Letter to Guardians
DNA & Genetics

Dear Parents/Guardians,

Thank you for choosing VAMPY to enrich your child's summer. I am very excited to get to know your child and to teach them more about our fascinating world.

DNA & Genetics is a course of study meant to provide students with the opportunity to learn more about our living world and how it functions. This course will contain many different experiences, including but not limited to labs, activities, discussions, research & presentation, and lecture. Major topics to be included each week can be found on the last page of this document. My experience as a teacher's assistant for three years in my college days, prior to becoming a lead instructor, gave me a unique opportunity to observe the community built in the classroom and between students at VAMPY. I encourage my students embrace VAMPY in and out of the classroom. It's a wonderful 3 weeks.

A little about Mr. Collings:

Mr. Collings graduated from the WKU Honors College with a bachelor's degree in Biology and a bachelor's degree in Science and Math Education, and is currently completing his master's degree in Biology at WKU. He teaches advanced courses at Bowling Green High School, including AP Biology and Honors Biology. Other classes he has taught include Genetics, Forensics, Anatomy & Physiology, Biology I, and Environmental Science. Throughout the school year, he serves as the Head Academic Team Coach. Additionally, he is employed through LifeSkills Inc. as Community Living Support staff, working to help meet the needs of a young adult who has autism.

A little about our teacher assistant:

Ms. Angelle graduated from Gatton Academy of Mathematics and Science and from the WKU Honors College with a bachelor's degree in each the following: Mathematics, Chinese, Science and Math Education, and Middle Grades Mathematics. While at WKU, she studied in China, Taiwan, Italy, and Hawaii. After WKU, she received the Fulbright Scholarship, providing her the opportunity to teach in Taiwan for a year. She is currently completing her master's degree in math at WKU and is teaching AP Calculus BC, AP Statistics, and Honors Alegra II at Bowling Green High School.

If you have questions or concerns about your child being at VAMPY, please contact the Center for Gifted Studies: 270-745-6323 or gifted@wku.edu

If you have specific questions regarding the DNA & Genetics class or would like to reach me regarding your child, contact me: colten.collings@gmail.com.

As you leave your child with us for the coming weeks, I hope you too enjoy your time!

Best wishes,
Colten Collings

DNA & Genetics Syllabus – VAMPY

Instructor: Colten Collings
Contact: colten.collings@gmail.com / for class- or student-specific topics

Course description: This class focuses on the exciting study of genetics and its applications. Genetics is a fundamental part of understanding how life works, and it will continue to be a strong emphasis of study in biological science, especially as it relates to the treatment of genetic disorders. After learning the basics of DNA structure and Mendelian genetics, participants will use this knowledge in a variety of more complex, real-world genetics applications. We will conduct genetics labs with live organisms and with real DNA samples. Students will conduct numerous experiments and demonstrations each week to enhance their experience.

Course philosophy: *VAMPY is one of my favorite places to teach, and I hope it becomes one of your favorite places to learn.*
This course is accessible to all students and will begin with the basics of DNA and genetics, as all students will not have experienced a high school biology course. However, we will quickly advanced past these concepts, exploring more rigorous (and exciting!) levels of study that will include college-level genetics concepts and biotechnology. Expect an active classroom with many different things happening throughout the day, including labs, activities, and lecture/discussion.

Expectations:

- Be ready to learn by being on time with your materials ready.
- Be responsible for your learning by actively participating in discussions, activities, and labs.
- Be respectful by listening to others, helping others, and taking care of our classroom.

Assessments: students will not receive standard grades during this course, but the will be informally quizzed and have their work reviewed and discussed regularly. A pre- and post-test will be given to measure major learning outcomes.

Laboratory notes:

- Students must have a pair of *closed-toe shoes* available for lab each day, as labs will take place each day. If they have an extra pair, they can even leave them in the classroom, so they do not have to be transported each day.
- There will be hazardous chemicals we use, so students must be willing to following laboratory procedures and expectations regarding handling and disposal. I will always explicitly discuss safety concerns and actions they should take should something arise.

Required Items:

- All learning materials, including textbooks, lab materials, paper, etc., will be provided by the Center For Gifted Studies.

One Lunch (1 hour) and 2 breaks per day:
A 15-minute break is given once in the morning session and once in the afternoon session.

- This time allows for restroom use and water refills.
- Student often go outdoors during this time and play four square, ultimate frisbee, card games, and others!

Study Hall:
Each night students will have a 1 hour study hall including an designated time of independent study for content of the day. Subsequent tasks will vary and could include finishing classroom assignments, studying with one another, and introducing new topics.

Topics, Lab, and Activities during class:

The timeline and order are subject to change based on pacing and student needs and interests, but these are the expected experiences for students. Not all activities or topics are detailed; listed below are those significant in time and content.

Week 1	Week 2	Week 3
Monday: Introductions and team building *Genetics Pre-Test* Lab Safety & Experimental Design Introduction to Genetics and Personalized Genetics ***Lab: Plant DNA Extraction*** ***Set-up lab: Wisconsin Fast Plants*** **Tuesday:** ***Lab: Extracting Human DNA*** Atoms, bonds, and macromolecules DNA Structure & Replication & Activity **Lab: Biobits - DNA replication** Protein Synthesis & Activity **Wednesday:** Enzymes Activity: Modeling Enzymes ***Lab: Macromolecules and Enzymes*** Types of Mutations ***Lab: Fruit Fly Mutants*** **Thursday:** Meiosis and Meiosis Activity Chromosomal Mutations Investigation Single-Gene Inheritance ***Wisconsin Fast Plants*** **Friday:** Mini-microscopes lesson Beyond Mendels Laws ***Lab: Synthetic Blood Typing***	**Monday:** Pedigrees Case Study Pedigree Presentation of Chromosomal Mutations Activity: Modeling Protein Synthesis with Sickle Cell Disease ***Lab: Corn Genetics*** Chi-sqaured Analysis **Tuesday:** Multifactoral Traits Activity: Exploring Multifactorial Traits Sex Chromosomes Case Study: Royal Disease **Wednesday:** Gene Expression Activity: Modeling Gene Expression in Stickleback Fish Stem Cells **Thursday:** Population Genetics ***Lab: Genetics of Taste Digest, PCR, & Gel Electrophoresis*** Activity: Genetic Drift **Friday:** Cell Cycle Genetics of Cancer DNA Technology ***Lab: Gel Electrophoresis #1*** ***Lab: pGLO Bacteria Transformation.***	**Monday:** ***Lab: pGLO Bacteria Transformation continued.*** DNA Sequencing Techniques *Activity: Genes and Consequences* Reproductive Technology **Tuesday:** Genetically Modified Organisms & Genetic Modification Techniques ***Lab: pGLO Bacteria Transformation continued.*** CRISPR-Cas9 and CRISPR Modeling Eugenics **Wednesday:** Ethics ***Lab: CRISPR*** **Thursday:** ***Lab: CRISPR continued*** *Reserved for on-campus experiences that do not have a confirmed time scheduled, but that are in the process of being scheduled.* **Friday:** *Time Reserved for topics of student interest that were left unaddressed and topics of which students show particular interest.* *Genetics Post-Test*