

Santa Barbara Unified School District
NEW COURSE APPROVAL

I. The teacher proposing the new course of approval will submit this completed form, along with 10 copies of the form, to the Administrative Curriculum Committee on or by _____.

II. If a new textbook needs to be purchased for the new course, please remember to complete the 'Request for Textbook Adoption (Non- Primary State Adoption)' form.

III. Description of Proposed Course.

Before you complete this form, please make sure that you have considered the following questions:

- Is there a similar course already being taught at another site?
- Have I looked through the district course catalog to make sure that the course doesn't already exist?

A. Title of course FIRST Science (Foundations in Rigorous Science Technologies)

B. Length of course (semester, year long) Year Long

C. ~~What type of learners will take the course?~~ Circle all that apply.

Special Education GATE English Language Learners

D. Description of the standards taught in the course. _____ Please see attached document that includes the standards.

If you need more room to answer the questions than what is allotted, please continue onto an additional sheet of paper and attach to form.

A. What A-G requirement does it fulfill? (High School Course only) G

F. Does the course have targeted ability level? If so, what is the designation of the course? (AP, Honors, College Prep) College Prep

H. Explain the rationale for the creation of the course. What need does it fulfill?

Please see attached document that includes the rationale and how it meets the needs of our students.

I. Describe the instructional materials used. Include the cost of instructional materials. All instructional materials are already on site.

I. Describe any other costs associated with the course. What will be your source of funding for these materials? Fieldtrips are a piece of this course and Title I funds will be requested through Site Council

J. What is the targeted grade level of this course? 9th grade students that are in the Algebra A,B,C series
Justification for targeted grade level See comments in attached document regarding justification

L. Describe how this course fits into the sequence of courses already being offered at your site. This will be a freshman level course that will prepare students to take all levels of science

M. What credential(s) are required to teach this course? Science Additional training? LeMaster literacy skills

N. Are there any partnerships with outside agencies? (businesses, community programs, colleges, grants). If yes, please explain. None at this moment

IV. Site Level Approval Signatures

[Signature] Date 4/3/13
Teacher Proposing Course

[Signature] Date 04/03/2013
Additional Teacher (Same Department)

[Signature] Date 4/2/13
Principal

[Signature] Date 4/3/2013
Department Chair

[Signature] Date 4/3/13
Head Counselor

The Administrative Curriculum Committee will review the proposed course and forward the proposal to all secondary sites for approval and review.

V. Other Site Level Approval Signatures.

Date of meeting in which the proposed course was discussed _____

☒ Approved

☐ Denied (include rationale for decision if denied)

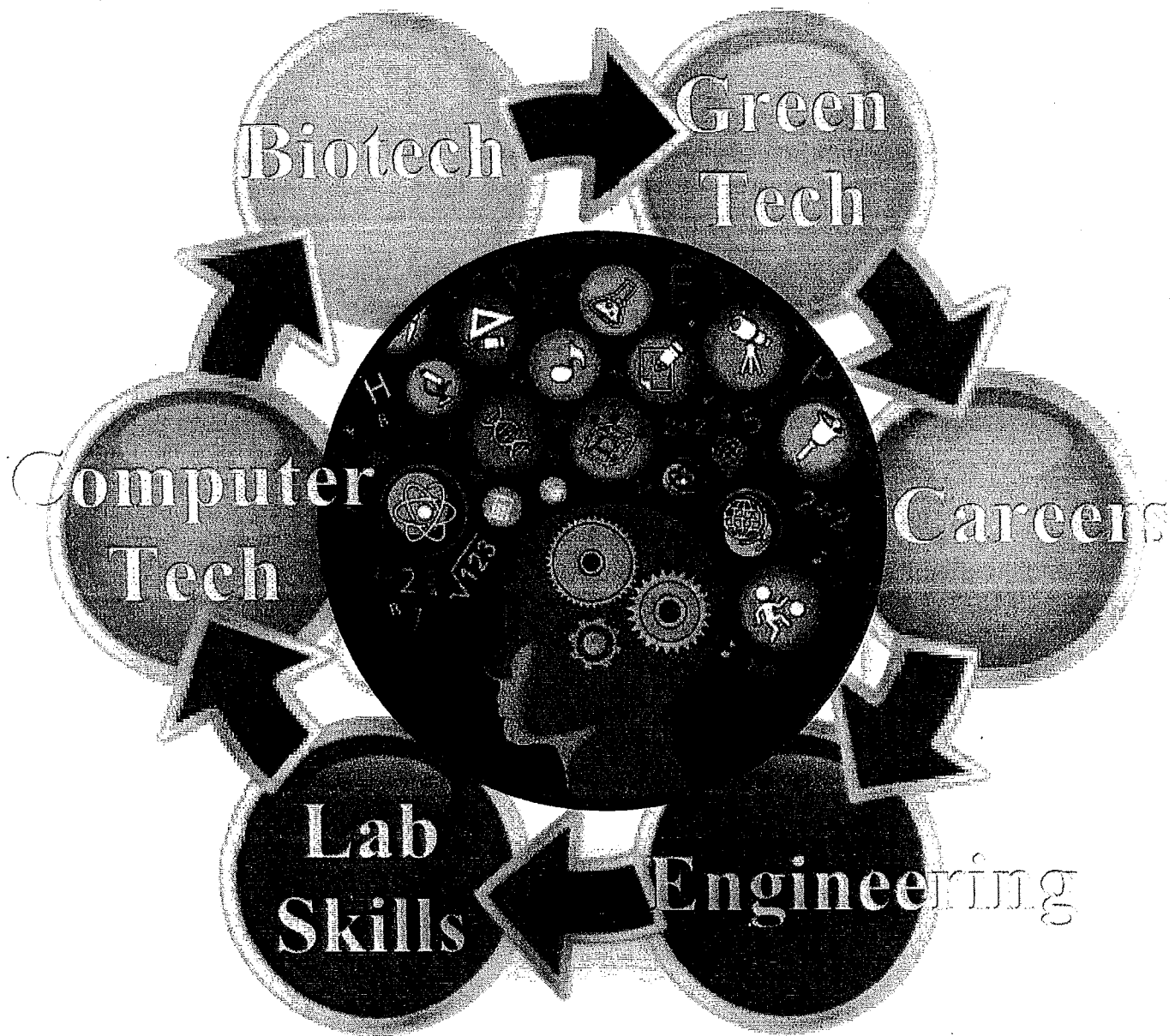
Chairperson of Department Date 4/9/13
 Olin Bausback, SMHS

After obtaining signatures, please forward this document to the Administrative Curriculum Committee at the District Office. This committee will review the forms and forward the completed proposal to the Associate Superintendent.

Associate Superintendent Date _____

Foundations in Rigorous Science Technologies

FIRST *Science*



Foundations in Rigorous Science Technologies (FIRST)

Course Description:

Foundations in Rigorous Science Technologies (FIRST) is a hands-on, standards-based course that will provide all students with a strong foundation for success in future science pathways and classes. FIRST will challenge students to make connections between various scientific disciplines while developing their observational, analytical, quantitative and technological skills--all of which will be necessary to compete successfully in the future global economy.

This course combines foundational studies in four distinct quarters: Computer Technology, Biotechnology, Engineering, and Green Technologies. Students will rotate through content specific 10-week quarters while exploring opportunities to use their developing skills in real-world applications and exposing them to an array of future careers in science. Each quarter, students will participate in hands-on labs and activities and attend at least one field trip that exposes them to rigorous careers in science, engineering and technology.

In order to prepare students for continued success in future and more advanced science classes, all four quarters of FIRST will encompass strategies for teaching disciplinary literacy in science in accordance with the Common Core Anchor Standards for Reading, Writing, Speaking & Listening and Language. Instructors of the course will work collaboratively to develop and implement strong literacy-based lessons that also meet some of the requirements for the Next Generation Science Standards.

How will this course address student needs better than current course offerings?

- This course will satisfy the UC “g” requirement as an elective, and will not constitute a lab science course. This distinction will enable the teachers to tailor the science content so that it is both accessible to the students and valuable to their future science classes without the added pressure of “getting through the standards”.
- The wide variety of material covered over the course of the four quarters (including an emphasis in science careers) is more likely to provide students with a “hook” to get them excited about future science courses.
- Students will not be “stuck” in a yearlong course covering one topic with one teacher. Students will start fresh every ten weeks with new opportunities for success.
- Content will be delivered in more manageable 10-week “chunks.” Students will see the light at the end of the tunnel, so-to-speak, from day one of each quarter.
- Students will gain an increased confidence, awareness, preparedness and enthusiasm for science courses and pathways offered at SBHS (Green Academy, Culinary Pathway, Health Careers Pathway, Computer Science, etc.) as well as for future careers in science and engineering.
- A small cohort of teachers will work together to develop a series of scaffolded lessons that teach strong study skills, as well as literacy skills associated with the Common Core. The instruction and development of these skills will become increasingly more sophisticated as students move from one quarter to the next, culminating in quarter-end and year-end labs/projects.
- Consistency in homework, lab-work and testing policies and expectations from quarter to quarter and teacher to teacher will be a key element of this course.
- Deliberate and scaffolded instruction for following both verbal and written instructions and increasingly complex lab procedures.
- Students will be exposed, or re-exposed, to several key science concepts that will be immediately necessary for success in future science classes. This will effectively eliminate the years-long gap between junior high general science and more content specific high school science.
- Students will demonstrate an understanding of technology, laboratory skills, scientific method, critical thinking, problem solving, verbal and written communication, and a variety of math skills.

Major Instructional Goals:

- Close the achievement gap and address Focus Goal 1, Student Achievement, as outlined by the Santa Barbara Unified School District's Board of Education.
- Apply and develop disciplinary literacy strategies for reading, writing, speaking & listening and language in science. The level of sophistication for each strategy will increase each quarter, as well as in following years of science. Teacher cohort will also work with and utilize LeMaster literacy teaching strategies.
- Prepare students to succeed in future CP, Honors and AP science courses at SBHS.
- Actively engage students in a more limited scope of science content while still maintaining academic rigor.
- Provide consistent and equitable classroom routines and policies that will enable students to feel comfortable while upholding high expectations for behavior, effort and work ethic.

Engineering

Description:

Through this course, students will become confident in applying the technical foundations of engineering. Students will...

- Take effective measurements using non-digital tools (e.g. rulers, beakers, analog devices).
- Collect consistently accurate data using technology (e.g. digital meters, LabPro transducers).
- Discriminate between useful data and erroneous data.
- Analyze data with Excel to predict future responses; extrapolate.
- Apply protocols to identify problems, attempt solutions, reflect on results, and repeat.

Lab Activity #1: Introduction to taking measurements.

- Description: Students will begin this course by learning how to use non-digital devices for gathering data on measurements such as length, time, force, voltage, and current. They will hand create graphs of the data and predict future responses.
- Skills: Collecting measurements and readings from non-digital devices. Analyzing those devices for accuracy and reader-error. Extrapolating.

Lab Activity #2: Introduction to LabPro software and data collection.

- Description: Students will upgrade their method for data gathering by using the LabPro and Excel software. Similar data as in Lab Activity #1 will be collected and represented digitally.
- Skills: Applying technology to simplify collection and improve accuracy of data. Analyzing those devices for accuracy and reader-error. Extrapolating.

Lab Activity #3: Electronics

- Description: Students will use digital multimeters to analyze the electric circuits they create. Circuits can control a blinking light's frequency, a motor's rate of rotation, or the frequencies created by a mini-speaker.
- Skills: Constructing electric circuits to control the output. Analyzing electric circuits with technology.

Lab Activity #4: Electric Motor

- Description: Students will begin their exploration of electromagnetism by creating an electric motor. They will create and test different shapes, sizes, and voltages.
- Skills: Testing variables to maximize results. Reporting of results verbally and in writing.

Cumulative Lab/Project: "Lows, Mids, or Highs"

- Design Challenge: A customer is shopping for custom made speakers she wants installed in her car. She has a limited space (volume specification), an existing amplifier (power specification), and needs a subwoofer, midrange speakers, and tweeters (frequency specification). In teams of three, design and create the three speakers to meet her demands.
- Skills: Converting a set of required specifications into a physical product that meets or exceeds those specifications.

Potential Guest Speaker: Design Engineer

Design engineers are presented with a problem and asked to design a solution. This course will provide students with similar circumstances. By interacting with a design engineer, students will discuss the steps and protocols necessary for successfully approaching a design challenge, including working in a team.

Field Trip: Sonos

Sonos is an audio equipment company headquartered in Santa Barbara. A visit to Sonos would provide useful information for students and their final class project/lab: create a speaker to meet the specifications of a tweeter, mid, or sub speaker. Students would be able to discuss their design ideas with the engineers and receive industry feedback.

Biotechnology

Description:

The biotechnology portion of the FIRST course will introduce students to three main areas in biology: cells, genetics and the cardiovascular system, while applying an emphasis in medical and biotechnology. Students will

- Make careful observations about the natural world
- Communicate their observations verbally and in writing
- Perform lab techniques accurately in the interest of collecting and analyzing data
- Make connections to real-world applications in biology and medicine
- Demonstrate an understanding of the relationship between cells, whole organisms and the use of biotechnology.

Lab Activity #1: Animal cell slide preparation and examination.

- Description: Students will prepare slides of their own cheek cells and identify cellular structure under a microscope.
- Skills: Microscope skills, following step-by-step written instructions, making observations and creating accurate illustrations.

Lab Activity #2: DNA Extraction and Analysis

- Description: Students will get a macro view of DNA after extracting it from a strawberry or other eukaryotic organism.
- Skills: Following step-by-step instructions, demonstration of proper science lab techniques, making accurate measurements and observations.

Lab Activity #3: DNA Fingerprinting

- Description: Students will model the DNA Fingerprinting process in order to prepare them for a future lab where they will conduct a real fingerprinting procedure.
- Skills: Following complex directions, cooperative lab work, analyzing DNA banding patterns, group presentation skills.

Lab Activity #4: Circulatory System and Heart Rate

- Description: Students will conduct measurements of heart rate before and after exercise and make connections between a healthy lifestyle and healthy heart.
- Skills: Taking and recording accurate measurements, graphing skills, scientific method, presentation skills.

Lab Activity #5: Heart Dissection

- Description: Students will dissect a sheep heart and identify major structures as well as the pathway of blood flow.
- Skills: Following instructions, cooperative lab work, creating and analyzing anatomy diagrams.

Cumulative Lab/Project: DNA Detectives: Heart Disease Genes

- Description: Students will research several possible disorders affecting a case study, create a hypothesis, conduct research and use gel electrophoresis to identify the presence of a heart disease gene.
- Skills: Research skills, scientific method, follow detailed lab instructions, demonstrate correct use of biotech equipment.

Guest Speaker:

Speaker on applications of gene therapy? Stem cells? Cardiovascular system & heart disease?

Field Trip:

UCSB Stem Cell Lab? UCLA Medical School and Anatomy Lab?

Computer Technology

Description:

The questions that the computer technology course will answer are:

- What is a computer?
- How do they work?
- What is the Internet?
- What careers are available in computer technology?

While finding the answers to these questions the students will learn:

- E-mail etiquette
- How to research on the internet and think about the reliability of source material.
- How to use spreadsheets
- Intro to programming
- What is a macro is and how to use them
- HTML and CSS (Building Websites)
- How to build a computer
- How to independently find answers to problems

Labs and Project Ideas:

- Taking apart and building a computer
- Program a simple game
- Design and build a website
- Program a macro to automate a repetitive task

Possible Guest Speakers:

- Jesus Orozco
- District Technology Engineers/Technicians
- Cox Engineers
- UCSB Students/professors

Possible Fieldtrips:

TBD (Lots of high tech in Goleta)

Green Tech focus

Description:

The focus of the Green Technology portion of the course will be on energy. Students will examine the environmental effects of burning fossil fuels as opposed to getting energy from alternative “green” sources. Students will investigate both advantages and limitations of alternative energy sources and compare them to the advantages and limitations of traditional fossil fuel energy sources. Investigation will include introduction to chemistry, the periodic table, chemical reactions through combustion and stoichiometry. Students will also engage in exploration of physical properties of energy production through solar panels, wind turbines and geothermal energy sources.

Project and Lab Ideas:

- Physics: Conservation of Energy. Examine energy production through solar panels. Exploration of transporting and storing energy.
- Chemistry: Latent heat examination through combustion reactions examining efficiency and the effect of reaction products.
- Physics: Methods and rates of heat transfer. Examination of the effects of added heat in to the atmosphere

Culminating Project:

Students will be presented with the issue of meeting the energy demands of a city/municipality. They will explore, design and problem solves the best ways to meet energy demands while having the least impact on the environment.