



2009-2010 Research Practicum

One requirement for the completion of the Science and Technology Program is the successful completion of the course Research Practicum. Students will learn and apply the basic skills of research. They will design an experiment to answer a research question. The major requirements are: (1) a research project which is either experimental or design and development; (2) the project must be approved by the Research Practicum teacher; (3) conclusions must be supported by sufficient data which will be tested statistically (if statistics are inappropriate, the student must be guided by a researcher); (4) presentation of research by student through presentations in class, at the school science fair, and at the Research Practicum Symposium; (5) five chapter paper. If a student does not submit an acceptable final paper, he or she will not pass the course and thereby will not graduate as a member of the Science and Technology Program.

The project must follow either an **experimental design** or a **design and developmental design**. Projects in the Biological Sciences or Physical Sciences must follow the experimental design. Projects in the Pre-Engineering/Technology areas must follow either the experimental design or the design and development design.

An **experimental design** must:

- ✓ contain a dependent and independent variable, must be part of the design (observational studies are permitted only if the student is working under the guidance of a mentor and must be approved by the R.P. teacher)
- ✓ include a hypothesis, which can be tested statistically
- ✓ focus on changing the independent variable, and then measuring the dependent variable
- ✓ include a statistical analysis of the data
 1. A **significant** statistical measurement
 - or
 2. A **correlation** between the independent and dependent variables (This means that you will determine if a plot of the independent variable vs. the dependent variable yields a linear relationship)

A **design and development project** must:

- ✓ involve the selection of a problem that requires an engineering solution including:
 - ✓ refinement of a current solution
 - ✓ developments of a new solution
 - ✓ analysis of possible solutions

Your project **must deal** with your focus area (Biological Science, Physical Science, Pre-Engineering, and Computer Science). If your focus area is Science/Engineering Exploration, the area of research you choose must be reflective of the Advanced Science/Tech courses taken from Grades 10-12.

Possible Research Areas in Biological Sciences include:

Biochemistry
Botany
Environmental sciences
Medicine and health
Microbiology
Zoology

Possible Research Areas in Physical Sciences include:

Biochemistry
Chemistry
Computer science
Environmental science
Mathematics
Physics

Possible Research Areas in Engineering include:

Acoustical
Aeronautical
Automotive
Biological
Construction and testing
Electrical
Environmental
Heating and refrigeration
Human factors
Manufacturing
Marine
Materials
Mechanical
Photographic

A NUMBER OF STUDIES HAVE INCLUDED AN OVERLAPPING OF SEVERAL OF THESE TOPICS. FOR EXAMPLE, A STUDY WAS PERFORMED SEVERAL YEARS AGO IN WHICH THE STUDENT COMBINED THE FIELDS OF COMPUTER SCIENCE, PHYSICS, AND ENGINEERING.

- Keep in mind the time frame in which your data collection must be completed. Some projects might require 1 to 3 months for data collection; other projects will require more time. As you are selecting your project, choose one that fits into your own time frame.
- If you are working with a mentor be sure he/she is aware of this time factor.
- Be aware of the time of year you will be conducting your research. For example, some bacteria grow only during certain seasons of the year.
- At the beginning of the year, your RP teacher will give you projected dates of major assignments for the entire year. You will need to plan accordingly.

- If you have a mentor, give him/her a copy of these dates. Your mentor must be aware of the deadlines of assignments set by your RP teacher.
- Students who begin their research during the summer are at an advantage. However, if you do not begin your research until the fall, you can still have an outstanding project. The RP staff will assist you along each step of your project.
- There are certain areas of study, which are NOT permitted for RP research:
 - No surveys/questionnaires are permitted.
 - No studies in psychology are permitted.
 - No historical studies are permitted.

Students often comment that the hardest part of RP is formulating the research topic. Once students know what they will be investigating, many aspects of RP fall into place. Some times of the year are more demanding than others. Being a good time manager is one of the keys to a successive RP project. Your S/T teachers will give you any assistance and support needed.

RP Grading Policy

I. Method of Computation

Grades are computed mathematically. Quarter grades are based on the numerical quarter average:

- 90% - 100% = A
- 80% - 89% = B
- 70% - 79% = C
- 60% - 69% = D
- Below 60% = E

II. Factors Considered in Determining Grades

The following factors will be utilized in determining a student grade on a quarterly basis:

- a. Assignments
- b. Components and preparation of chapters in research paper
- c. Logbook
- d. Attendance in class
- e. Attendance at internship (Interns only)
- f. Mentor evaluation (Interns only)
- g. Science Fair participation
- h. Oral presentations/discussions
- i. Symposium participation
- j. Final paper
- k. Team work

Due to the nature of this course, the weight of these factors will vary with each quarter. The general emphasis of each quarter will be:

- 1st: Research Project Development, Descriptive Statistics, Bibliography Search, Chapter 1, Logbook
- 2nd: Inferential Statistics, Chapters 3 and 2, Bibliography Development, Pilot Study with Data Collection, Logbook, Preliminary Data Summary
- 3rd: Data Collection, Data Analysis, Chapters 4 and 5, Logbook, Science Fair
- 4th: Poster, Symposium Participation, Formal Presentation of Research, Final Paper Evaluation, Portfolio

Assignments and Preparation

1. All assignments have a deadline specified by the teacher.
Assignments submitted after the deadline are subject to the following penalties:
 - 10% per day for the first three days**
 - A grade of zero will be given if the assignment is more than three days late.**

2. Missed classwork and short term assignments must be made up within one week of the absence. In case of extended absences, the work must be made up by individual arrangement with the teacher. It is the student's responsibility to schedule make-up time with the teacher.

Comments

Participation is an important factor in this course. Students will be expected to develop an independent research project and final paper.

STUDENTS ARE NOT TO BE OUT OF SCHOOL WORKING ON PROJECTS WITHOUT APPROPRIATE PARENT AND SCHOOL CONSENT.

Automatic Failure

Research Practicum is a major requirement for Seniors in the Science and Technology Program. Successful completion of Research Practicum requires consistent work and dedication by the student throughout the school year. Ample time must be allowed for both the collection and analysis of the data. Because the following three assignments are critical components of the course, **automatic failure for the year** will result if a student does not:

1. Participate in the Charles Herbert Flowers High School Science Fair by submitting an acceptable backboard and by presenting his/her research to the Science Fair judges.
2. Participate in the Research Practicum Symposium by submitting an acceptable poster and presenting his/her research during the Symposium. All five chapters must be submitted to and approved by the student's RP teacher prior to the submitting the poster.
3. Submit a final, **complete, bound** paper, which is acceptable to the Research Practicum teacher.

Students are responsible for maintaining a hardcopy and creating electronic backups of all work.

Any alteration or creation of data or plagiarism will result in a final grade of "E" for the course.

Signed by Student: _____

Signed by Parent/Guardian: _____