



## Innovative Course Application 2007-2008

### Instructions:

1. Complete this application with care, remembering that if the course earns state approval, this application will be made available on the internet and may be accessed and referenced by the public.
2. Obtain the approval of your local board of trustees prior to submitting your application.
3. Submit your application via email as an attachment. Use "Innovative Course Application" as your subject line, and address the email to [curriculum@tea.state.tx.us](mailto:curriculum@tea.state.tx.us). **Submit your 2007-2008 application no later than February 27, 2007.** Expect a receipt confirmation within 5 business days.

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Name of applying district or organization: Coppell ISD

Complete mailing address: 185 West Parkway Blvd., Coppell, TX 75019

Contact person: Donna Carpenter

Contact person's email address: dcarpenter@coppellisd.com

Contact person's phone number, area code first: 214-496-6415

County District Number (if applicant is a Texas school district): 057922

Superintendent (if applicant is a Texas school district): Dr. Jeff Turner

Date of local board of trustees' approval of this innovative course application: [REDACTED]



Name of innovative course(s): **Lego Engineering**

(Only if this is an application for multiple levels of the same course may multiple course names be listed here. For example, an applicant may apply for approval of Latin Literature I and Latin Literature II with one submission.)

Number of credits that may be earned: **0.5**

Brief description of the course (150 words or less):

The Lego Engineering course is an optional entry point into the Engineering Pathway. Students who know nothing of engineering can enter through this elective course. This course is designed to give students a fun and exciting look at engineering. Students will explore team work, problem solving, programming, and design through a series of activities.

Essential Knowledge and Skills of the course:

(These should be presented in the same format as the State Board of Education approved Texas Essential Knowledge and Skills (TEKS). You may find samples of this format in Chapters 110 – 128 of 19 Texas Administrative Code (TAC) at <http://www.tea.state.tx.us/rules/tac/index.html>.)

1. Teamwork. The student will work on projects with at least one other student in a team environment. The student is expected to:
  - a. Share responsibility for project duties;
  - b. Communicate effectively with team member
2. Problem solving – The student solves problems, thinks critically, and makes decisions related to given projects. The student is expected to:
  - a. Use specified problem-solving strategies;
  - b. Apply critical-thinking strategies;
  - c. Apply decision-making techniques to the selection of solutions
3. Solving problems – The student uses appropriate LEGO programming solutions to solve project challenges. The student is expected to:
  - a. Design logic based programs that meet project requirements;
  - b. Create program algorithms that are clear and concise as required to complete the project
4. Solving problems – The student uses creativity and thought in the design process. Designs will be created such that they solve the project given. The students is expected to:
  - a. Create robot designs that work with the program to complete the project;
  - b. Use the materials given and stay within project constraints;
  - c. Use the engineering design algorithm to create solutions to project problems.
5. Communication - Communication is paramount to engineering. Students must be able to communicate effectively with peers, teachers, and others. The student is expected to:
  - a. Keep a daily journal of daily activities and goals for the next day;
  - b. Work with peers in a cooperative, productive manner;
  - c. Give oral presentations about major projects to the class. These presentations should be clear, concise and stay on the topic



Description of the specific student needs this course is designed to meet:

The purpose of this course is to increase student opportunities and exposure to the field of engineering. The course will provide students, specifically females and males who have never considered engineering, an opportunity to an exciting exploratory introduction into engineering design and principles. In much of the research related to science and engineering students, girls are portrayed as losing interest in science in greater numbers and sooner than boys. Their exodus begins in the middle school years, continuing through high school years and beyond. As a result, women only account for 23% of scientists and engineers (Holly McDonnell James, (2002). *Why do Girls Persist in Science? A Qualitative study of the Decision-Making Processes of Pre-Adolescent and Adolescent Girls*. Harvard University, Graduate School of Education.). Based on current research and the advice of Dr. Betsy Willis, with the SMU College of Engineering, our goal is to offer opportunities to increase the involvement of students, especially girls.

Major resources and materials to be used in the course:

The major resources used in the course will consist of a computer lab and Lego Mindstorm NXT Robotic kits. The kit includes Lego pieces, sensors and the Lego NXT computer.

Required activities and sample optional activities to be used:

Throughout the course, students will work with a partner in all activities. In the first part of the class, students learn to build and program robots that will complete a specific task. In the second part of the semester, students will build a “Kinesthetic Sculpture”. This is an open ended artistic project in which students are free to explore their creative side. There is no limit to the possibilities. The sculpture will be built out of the Lego kits and have motion and action as well. The final part of the semester will involve a “Soccerbot” challenge. Students will construct and program a soccer playing robot that will select a ball and shoot it into the goal. After the “Soccerbot” games, student teams will present a final report about their robot and the “Soccerbot” game.

Methods for evaluating student outcomes:

Students will be evaluated on each portion of the program. Since there is no one, single, correct way to finish a project, evaluation will be based on how well students meet the challenge objectives. Each challenge will present students with certain objectives, such as time requirements, size constraints, performance standards, etc. All of the objectives create a real-world constraint that engineers must face in the performance of their duties.

At the end of the Kinesthetic Sculpture project and the “Soccerbot” challenge, students must give a short oral presentation of their robot and its performance. Communication is a key to engineering and students will have to give an engineering presentation as part of the course.

Required qualifications of teachers:



Teacher will be certified in Technology Education 8-12. The teacher will be an instructor in the school's engineering program which is a defined Career and Technology pathway.

Additional information (optional):

This curriculum and material for this course is being developed with the TCU Education Department - Math, Science & Technology Institute, and the TCU Engineering Department