

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 and out of the classroom and between students at VAMPY. I encourage my students to embrace VAMPY in and out of the classroom. It is a wonderful 3 weeks of learning about science and self.

A little about Mr. Collings:

Mr. Collings holds a Master of Science in Biology and a Bachelor of Science in Science and Math Education from Western Kentucky University. At Bowling Green High School, he specializes in teaching advanced biology courses, including AP Biology and Honors Biology, where his students consistently achieve high pass rates. Over his career, he has also taught a diverse range of subjects, including Genetics, Forensics, Anatomy & Physiology, Biology I, and Environmental Science.



In addition to his teaching responsibilities, Mr. Collings serves as the Head Academic Team Coach, guiding students to excel in academic competitions throughout the school year. Beyond the classroom, he is dedicated to supporting his community through his work with LifeSkills Inc., where he provides Community Living Support to a young adult with autism, helping them navigate daily challenges and achieve greater independence.

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 enjoy your time!

Best wishes,
Colten Collings



DNA & Genetics

Syllabus – VAMPY

Instructor: Colten Collings, M.S. in Biology, B.S. in Science & Math Education

Instructor Contact: for class-specific topics - colten.collings@gmail.com

Center Contact: gifted@wku.edu or 270-745-6323

Course description: Dive into the fascinating world of genetics, where science meets real-world innovation. In this engaging course, you'll explore the building blocks of life, uncovering the mysteries of DNA, genes, and inheritance. Starting with the basics of DNA structure and Mendelian genetics, you'll advance to tackle real-world genetic challenges, from understanding genetic disorders to exploring cutting-edge applications in medicine and biotechnology. This course will provide a scaffolded learning experience accessible to all students, starting with foundational genetics concepts and advancing to college-level studies in genetics. This course involves mixed methods of inquiry and explicit instruction, where minds-on learning takes center stage with daily lab experiments and interactive demonstrations that bring genetics to life. Whether you're passionate about biology or curious about how genetics shapes the world around us, this class offers an exciting journey into one of the most rapidly advancing fields in science.

Course philosophy: *VAMPY is one of my favorite places to teach, and I hope it becomes a favorite place 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 advance 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 they will be informally quizzed and have their work reviewed and discussed regularly. A pre-test and formal weekly assessments will be given to measure major learning outcomes.

Laboratory notes:

- Students must have a pair of *closed-toe shoes* available for the 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 follow 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.
- Students 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
<p><u>Monday:</u> 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</p> <p><u>Tuesday:</u> Lab: Extracting Human DNA Atoms, bonds, and macromolecules DNA Structure & Replication & Activity Protein Synthesis & Activity</p> <p><u>Wednesday:</u> Enzymes Activity: Modeling Enzymes Lab: Macromolecules and Enzymes Types of Mutations Lab: Fruit Fly Mutants</p> <p><u>Thursday:</u> Meiosis and Meiosis Activity Chromosomal Mutations Investigation Single-Gene Inheritance Lab: Wisconsin Fast Plants</p> <p><u>Friday:</u> Mini-microscopes lesson Beyond Mendel's Laws Lab: Self-blood typing Lab: Synthetic Blood Typing</p>	<p><u>Monday:</u> Pedigrees Case Study Pedigree Presentation of Chromosomal Mutations Activity: Modeling Protein Synthesis with Sickle Cell Disease Lab: Corn Genetics Chi-squared Analysis</p> <p><u>Tuesday:</u> Multifactorial Traits Activity: Exploring Multifactorial Traits Sex Chromosomes Case Study: Royal Disease</p> <p><u>Wednesday:</u> Eukaryotic & Prokaryotic Gene Expression Activity: Modeling Gene Expression in Stickleback Fish Stem Cells</p> <p><u>Thursday:</u> Population Genetics Activity: Genetic Drift Lab: Genetics of Taste Digest, PCR, & Gel Electrophoresis</p> <p><u>Friday:</u> Cell Cycle Genetics of Cancer DNA Technology Lab: Gel Electrophoresis #1 Lab: pGLO Bacterial Transformation.</p>	<p><u>Monday:</u> Lab: pGLO Bacterial Transformation continued. DNA Sequencing Techniques Activity: Genes and Consequences Reproductive Technology</p> <p><u>Tuesday:</u> Genetically Modified Organisms & Genetic Modification Techniques Lab: pGLO Bacterial Transformation continued. CRISPR-Cas9 and CRISPR Modeling Lab: CRISPR</p> <p><u>Wednesday:</u> Lab: CRISPR continued Ethics</p> <p><u>Thursday:</u> Reserved for on-campus experiences that do not have a confirmed time scheduled, but that are in the process of being scheduled.</p> <p><u>Friday:</u> Time Reserved for topics of student interest that were left unaddressed and topics of which students show particular interest. *Genetics Post-Test*</p>