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## Emerging Scientists Workshop – Project List

### 01- “Simulating Properties of Dyes via Computational Tools ” (Computational Chemistry)

We use computational tools to predict the properties of chemical compounds to narrow the range of molecular targets and justify observed phenomenon. For this experiment, you will use the Gaussian computation suite to calculate the optical properties of dyes/emitters for use in organic light emitting diodes.

### 02- “Preparation of Catalysts in Oxygen Free Environments” (Chemistry A)

We aim to design improved catalysts for unusually challenging reaction steps by designing transition metal centers supported by redox non-innocent ligands. For this experiment, students will attach the ligand to the metal center via solution phase reaction, observing changes to the metal core via appearance, while working with conditions completely free of oxygen.

### 03- “Evaluation of Light Usage in Cyanobacteria” – Biochemistry A

We are studying the mechanism by which cyanobacteria make efficient use of incoming light. For this experiment you will participate in using fluorescence spectroscopy to follow the partitioning of light usage in cyanobacteria.

### 04- “Development of Novel Molecules as Inhibitors for Antibiotics.” (Chemistry C)

We are synthesizing and screening new molecules for potential use as antibiotics to surmount the issue of antibiotic resistance. For this experiment, you will assess the ability of this molecule to inhibit activity of bacterial enzyme via colorimetric assay.

### 05- “How to Study Proteins by Mutagenesis” (Biochemistry B)

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- “Observation of Intercellular Interaction in Gonad Cells” (Biology A)

We are studying cell-cell interactions in somatic gonad cells for their role in tissue architecture. For this experiment you analyze the cellular cluster via a combination of fluorescence and optical microscopy.

### 07- “Optimizing Electrodes Deposited onto OLED Related Surfaces” (Materials Chemistry A)

We aim to generate better functioning OLEDs that are used in modern displays via modification of the surfaces/interfaces via chemical reactions. Students will use a scanning electron microscope to determine the topography/coverage of an organic thin film and determine the success of a reaction based on the elemental composition via EDX analysis.

### 08- “Identification of drug substances in medicinal plants” (Forensics A)

We are developing analytical methods to extract and identify drug substances in various types of medicinal plants. The work is a three-step process of sample preparation, extraction, and analysis by techniques such as gas chromatography, mass spectrometry, infrared spectrophotometry, thin layer chromatography, and color tests. For this experiment, you will participate in all three steps in the process from grinding the sample through to data interpretation."

### 09- “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\*\***

**10- “Confocal Expression Study of Embryonic Pattern Formation in Zebrafish” (Biology B)**

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.

**11- “Analysis of Metal Penetration in Electronic Materials” (Materials Science A)**

We are studying methods to eliminate the damage caused when metal electrodes are deposited onto sensitive organic electronic materials. For this experiment you will examine a thin slice of the metal-on-organic stack via transmission electron microscope (TEM) to observe the degree of penetration into these 30-100 nm thick samples.