



# Biotech Expo Contest Instructions

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<http://biotechsystem.ucdavis.edu>

**"SCIENCE & TECHNOLOGY MAKE THE WORLD A BETTER PLACE!"**

The world needs bright students to tackle global challenges in agriculture, medicine and environmental conservation... ...In other words, we need YOU!

## About the Contest

Through Biotech Expo, you'll discover more about cutting-edge life technologies being used to treat and cure diseases, clean up our land and water, and feed the growing populations of the world. Life science or "bio" technologies are tools and processes developed by scientists and engineers that use cells or components of cells to create useful products and address global challenges. We hope that you will be inspired to dream of the challenges you might tackle by pursuing studies and a career in science and technology.

Participants in Biotech Expo must be in grades 6-9 and may work individually or in teams of up to three students. Students will choose a biotech topic and develop a poster to illustrate how that life science technology impacts our world. Imagine that your audience includes students your age and members of the community that may not know about this topic. **Posters submitted in each of the seven focus areas will be judged at the Biotech Expo Poster Symposium on the evening of Friday, May 11, 2012. Judges will include local scientists and educators, awarding 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> or Honorable Mention recognition prizes at the event. The Apprentice (Grades 6-7) and Master (Grades 8-9) levels will be judged and awarded separately.**

Use creativity in designing the poster and select interesting images, photos, and original artwork to illustrate the biotech topic. Follow the directions below in writing about your biotech topic. Most importantly, have fun!

## **A. Poster Content & References**

### **\*\*STEP 1\*\***

Choose a biotech research topic from one of the following seven focus areas:

- **Agricultural Biotechnology**



Genetically modified plants and animals have allowed scientists to increase food production, enhance the nutritional content of foods, decrease pesticide use, produce less industrial waste and clean up toxins in the environment.

Possible topics: Animal Cloning; Genetically Modified Crops; Bioremediation (genetically engineering microbes or plants to clean-up pollutants in soil and water); Pharming and/or Plant-Made Products (genetically engineering plants to make vaccines, drugs, enzymes and other useful molecules); Super Foods (making plants with increased vitamins & nutrients...like "Golden Rice" or "Super Cassava"); etc...

- **Biofuels**

Harnessing the metabolic and photosynthetic talents of algae, microbes and feedstock plants, scientists are exploring new sources of biofuels and clean, green energy.

Possible topics: Algal Production of Hydrogen Gas; Biodiesel Production; Biomass Conversion & Making Cellulosic Ethanol; Identifying or Genetically Engineering the "Perfect" Biofuels Crops; etc...



- **Biomanufacturing**

Scientists are using genetically engineered cells to produce useful molecules for people, including vaccines, cancer therapeutics, enzymes and other industrial precursors.



Possible topics: Cell Transformation; Cloning; Drug Design; Fermentation Technologies; "Green Chemistry"; GM Microbes (production strains); Industrial Enzymes; Vaccine Production; etc...

- **Biomedical Engineering & Nanotechnology**

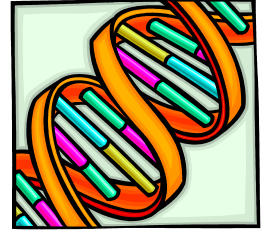
Development of molecular imaging technologies, synthetic and living materials that will integrate with the human body, molecular diagnostics, therapeutic nanoparticles & nanomachines, and robotics are revolutionizing basic research and medicine.



Possible topics: Biomaterials; Biomechanics; Biophotonics (using lasers in medicine); Biosensors; Brain-Computer Interfaces (BCI or B2B technologies); Cryobiology; Diagnostic Devices; GM "Therapy Delivering" Microbes; Gene Therapy; Medical Imaging; Nanoparticles to Target & Kill Tumors; Quantum Dots; Prosthetics & Implants; Robotic & Virtual Surgeries; etc...

- **Genetic Testing & Forensics**

"DNA fingerprints" may be used to identify organisms, track infectious microbes, establish relationships between people and/or identify specific individuals. Genetic tests may yield information on a person's disease risks and other important medical traits. *(Note: Biotech Expo posters should focus on "biotech forensics", which is limited to the use of DNA or cellular materials to identify individuals. Please do not include other forensic or crime scene topics, such as "dusting" for actual fingerprints, dental impressions, etc...)*



Possible topics: Animal Genotyping; Crime Scene Analysis (DNA fingerprinting using STRS, CODIS database); Detecting Biological Weapons; Food Safety (testing for microbial & viral contaminants); Genetic Testing; ID Human Remains; Paternity & Relationship Testing; Tracking Infectious Microbes & Viruses (MRSA, SARS, Swine Flu/H1N1); Wildlife Management/Monitoring Endangered Species; etc...

- **Genomics & Life Science Informatics**

It is a great challenge for scientists to decode and analyze the genomes (ALL of the genetic information) of living cells. We now have billions of base pairs of DNA sequence data available for many different organisms!

Life science informatics involves the storage, analysis and electronic sharing of large batches of biology-related data, such as DNA sequences, protein sequences & structures, biotech patent information, and patient data (medical records, clinical trials, personal genomics). Scientists in this field often have training in molecular biology and information technology.



Possible topics: Comparative Genomics; Genome Projects (HGP, others); Phylogenetics (reconstructing the "Tree of Life"); Metagenomics (microbes exist that we can't see or culture...); NCBI Databases (Entrez Gene, MapViewer, Online Mendelian Inheritance in Man...); Personalized Medicine (23andMe, deCODE, SNP's, The International HapMap Project); Synthetic Genomics (building cells "from scratch"); etc...

- **Stem Cells**



Scientists are looking to stem cells for new ways to repair damaged and diseased organs, ultimately improving the length and quality of human lives. California has a "head start" in the field of stem cell research and students should seriously consider acquiring skills and expertise in stem cell technologies, as this new field of medical science is likely to expand in our state.

Possible topics: Allotransplantation; Bioprinting; Reproductive Cloning; Stem Cell Therapies; Synthetic Organs; Tissue Scaffolds; Xenotransplantation (transplanting cells or tissues from one organism to another); etc...

For suggested online references in each of the above focus areas, visit the Biotech Expo webpage ([http://biotechsystem.ucdavis.edu/biotech\\_expo.cfm](http://biotechsystem.ucdavis.edu/biotech_expo.cfm)) and click on the focus area links.

### **\*\*STEP 2\*\***

For each of the content section headings, I. Topic Background, II. Biotech Innovators, and III. Ethical, Legal & Social Issues, found below (beginning on page 5) write one or more paragraphs using standard English grammar and spelling:

To help you get started, we have included questions to consider when writing the text. Please answer these questions and feel free to add other related information. Try to include only factual, scientifically supported information in designing your poster.

For each statement that you make when writing, think about whether it is:

- your opinion
- something that most people know, or
- a fact that you read in a book, on a website or in a magazine.



If you are stating a fact that you have found in one of your references, indicate this at the end of the sentence by putting the author's name and the date that the information was published. This is called "in text" citation. Here is an example of "in text" citation, supposing that I am writing a sentence using information I found in an article written by Edna Jones in 2001, for the Sacramento Bee:

Stem cell researchers are working to develop methods that will allow them to grow new organs in beakers (Jones, 2001).

If you use text taken directly from a written or online source, please put quotation marks around the text and indicate the original source by using the author's name and date of publication, as well.

"The most common way to transfer genes into human cells is through the use of retroviruses." (Bourgaize, et. al., 2000)

If you are stating your own opinion or making a very general statement that everyone already knows to be true, such as 'Birds fly by flapping their wings', do not worry about using an in text citation or finding a reference to support the statement.



For scientists, looking up references to find out what other scientists have been doing is part of the daily routine. It is considered very bad manners and highly unethical to use another scientist's work without giving proper credit, so be very careful to use "in text" citations and let your readers know where you've gathered the Biotech Expo Poster facts!

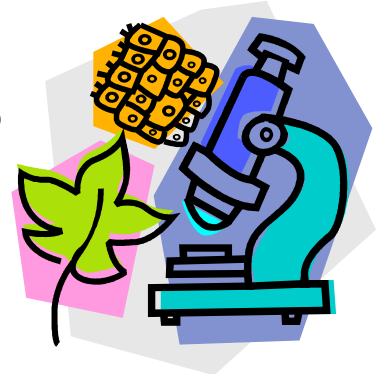
The last section of your poster will be "IV. Reference List". Find specific details on how to make a reference list in STEP 3 (coming up soon!). Remember, all of the references cited "in text" while you were writing your paragraph(s) should be on the reference list.

### I. Topic Background

Provide a general overview of your chosen biotech topic and the corresponding focus area. Include photos, graphs, charts and other eye-catching visuals to help people understand your topic. Be creative—you may use any combination of the visuals mentioned above in artistically designing your poster.

Questions to consider:

- When did scientists first begin working in this area of biotechnology? Make a timeline of major discoveries related to this field. Who were the key scientists and/or organizations involved in developing this area of biotechnology?
- Is this field/application of biotechnology still under development--if so, what do scientists hope to accomplish in the next few years?



### II. Biotech Innovators: Research & Economic Impacts

Identify at least one biotech product and/or service available to the public as a result of a scientific discovery in your topic/focus area. Who has helped in making this invention/discovery available to the public (i.e. individual scientists, research universities, biotech companies, government regulatory agencies, etc...)?



Questions to consider:

- What is the name and function of the biotech product/service you found?
- How has this biotech product/service helped the average person in our society?
- Are there new technologies under development or recently released that address the same problem/need as the product/service that you identified?
- Where does research in your topic area occur? At universities? Government agencies? Biotech companies? All of these?
- Has this biotech product/service had a positive or negative impact on our economy (i.e. creation of a new industry, new jobs, etc...)? If possible, find the name of a biotech company that works in this topic area.



### III. Ethical, Legal & Social Issues

Throughout history, new technologies have had a large influence on human health and nutrition, daily habits, migration patterns, competition for resources, cultural values, laws, etc... Discuss the possible impacts that your biotech topic has had on our society and any future impacts that might occur. Also, discuss any ethical or legal issues that apply to your topic. Try to present an unbiased, balanced look at the ethical, legal and social issues involved (both the "pros" and "cons").



Questions to consider:

- Why should people support biotech research in your topic area? Who will benefit most from discoveries in this topic area?
- Do scientists have ethical and legal obligations to serve the community at large? Keep in mind that most scientific research at public universities is paid for by tax-payers (the adults in your household!).
- Before working on this project, had you seen any information on this topic in the newspaper, in magazines or on the evening news? Do you think that the average person knows enough about this topic? Or should learn more? Why?
- Look up the term "intellectual property". Who "owns" the ideas or discoveries made in your biotech topic area? The public sector/government? Individual scientists or universities? Private sector companies?
- Currently, is there a good balance between rewarding researchers and effectively sharing scientific discoveries for the benefit of mankind? Whose job is it to make sure that beneficial discoveries are shared?

### \*\*STEP 3\*\*

In the bottom right-hand corner of your poster, list all of the references used in compiling the information displayed on your poster in APA format.

#### IV. Reference List

You may use books, scientific journal articles, newspapers, magazines and online media sources as references. When referencing source material, it is important to indicate the authors, the title of the reference, when it was published, the name of the publisher, which sections or pages you used, etc...

Professional writers in different fields use different formats to put together reference lists. For Biotech Expo, we will use a common format, American Psychological Association or "APA" format to construct the reference list.

Here is an example of the APA format for a General Book:

Author, A. A. (2002). Title of work. Location: Publisher.

Here is an example of the APA format for an Article in an Internet Newsletter:

Glueckauf, R. L., Whitton, J., Baxter, J., J., Vogelgesang, S., Hudson, M., et al. (1998, July). Videocounseling for families of rural teens with epilepsy -- Project update. *TelehealthNews*, 2(2). Retrieved from:  
<<http://www.telehealth.net/subscribe/newslettr4a.html>>

See pages 10-11 of these instructions for more examples of APA formatting.

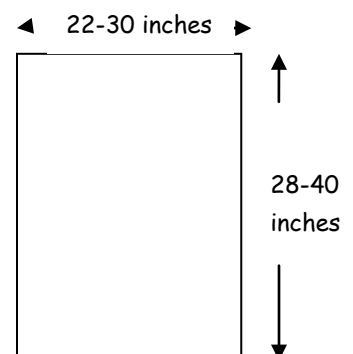
## B. Poster Basics

### a. Size and Shape

- i. Use portrait orientation\*
- ii. Minimum size 22" width x 28" height
- iii. Maximum size 30" width x 40" height

### b. Content Layout (see the page 9 of these instructions for a sample poster layout)

- i. Poster title & Student Information *at the top*
- ii. I. Topic Background *near the top*
- iii. II. Biotech Innovators: Research & Economic Impacts *near the middle or bottom*
- iv. III. Ethical, Legal & Social Issues (ELSI) *near the middle or bottom*
- v. IV. Reference List *at the bottom*



**c. Appropriate Content**

- i. Do not include any explicit language or images
- ii. For safety, we request that contestants do not include any personal images or contact information, such as phone #'s or email addresses, on the poster
- iii. Posters with inappropriate content, as determined by the judges will be disqualified from the contest

**d. Readability**

- i. There are no restrictions on background colors, text colors, etc..., but keep in mind that judges will be scoring the posters on their readability and usefulness in conveying the biotech topic information. If your poster is difficult to read or understand, it is not likely to score well. We recommend that students use background-text combinations that are easy on the eyes (ex. black text on light colored backgrounds, white text on dark colored backgrounds, avoiding very bright or fluorescent text, etc...). When in doubt, ask a classmate, sponsoring teacher, or trusted adult to take a look and offer an opinion.
- ii. Use your best grammar and spelling on the written portions—this will be part of the scoring, as well. Have a sponsoring teacher or parent proofread the poster.

## **C. Poster Title & Headings**

**a. Position**

- i. Center your title approximately 1 inch from the top and sides of your poster board.

**b. Style**

- i. Capitalize all of the major words in the title.

**c. Text Size**

- i. Students using a word processing program (i.e. Microsoft Word) to print their poster titles should use a minimum 60pt font and may choose any font style (remember—the more readable, the better).
- ii. If hand-lettering your title or using stencils, please use a minimum of 1.5 inch tall letters.

**d. Student Information**

- i. Centered directly under your title, include your name, grade and school; this information should be slightly smaller in size/font (~48pt), relative to the poster title.

**e. Section Headings & Text**

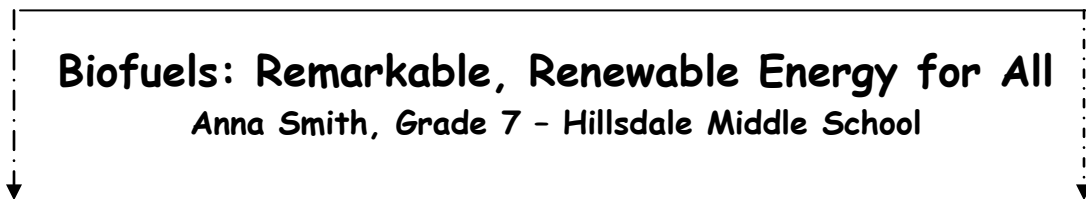
- i. Use these four section headings (48pt font) to define areas of your poster:



1. I. Topic Background
  2. II. Biotech Innovators: Research & Economic Impacts
  3. III. Ethical, Legal & Social Issues
  4. IV. Reference List (use APA format <http://www.apastyle.org/>)
- ii. Use ~24pt font (minimum of 18pt font) to write the text for each section I-III, section IV may use 16pt font to list references if space is limited.

Keep in mind that poster clarity and legibility will play a significant role in judging decisions, so keep it neat!

Example Poster Title:



An example poster layout is provided below. Contestants may follow this template or change the shape and orientation of content sections, with the exception of the Poster Title/Student Info (*must stay at the top*) and the VI. Reference List (*must stay at the bottom*). Background colors, text colors and styles, the location of images, photos, artwork, etc... will hopefully vary between posters...let's see what you can do! Unleash your inner artist!

