**Roanoke Valley Governor’s School for Science and Technology  
Computational Biology and Bioinformatics  
Syllabus 2021-2022**Mark Levy  
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1. **Course Information**
   1. **Course Description**

This course explores the interdisciplinary analysis of biological data, with a focus on bioinformatics and genomics. Students will learn to use existing software, along with developing their own code, to employ gene expression databases in pursuit of research objectives. Major topics include molecular biology, comparative sequence analysis, ‘big data’ resources, human health, and evolutionary biology. Students will gain direct experience with database searches, sequence alignments, visualization of gene expression profiles, and coding in Biopython. Each student will conduct an analytical research project in the area of human health, phylogeny, or a related biological topic. Each student will write a scientific paper, using VJAS format, to describe their research project.

* 1. **Gifted education strategies**

In this class, students have the opportunity to explore in depth a topic of interest to them. Students ask questions based on individual interests and then design and perform a long-term analytical research project. Students have the opportunity to work with the same databases and analysis software that are employed by professionals.

1. **Grading Policy**
   1. **Grading Scale**

100-90% **A**

89-80% **B**

79-70% **C**

69-60% **D**

59-0% **F**

* 1. **Types of Evaluations**
     1. **Labs and Assignments:** We will complete a number of practice activities and ‘labs’, including one or more major labs completed on long elective days. The intent is to expose students to a wide array of tools, techniques, and procedures available for them to use as they design their own experiments. Students will complete short homework assignments in the fall semester, usually focused on practice activities and labs started in class.
     2. **Research Process:** 
        1. **Pre-intersession work on Project:** During the first semester, students are expected to work on various aspects of their project including submitting a database resource list, researching relevant software tools, and completing ISEF forms. Students will create a project workflow map to be used and revised throughout the course of experimentation. Students are expected to conduct a literature review, contact outside experts if needed, and have regular communication with the teacher about their projects. In the context of the varied skillsets required for successful work in this field, peer collaboration and assistance will be a key feature in our class culture.
        2. **Intersession Work on Project:** During intersession, students will be graded on the quality and effectiveness of work devoted to the project. Students will be provided with expectations, and grades will be based on teacher assessment as well as students self-assessment. Time management will also be a component of assessments.
     3. **Research Paper:** Following a series of deadlines throughout the course, **s**tudents will compose a rough draft, make necessary revisions, and submit a final draft of each part of the research paper. Students are expected to review instructor feedback and make necessary adjustments. It is expected that the research paper will follow the VJAS guidelines and that a final copy of this paper be completed before the VJAS competition date. The final, edited paper will comprise a major portion of the second semester grade, and work on this paper should receive attention from the student throughout the research process.
     4. **Research Presentation:** 
        1. **Project Display Board:** All students will complete a high-quality project display board for Project Forum. Checklists and rubrics will be provided for each project display board component.
        2. **Project Forum Day:** All students are expected to be in attendance and on-time for all events related to Project Forum.
        3. **Other Science Fairs and Symposia:** All students are expected to participate in all science fairs and symposia available to them.
        4. **PowerPoint Presentation:** Students will prepare and present a PowerPoint presentation in accordance with VJAS guidelines. All students will present their research to the class before the end of electives in the spring. Students are expected to make revisions to improve their PowerPoint slides and oral presentation based on suggestions from the teacher and members of the class.
  2. **Semester Grade Determination**

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| --- | --- | --- | --- | --- |
| **1st Semester Grade Determination** | |  | **2nd Semester Grade Determination** | |
| Research Paper | 30% | Research Paper | 35% |
| Research Process | 30% | Research Process | 30% |
| Labs and Skills Activities | 40% | Research Presentation | 35% |

* 1. **Final Grade Determination**

The final grade is the average of the 2 semester grades.

1. **Class Policies and Procedures**
   1. **Absences and tardies:** The procedures in the RVGS student handbook will be followed.
   2. **Make-up Work:** It is the responsibility of the student to work out amended due dates with the instructor following excused absences.
   3. **Late-work policy:** Ten percent per day (including weekends) will be deducted for work turned in late, unless other arrangements have been made with the instructor in advance.
   4. **Academic Integrity:** The Governor’s School Honor Code will be followed. Students are expected to follow procedures explained in class regarding use of code and programming resources they did not develop themselves. Any outside code employed in student work, even if modified from its original form, must be properly annotated and cited. While peer assistance is encouraged in many instances, it is never acceptable for code to be copied or shared between students, even if annotated and cited.
   5. **Technology Policy:** The RCPS Acceptable Use Policy and the RVGS student handbook policy will be followed.
   6. **Extra help:** When extra assistance is needed, students are encouraged to schedule time before or after school in advance by email or ‘remind’, at least two days in advance when feasible. Students are always encouraged to seek help with clarifying planning and objectives prior to investing considerable time into a task. However, students are expected to seek reasonable resources (user guides/cookbooks, internet searches, youtube, etc) prior to asking for assistance with writing lines of code.
   7. **Grade Access:** Parents and students will be able to view grades online. Most assignments will be graded within 5 school days of the due date.
      1. A blank in the grade book means that the assignment has not yet been graded. Blanks do not count as zeros in your average.
      2. A zero in the grade book means that you have earned a zero on the assignment. This will included instances where the assignment hasn’t been submitted by the due date. Late work will be accepted according to class procedures and may substitute for the zero.
      3. An excused (EX) in the grade book means that you are excused from the assignment without penalty.
   8. **Interim Reports:** Interim reports will be provided to you three times during each semester (see dates on the school calendar). The interim report is a snapshot of the current class average. Please feel free to discuss your report with your instructor.
   9. **Student Performance Strategy:** Interventions will be implemented at the teacher’s discretion or in the event that the student's grade falls below an 80.
   10. **Cell phones and Technology:** While use of computers and technology is a key aspect to this, students are expected to follow all normal RVGS procedures regarding cell phones and computer use.