Instructing at Hector Garcia Middle School
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By Kent Namikas, BMC – Secretary

On Thursday, January 27, the Billy Mitchell Chapter (BMC) taught electromagnetic principles to 8th grade students at Hector Garcia Middle School as part of the Chapter's Science, Technology, Engineering and Mathematics (STEM) program. Over the course of seven periods, BMC members taught over 500 students. The instructors were Mr. Kent Namikas, Mr. Ross Vincent, Captain Ajay Reddy, Mr. Gary Henley and Dr. Marius Necsoiu. It took several weeks to prepare for the classes. First Kent updated the presentation and a quiz on the material and had it approved by the school's STEM lead, Ms. Candace Schantz. Then it was time to start work on the demonstrations. Kent gathered things like an FM antenna, flashlight, handheld laser, slinky, prism and a mirror to demonstrate various electromagnetic principles. But by far the most important demonstration was the display of live radio signals. For that the Kent programmed a software defined radio to receive and display signals through a projector.

On the day of class, the instructors ran through the 45 minute briefing and demonstrations seven times for groups ranging in size from 30 to over 100. They began by running through some of the examples of how we use the EMS to sense, communicate and transfer energy. They also ran through a little wave theory as well as explaining the inverse relationship between frequency and wavelength. This led them to explain that one needs a bigger antenna to transmit and receive lower frequencies. The instructors selected students to come up and help demonstrate antenna theory as well as wave theory (with the slinky). They also discussed propagation and polarity, and went on to explain refraction, reflection and absorption. To demonstrate polarization they gave the students two polarized sunglass lenses to look at a polarized clock display. To demonstrate reflection they had a student direct a laser beam onto the screen while the instructor held up the mirror to reflect the light on the ceiling. They used the prism to demonstrate the refraction of while light into a rainbow of colors. Finally the BMC members described the Doppler shift and how it creates a blue and red shift caused by the movement of stars – a lead-in to the students' next block of instruction on astronomy.

For the climax of the class the instructors explained that the software defined radio setup they had put together was a fairly simple device that costs about $20 and could plug into most any computer. They further explained that the device is relatively easy to program. First they demonstrated the FM broadcast signals and discussed the importance of matching the bandwith

of the transmitted signal. Then they brought up one of the students and had the volunteer key the mike of the hand held radio. Their eyes light up when they saw the signal appear on the screen! The instructors had been talking about electromagnetic signals throughout the class but now the students could actually see them on the screen. Then the BMC members had the student talk into the radio causing the signal to shift around as the system displayed the frequency modulated transmission.

The students seemed to enjoy the class. In the end the instructors got as much out if it as the students and all agreed that we enjoyed it just as much as we did last year. Candace did a great job making us feel very welcome. This is the third year that we have conducted these classes and hopefully we are encouraging the students to study STEM. Who knows, maybe the BMC started a student on a path towards an electrical engineering degree!