

## **Advanced Physics**

2011-2012

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### **Course Description**

Advanced Physics at MCA is a class that immerses students in the world of high-tech robotics for the purpose of introducing them to practical aspects of science and technology. Ultimately, the goal is to open doors for the students to explore college majors, scholarship opportunities and eventually careers in a wide variety of fields touched by robotics – programming, design, construction, electronics, mechanics, finance, accounting, communication, art, fund-raising, public speaking, community organizing, and team-building.

### **Class Structure**

Seniors in the class are broken into teams along their natural bents and interests and lead younger students who are part of the larger MCA Robotics Club.

Students work along-side adult mentors that come from various sources in the community: tutors, technicians, engineers, electricians, programmers, architects, accountants and parent volunteers.

The end-product of the class is to build a full-scale, working robot to participate in regional and possibly national competitions in association with USFIRST.ORG, a nationally recognized and highly respected industry leader in the field of Robotics (recently featured in a full-length documentary by C-Span, all information available by going to the usfirst.org website). These competitions are in April, but preparation begins in September with fund-raising and entails workshops in Dallas and Lubbock in November and December. In January, an intense “build season” begins with a Kickoff Presentation in Dallas and ends with a robot “ship” date in late February. March is spent practicing with a duplicate robot, and April competitions can be expected in San Antonio, Dallas, and potentially St. Louis. September through November class time will be exciting! Students in the class are taught various aspects of simple robotics using Lego Mindstorm kits and progress to more sophisticated mini-robotic systems. Teams in the class will build robots to compete against each other for various incentive prizes.

### **Class Fees**

All students in the class are automatically required to be in the MCA Robotics Club. The club requires a \$75 participation fee that is used to initially purchase some of the robotics kits used in the curriculum. It also goes to pay for T-shirts, safety equipment and eventually meals and hotels during the competition season. Everyone joining the MCA Robotics Club must pay this fee to participate. Depending on the success of fund-raising (last year we raised over \$20,000 from individual and corporate sponsorships), this \$75 club fee may be the only fee an “MCA Robotics Club” member pays during the year.

All students in the class are also required to pay a \$125 fee for Kolbe personality testing that will be conducted during the first week of class. This testing and analysis is being provided for a reduced cost by Hermann Eben at TrimTab Solutions. The purpose of this testing is to identify students' natural tendencies in how they work at a task. Some students are high "fact-finders" that will want to know how all things work, while other students are high "implementers" and like to work with their hands to construct things. Some students are high "researchers" and make great programmers and game-strategists because they love to read the competition rules and find loopholes. Students who are high "quick-starts" tend to be the inventors and designers. Knowing tendencies is extremely crucial to running an effective team. The Advanced Physics class is essentially one big team that will need to accomplish large tasks on short deadlines. The information gained by the Kolbe testing is extremely useful to the student for the rest of their lives.

### **Class Schedule**

Classes will meet on Mondays at 10:00 AM and Wednesdays at 1:00 PM. Because the class relies so much on adult-mentors from the community that have regular jobs, there is also an evening class on Thursdays at 7:00 PM. Night classes will be used for adult mentors to teach electronics, pneumatics, programming, tool safety and many other topics that cannot be taught during the day.

### **Scholarship Opportunities**

Parents and students are encouraged to visit the [usfirst.org](http://usfirst.org) website and research scholarship opportunities that are available to students participating in a FIRST Robotics Club. A generic letter will be provided to students to seek some of the \$14 million dollars in scholarships that are available from industry sponsors.

### **Class Grades**

Each team within the class will have specific projects they will be expected to complete on a given time schedule for the good of the entire class. To the degree that other members of the class must work to complete that given project, a good or poor grade will be assigned subjectively under the "project" category, and a further good or poor grade will be assigned under the "participation" category. It is hard to hide when you are on a small team! Grades will be given for participation and results in class competitions, attendance at workshops, kickoff meetings and out-of-town seminars. Grades will also be given in the form of short quizzes or "tests" that may be created by the adult mentors to test the attentiveness and retention of their topic. For example, after hearing about electronics from Mr. Cole (an adult mentor), a basic quiz may be given regarding simple aspects of electronics (the RED wire is +, the BLACK wire is -, and it's not a good idea to stick these in your mouth when connected to a 12 volt battery!). After tool safety, a quiz may be given regarding the benefits or disadvantages of using a band saw without a safety guard. Many jobs are required to make a team function. Assignments may not always be "fair." A student who keeps the accounting books (a pretty easy job) may get the same grade as a student who has to load the robot and take it to San Jacinto Jr. High and perform a demonstration on their own time. A lot will depend on what is required and what the team needs at a critical moment. Participation on Thursday nights is mandatory and will be given a participation grade. If a quiz is given, it may or may not be made up. Extra credit is always possible to get a grade out of the gutter and into the manageable range. Communication of planned absences is crucial to a team running smoothly. Please let Mr. Snell know if you cannot attend a class session.

### **Second Thoughts**

If due to cost, class schedule or false impressions of what the class would be like, a student may drop or change elective classes IF SCHEDULES PERMIT within the first two weeks of school. Refunds will not be provided, since these are required to secure Mr. Eben's time. After two weeks, a student is in the class for good and failure to pass with a grade of 85% will mean a failure to graduate from MCA.

**Primary teachers** for the class are Dan Schantz with Dawson Geophysical (cell phone: 432-770-1155) and Jon Snell with MCA and Crownquest Oil and Gas (cell phone: 432-978-7042). Students are also invited to join the MCA Robotics Club group on Facebook, as many communications are conducted in this way.