

Science of Vision Course Proposal

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We are proposing a ninth grade science course, titled “The Science of Vision,” for New York City public schools and particularly the new maker-focused high school, Maker Academy. The goal for this project-based learning course is to give students an understanding of the fundamental concepts underlying light, color and vision through the use of technology. It is proposed as an elective course that would meet twice a week for an hour and a half. The curriculum for the course is divided into 3 sections. The order of the sections may alternate or occur consecutively, depending on the finalized lesson plans.

Section 1: Concepts and Processes

Section 2: Cameras and Mechanics

Section 3: Practical Applications

In **Section 1: Concepts and Processes**, the course will cover key concepts, such as, but not limited to, the light spectrum, darkroom chemistry development, stereopsis, digital sensors, pixels, optics and perspective, etc. Potential exercises may include darkroom development (if available) or building a camera obscura.

In **Section 2 : Cameras and Mechanics**, the physical mechanics of cameras and image capturing will be covered. Topics may include aperture as related to the eye,

field of view, focus, shutter speed and/or ISO sensitivity. Potential exercises may include high speed photography, time lapse photography and testing various cameras to find differences in depth of field, sensitivities and mechanics (SLR vs. point and shoot).

In **Section 3 : Practical Applications**, students will apply the knowledge gained in sections 1 and 2 into potential practical applications for the future. Some potential activities may include: aerial photography, pinhole camera, computer vision with Arduino/Raspberry Pi and exploring hardware modularity (magic lantern, flash units, lenses, etc.).

For the course final, students will be presented with a given problem; students should pick a particular area of interest to solve the problem in a unique way through deeper personal skill development. Badges or awards will be given to students that show mastery of their chosen skill focus.