s In Our Food? Discussion about the different elements of food using evidence from video to determine which components are healthy. • MyFitnessPal/Food Journal/NCI ASA24 Analysis
Module 2 Starts <hr/> 2 weeks	My Nutrition – Recipe Makeovers	<ul style="list-style-type: none"> • Lesson 2.1 – Reading Nutrition Labels • Activity - Nutrition Label Scavenger Hunt • Activity - Snack Comparison • Lesson 2.2 – Healthy Food Substitutions • Ingredient Substitution Article • Research/Analysis • YouTube: “Healthy Cooking Substitutions and Swaps” (2:40) • Activity – Favorite Meal Makeover • C2 Healthy Eating Cookbook

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 3 Starts _____ <i>1 week</i>	My Physical Activity 1 – Components of Fitness	<ul style="list-style-type: none"> • Lesson 3.1 – Components of Fitness Introduction • Stress Management through Exercise • Lab - Stress Management Food • Food Lab - Promoting healthy nutrition needed to exercise • Components of Fitness Student Presentations • Categorize physical activities according to performance results
Module 4 Starts _____ <i>2 weeks</i>	My Physical Activity 2 – Fitness Plans	<ul style="list-style-type: none"> • Lesson 4.1 – Fitness Plans, Benefits, and Barriers • Fitness Benefits/Barriers and Exercise Lab • Fitness Myths and Exercise Lab • Sports Nutrition Food Lab • Plan and Evaluate a Clients' Fitness Program • Lifelong Fitness • Develop a year round sport specific exercise program • How Much Physical Activity is Needed? • FitnessGram Lessons (FitnessGram assesses the physical fitness of a child based on the scientifically-established Healthy Fitness Zone® standards that indicate a lower risk of chronic diseases later in life) • FitnessGram Lab – exercise • Pedometers
Module 5 Starts _____ <i>1 week</i>	Physical Activity and Nutrition	<ul style="list-style-type: none"> • Lesson 5.1 – Understanding Calories • Physical Activities and Calories – How much/what type of physical activity is required to burn “x” amount of calories? • Activity - Fast Food Frenzy • Discussion Post

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 6 Starts <hr/> 1 week	Nutrition and Caloric Needs	<ul style="list-style-type: none"> • Lesson 6.1 – Lifestyle and Dietary Needs • Character Cases: Making predictions about nutritional needs • Comparing Diets • Discussion Post
Module 7 Starts <hr/> 1 week	Our Physical Activity	<ul style="list-style-type: none"> • Lesson 7.1 – Creating SMART Goals • Graphing Physical Activity (using pedometers) • Fitness Goal Trackers • Personal Fitness Plans • Discussion Post 7.1
Module 8 Starts <hr/> 1 week	Healthy Lifestyle Campaign	<ul style="list-style-type: none"> • Lesson 8.1 – Role of Media in Nutrition Decision-Making • Media Persuasive Technique Examples, YouTube videos, Five Advertisement Techniques • Media Campaign: Social Media, Posters/Flyers, Video PSA • Discussion Post 8.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 9 Starts <hr/> 2 weeks	How Does Your Body Use Food?	<ul style="list-style-type: none"> • Lesson 9.1 – How Does Your Body Use Food? • Interactive Activity – Journey Through the Digestive System • My Peanut Butter Sandwich Goes Where?? – Organs and Enzymes Chart • Dougie’s Weight Loss Interrupted (Part 1) – Case Study (ATP synthesis) • Metabolism Game and Follow-Up • Metabolic Pathways Worksheet (apply to physiological scenarios of high and low blood glucose) • Video: Glucagon and Insulin Hormones • Jigsaw Activity – What happens when the metabolic pathways don’t work normally? • Worksheet – Review organ functions in glucose homeostasis and relate them to diabetes. • Dougie’s Weight Loss Interrupted (Part 2) • Diet Comparison: Marathon Runner vs. Power Lifter
Module 10 Starts <hr/> 2 weeks	What is Metabolic Disease?	<ul style="list-style-type: none"> • Lesson 10.1 – What is Metabolic Disease? • Activity - BMI Comparison Worksheet • Worksheet – Calculating Basal Metabolic Rate • Video Clip – 60 Minutes, “Hooked: Why bad habits are hard to break” (13:31) • Reading: “Long-Term Persistence of Hormonal Adaptations to Weight Loss” with reading guide worksheet • Jigsaw Activity with worksheet: Linking elements of the reward pathway that are activated during drug addiction with obesity. • Jigsaw Case Study • How does obesity lead to disease? • Lab - Metabolic Mystery Patient • Discussion Post 10.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 11 Starts <hr/> 1 week	Digestive Disorders	<ul style="list-style-type: none"> • Lesson 11.1 – How do Nutrition and Diabetes Relate? • Review – Characteristics of Food • Discussion Post 11.1 – What are some factors that lead to diabetes? • Review Food Journals/MyFitness/Pal/NCI ASA 24 • Metabolic Disorder Mini-Research Project • Metabolic Disorder Brochures • Digestive Disorders Medical Cases and Predictions – What do they have in common? • Asking Questions about Diabetes • Discussion Post 11.2 – Linking Insulin Function to Diabetes
Module 12 Starts <hr/> 1 week	Homeostasis: Glucose in Balance	<ul style="list-style-type: none"> • Lesson 12.1 – Where is Glucose Found in Food? • Hands-On Activity – Creating Carbohydrate Chains • Feedback and Homeostasis – What does glucose have to do with type 2 diabetes? • Preparing our Pasta Pieces – Glucose, Glycogen, Insulin, and Glucagon • Glucose in Balance worksheet • OPTIONAL ACTIVITY: Yeast Lab with Data Analysis • Discussion Post 12.1
Module 13 Starts <hr/> 1 week	Modeling Type 2 Diabetes	<ul style="list-style-type: none"> • Lesson 13.1 – Glucose: In and Out of Balance • What factors contribute to a <i>loss of control</i> of blood glucose? (consider the role of the pancreas/diet/exercise) • Modeling Type 2 Diabetes – Game with Scenario Scaffolds • Scenario Scaffold Cards • Discussion Post 13.1 – Insulin Resistance and Beta Cell Damage in Pancreas

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 17 Starts <hr/> 1 week	Analyzing Solutions	<ul style="list-style-type: none"> • Lesson 17.1 – Assessing Four Options • Intro Hypotheticals – You’re given \$1 million dollars to combat type 2 diabetes. What percentage is spent on prevention? Treatment? How would the money be used? • Evaluating Options: Food Labelling and Marketing, Lifestyle Changes, Medications, Surgery. Compare and Contrast. • Student-developed solutions: Brainstorming, Researching, Planning, Developing. • Discussion Post 17.1 – Revisit Hypotheticals. Where would your \$1 million go?
Module 18 Starts <hr/> 2 weeks	STEM Diabetes Design Challenge	<ul style="list-style-type: none"> • Lesson 18.1 – How can you design a product to help people regulate their diabetes? (OPTIONAL: 3D design) • Engineering Design Process review • Understanding problem/challenge • Brainstorming solutions • Product Development • Testing Prototypes • Product Improvement • Product Presentations
Module 19 Starts <hr/> 1-2 weeks	Community Outreach and Education	<ul style="list-style-type: none"> • Lesson 18.1 – How can we educate the community? • Major Takeaways brainstorming • Developing presentations for elementary/middle school • Shadowing Opportunities? Assisting SNMA students with screening tests. Compile and analyze data for relationships between risk factors and test results. Compare community to nationwide data. • Medical student-directed outreach programs? • Discussion Post 18.1

Module / Start Date	Topic	Lessons, Discussions, Activities, and Assignments
Module 20 Starts <hr/> 1-2 weeks	Bringing Healthy Habits Home	<ul style="list-style-type: none"> • Lesson 19.1 – Learning from the Past • Develop interview questions for senior citizens regarding nutritional/exercise habits. • Interview senior citizens. • Examine relationships between nutritional/exercise habits and current health status • Presentation of interview results including impact of own health. • Discussion Post 19.1
Module 21 Starts <hr/> 2 weeks	Research-Based Nutrition and Diabetes Literacy Resource	<ul style="list-style-type: none"> • Lesson 20.1 – Introduction to poster expectations • Analysis of food and exercise journals • Topic Selection • Research and poster development