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Emerging Scientists Workshop – Project List

01- "Real Time Reaction Monitoring" (Chemistry A)
We are analyzing the means by which Lewis acids catalyze industrially relevant chemical reactions to increase efficiency and minimize waste products. For this experiment, you will use a live feed from a ReactIR to directly observe two molecules reacting with each other.

02- "Identification of Toxic Chemicals in Water Sources" (Chemistry B)
We are studying what potentially toxic compounds may be found in water from various sources (surface waters, drinking water, waste water, etc.) utilizing direct injection on a GC ion trap mass spectrometry. For this experiment, you will be involved in analyzing a standard solution of a compound known to exist in the environment. An environmental, tap and/or waste water sample(s) will then be analyzed to determine if the compound is present.

03- "Formation and Separation of Unnatural Amino Acid Conjugates" (Chemistry C)
We are developing optical probes for visualizing physiological processes occurring in the brain in health and disease. An important tool is unnatural amino acids tagged with optically active dyes. For this experiment you will be separating amino acid-dye conjugates via column chromatography.

04- "Surface Modification to Improve Semiconductor Properties" (Electronic Materials A)
We are studying the surface chemistry of the next generation of organic (plastic) electronics in order to minimize the device failures which occur at mismatched interfaces. For this experiment you will analyze bendable/flexible electronic substrates after stressing via a scanning electron microscope.

05- How to Study Proteins by Mutagenesis (Biochemistry A)
We are studying the different roles of individual amino acids in a protein. After we find amino acids that we hypothesize are important, we mutate them and analyze whether the protein activity was affected. For this experiment, you will purify by electrophoresis the gene that produces our protein, and how we can find with computational methods candidates for mutagenesis.

06- "Molecular Modeling of Pharmaceutical Interactions in the Body" (Computational Chemistry)
We are studying the pathways by which pharmaceutical dock within proteins to regulate active site behavior. For this experiment, you will use a molecular modeling program on our computer cluster and the results of molecular dynamics simulations to understand more about how the protein functions due to its motions.

07-Microscopy Studies of Gold Nanoparticles (Nanoscience A)
We are studying the effect of molecular switches on the collective electron oscillations within gold nanoparticles of various sizes. For this experiment you will utilize a transmission electron microscope (TEM) to view the 13 nanometer gold nanoparticles.

08- "Identification of Human Skeletal Remains" (Anthropology A)
We are studying how human skeletal remains are examined to assess their age and sex. This skill is of paramount importance in forensic contexts when an individual's identity is necessary for police investigations. For this experiment, you will be creating a biological profile of a human skeleton by

exploring the standard protocols and skeletal landmarks used by forensic anthropologists. ****Note, this project involves working with actual human skeletal remains****

09- "Confocal Expression Study of Embryonic Pattern Formation in Zebrafish" (Biology A)
We are studying the assignment of regional fates along the long axis of the vertebrate body using transgenic zebrafish. For this experiment, you will chart the dynamics of development using a confocal microscopy, which allows for visual reporting of data in real time in fish embryos.

10- "MicroCT Analysis of *Anolis* Lizard Toe-pads" (Biology B)
We study developmental processes that underlie diversification in species via anoles, which are a textbook model system for evolutionary biology. For this experiment, you will use microCT scanning to visualize the hard and soft tissues of anoles the size of a pencil eraser and use 3D printing to visualize the parts of the lizards that change over time.