**Science Research Syllabus 2025-26**

**McKinley Classical Leadership Academy**

**Instructor:** Dr. Jason Kesselring (Please call me Dr. K or just Doc)

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**Materials:** 1) SLPS laptop and charging port. 2) Pen / pencil. 3) Notebook and / or folder dedicated to Science Research. 4) Logbook for your project - you need a place to keep your ideas and bibliography. This can be done as an electronic file. 5) Research workbook - when you are to the point of doing data collection, you need to take official results.

**Philosophy:** This class is a “guided study” into scientific research. Students in this class should treat this like an “independent study” into a scientific topic of their choosing! My role is to be one of a “guide” or “sounding board.” The content will focus on skills and “things to think about” when conducting research. Students will develop their own unique, novel research project. As such, students need to be a self-starter; what you ACHIEVE is directly proportional to the work you put in! (To put it another way, I cannot do your project, but I will help teach you the skills necessary to do the work yourself!)

**Goals:** 1) Students will learn HOW to pick a topic of interest to them that is worthy of independent study. This may include (but is not limited to): self-assessment, what motivates them, how to ask more specific questions, how to narrow an interest into a researchable question, and how to organize their search. 2) Students will learn the “research behind the research.” This may include (but is not limited to): How to assess sources, how to query a scientific database, how to read / assess scientific literature, and how to build a bibliography for their project. 3) Students will learn about research and study ethics. This may include (but is not limited to): discussion and analysis of research ethics, types of studies, variables, how to design an experiment - including methods, materials, and supplies. 4) Students will learn HOW to conduct an experiment. This may include (but is not limited to): writing a preliminary protocol, networking to contact / find a mentor (expert) in the field, collaboration with a mentor and / or team, graphing / tables / statistics - appropriate use of these tools, requesting funding, and communication of results. 5) Students will learn scientific communication. This may include (but is not limited to): status reports, final presentation, entering a science fair and / or publishing data, and writing for a scientific journal.

Students that had not previously been in “Research Club” may not make it all the way through goals 4 and 5 in their first year. This is OK!!! The baseline goal is for EVERY STUDENT to have a project that is ready to implement by the end of the year. There will be a “Year 2” of the class, in which students can execute (do) their project. If a student can accomplish all the background work and research in Year 1, that is even better. HOWEVER, ALL STUDENTS WILL BE EXPECTED TO GIVE A MID-YEAR STATUS PRESENTATION AND AN END-OF-THE-YEAR PRESENTATION TO THE REST OF THE CLASS REGARDLESS IF YOU ARE ACTIVELY COLLECTING DATA OR NOT.

This course is designed for each student to work on their own unique idea. If you wish to collaborate with another student, I WILL PERMIT IT AFTER I HAVE DISCUSSED WITH THE IDEA / PROCESS WITH BOTH STUDENTS. Please note that some research competitions DO NOT permit more than one student working on a project.

**Course Outline:** There are two main parts to the class. The first part is the lessons I provide to guide you through the research process. In the first semester, there will be (for students new to research) more guided work in each class. The second part of the class is the development of YOUR OWN PROJECT. This

will require you to a) work independently for each class in order to advance your project and b) at-home / offline work to do the same.

The list of topics that follows is an estimate into timing of the topics. Further, by mid-to-late

semester 2, many students will likely spend more time advancing their own work (less “teacher directed” and more work on your own idea). If a student makes rapid progress, a student might learn some of the later topics “on the go.”

Topics that we will cover are listed on the next page:

|  |  |
| --- | --- |
| Semester 1 | Semester 2 |
| Picking an area of interest | Targeting a science forum / journal for your experiment |
| Narrowing down a topic | Use of data in research |
| Asking a question | “Real world data” / types of data |
| Focusing your question | What are statistics |
| Organizing your search | Types of statistics |
| Scientific vs. public literature | What is significance? |
| Arranging sources / vetting sources | Displaying results |
| Ethics in research - informed consent / disclosures | Results vs. Conclusion |
| Types of variables | Formatting your research (presentation vs. paper) |
| Types of studies | (To include abstract, introduction, materials / methods, results, conclusion |
| Study design | How to present your topic |
| Developing a protocol | Directing your topics to different audiences |
| Networking | Reflection |
| How to find and approach a potential mentor | What went well / what was difficult |
| Preparation and conversing with a mentor | Goal setting for next year |
| Revising your question / protocol | End-of-year presentation and status report |
| Time management for your project |  |
| Resource management / funding |  |
| Developing a presentation |  |

**Grading:** I reserve the right to tweak the grading formula as needed to keep students a) motivated and b) to be accurate or reflect extenuating circumstances. If I need to make an alteration, I will let you know. As of now, here it is:

Daily assignments / group work on content → 20%

Status reports → 20%

Meeting self-directed deadlines → 30%

Presentations and papers (end of semester, end of year, for research competition) → 30%

Daily assignments → In 90% of classes, there will be a topic (as listed previously) that we address. This could entail group work, problem solving, discussion, processing data, reflection on how the topic pertains to your work, and more. This work is to be completed IN CLASS before working on your own project.

Status reports → I will have a document for you to complete ONCE EVERY FOUR WEEKS where you update me (and yourself) on your project. This will include (but is not limited to) what you were working on in the time window, what got accomplished, tasks that need addressing, and reflection on assistance you might need. These are due on a DEADLINE, and late reports are NOT accepted under any circumstance. The purpose of these is: to keep communication between all parties open, for you to critically assess what you have accomplished in the time window, identify what issues you need to address, and to start setting goals for the next time period.

Self-directed deadlines → In addition to your reports, I will keep a spreadsheet of the milestones you need to hit throughout the class in order to keep you on track for delivering your project. As you set the deadlines for how far you should be, you will keep me updated on your progress.

Presentations and papers → Presentations and papers that you need to give will be assessed by me. This includes mid-year and end-of-year presentations, end-of-year reports, and presentations / writing you need for competitions (if applicable). As alluded to earlier, all students will be required to present AT LEAST TWICE IN THE YEAR to the class.

**POLICY ON TURNING IN WORK:** Most work will be turned in via Microsoft Teams unless noted otherwise. Some labs and most tests will be done with “old school” pencil and paper. This means uploading a copy of work to Teams. If there are assignments where I request a hard copy, the instructions will still be posted on Microsoft Teams.

To be clear, I DO NOT ACCEPT LATE WORK. At higher levels, deadlines are deadlines. Part of college and career preparedness is getting your work done on time. In this class, there is an emphasis on making progress and meeting deadlines (like if you were working on your own project). If you work on research projects or work in a research lab, there are lab meetings to discuss project flow. Get used to being accountable for your deadlines.

**Grading Formula:** (Total points earned + extra credit points)/ (Total possible points - exemptions)

Letter grades are as follows: **A (89.5% to 100%) B (79.5% to 89.4%) C (69.5% to 79.4%)**

**D (59.5% to 69.4%) F (59.4% and under)**

**Class Structure:** This will vary a bit from Semester 1 to Semester 2, but the general flow will be like this:

-Expect a Do-Now → usually a response that I want you to discuss with partners and write. I will give you a prompt, in the form of a question of topics we have discussed, a brief audio or video file that pertains to our work, a brief reading that sets up what we will do in class.

-Content / Skills for the day → I will have a lesson which requires all individuals to participate. This could be an extension of Do-Now, a skill listed that needs to be practiced, articles that require investigation, a group discussion, or any other content that you need to advance your project.

-Time to work on your own project → At the beginning, much of this time the students will spend trying to advance / start / narrow down their project. I may be very direct in what I expect from you, or - if you are sufficiently far enough in your project, time to work on your project.

This is why Semesters 1 and 2 are different in terms of “flow.” In Semester 1, most students are taking in research “process” knowledge and skills. In Semester 2, more students should have an idea for their research, and now they are truly advancing their unique work. This way, the student is prepared to do mostly ACTUAL RESEARCH in the following year.

**Absences:** These will inevitably happen, whether these are at the last minute or scheduled. Communication is key! For brief absences, we will assign any homework, classwork, or lab work that was missed. This should be completed as soon as reasonably possible so your learning can continue with minimal interruptions - IT IS YOUR RESPONSIBILITY TO CATCH UP. If you are out for a prolonged period of time, please talk with me, and we will set a schedule to have you catch up. Remember! The work assigned and deadlines to meet all exist to help you advance your project!

**Classroom expectations:** As stated earlier, I am a firm believer in working hard, but also in treating each other with kindness and respect. Learning goes MUCH BETTER in a relaxed environment where there is mutual respect. As such, the specific rules that we will make together at the beginning of the year will reflect this. You are close to being adults, and I will treat you as such so long as your behavior and effort reflect this. Specific procedures are listed at the end of the document. My big expectations and rule are: Act like an adult and I will treat you like one. I am in Year 8, and 99% of my students do just fine with this expectation.

**Technology expectations:** You need to → check Microsoft Teams DAILY for messages / (even on days we do not have class), check your SLPS email DAILY for messages, and STAY OFF YOUR PERSONAL DEVICE (CELL PHONE) in class - see below.

These are expectations in college and the professional world and are easy to do. You have been given SLPS technology, please use it like a professional. Further, you will be contacting EXPERTS in your chosen field to contact. You MUST respond to your mentors (and other people you approach for help) in a timely and respectful manner. As such, checking your messages and email REGULARLY (with a professional response) is now just part of your DAILY ROUTINE.

**Use of “Artificial Intelligence” in the classroom:** You are at the stage of your education where being original and learning to THINK FOR YOURSELF is more important than using AI. There MIGHT be a case where using an “AI” will be sanctioned and allowed under my guidance in the classroom. However, unless stated otherwise, use of AI to complete an assignment is not allowed. Use of AI (such as - but not limited to - ChatGPT) would result in failure of the assignment. Continued use of AI to complete what needs to be original work would result in a conversation with the principal.

There will be a blend in our careers of using AI to accomplish some tasks! However, we still need to be able to do critical thinking. There is little use in using AI before you are accomplished critical thinkers. When we can use it to make a point about a concept, we will.

For example, using AI to make an outline of a topic or setting up a schedule for you is REASONABLE. Any written analysis or report you turn in needs your original thought and writing. If you are unsure if AI is acceptable for a task - ask me.

**Please:**

-Come to class prepared - have your materials with you and have your work COMPLETE

-Be respectful and kind to your classmates; I use my “thank you” and “please” with you; extend the same courtesy to me and your classmates.

-Follow district and school policy with regards to NOT using your cell phone / personal devices in class.

-Stay on topic.

-Adhere to the rules of the student handbook.

-Clean up your workspace / table / lab before you leave the classroom (this is really helpful! Thank you in advance!)

-Use school appropriate language in the classroom, hallways, and school property.

-Be on time.

-Communicate with me if you have specific problems, ahead of time if possible. This is another HUGE skill for after high school. It is much easier to help you if I know about issues. A simple email or side conversation fixes a lot - but it needs to come from you first. I promise you, I am easy to work with, and USUALLY work arounds exist - **if** I know about the issue.

**Procedures:** I will be utilizing Microsoft Teams for most work, so turning in “paper” will rarely be needed. When it is, it is due at the beginning of class

I will have a “do-now” or “warm-up” activity. This should start at the beginning of class.

I will have a supply of paper, pens/pencils, or other materials if you lack material for the day. Please quietly help yourself to the material needed. Due to coronavirus, if you take a pen or pencil, it is yours!

When I am giving a lecture or instruction, attention should be on me and the information I am conveying. No conversations or other distractions should be taking place. I will take questions from students in an appropriate manner (please, just raise your hand!)

I will put you in groups for group work - sometimes I will pick groups; sometimes students will pick. I am intentional about this - students need to learn to work with a variety of people. Of course, group work will require conversation and collaboration. However, your group should treat each other with respect, talk at a tone appropriate for learning, and have everyone participate. If you need help from me, please ask!

Should you be doing individual work in class, the room should be quiet unless I say otherwise.

Food and water are not permitted on lab days. I also highly encourage students to wear closed shoes on lab days and to wear lab safe clothing. This is for your safety. Many of the lab activities will be low risk, but I urge students to prepare on the side of caution.

If you need to use the restroom during class, please raise your hand. Once I acknowledge you, you need to sign out before using the restroom. If this becomes a chronic issue, it will be discussed with the student first & then parents. I need you and expect you in my classroom as much as possible. If I see a pattern of avoiding my room, it will be addressed. The same holds for getting a drink during class.

Generally, I will finish right at the bell. If instruction is occurring, do not leave class until I have finished the class. I promise I will not run over for unnecessary reasons & let your next teacher know. (I have started using a “Dr. K, be quiet alarm” 2 minutes before class ends to avoid this problem!)

I am very much excited about this class, this school year, and this group of students! Let’s get to this! Please do not hesitate to contact me if you have any questions. I hope this is a fun year for all involved.

Respectfully,

Dr. K