Course Description: Green Urban Design and Technology

Course Purpose: This course serves as one of a sequence of college preparatory, career-technical education courses in a four year Green Academy program of study. The purpose of this course is to provide students knowledge, skills, and values associated with sustainable urban design. The 10th grade CTE course will guide students about how to become environmental leaders on the school campus. This 11th grade CTE course will build on that knowledge, educating students about the health and structure of their larger community. They will be able to apply the principles they learn to making one aspect of their community more sustainable.

Course Objectives:

1. Students will demonstrate knowledge and understanding of methods of sustainable urban planning and design, and insight into research and development in urban design and urban development.

3. Students will demonstrate the ability to integrate critically and systematically knowledge and skills acquired in urban design and sustainability as well as green technology.

4. Students will demonstrate an ability to communicate observations, findings, processes, and products in writing and in oral and visual presentations that involve various degrees of challenge

5. Students will demonstrate an ability to plan and design green urban structures

6. Students will demonstrate an ability to make decisions in the field of sustainable urban planning and design with consideration of relevant scientific, technological, ethical, social, and environmental aspects.

7. Students will demonstrate an awareness of the decisive influence of sustainable urban planning and design on the living environment of human beings and other living creatures

Standards addressed include:

Social Studies Standards

Historical and Social Sciences Analysis Skills:
Chronological and Spatial Thinking: (1) Students compare the present with the past, evaluating the consequences of past events and decisions and determining the lessons that were learned. (2) Students analyze how change happens at different rates at different times, understand that some aspects can change while others remain the same, and understand that change is complicated and affects not only technology and politics but also values and beliefs. (4) Students relate current events to the physical and human characteristics of places and regions.

Research, Evidence, and Point of View: (1) Students distinguish valid arguments from fallacious arguments…; (4) Studnets construct and test hypotheses; collect, evaluate, and employ inforamtion from multiple primary and secondary sources; and apply it in oral and written presentations.
11.8 Students analyze the economic boom and social transformation of post-World War II America. 11.8.6 Students discuss the diverse environmental regions of North America, their relationship to local economies, and the origins and prospects of envrionmental problems in those regions. 11.8.7 Students describe the effects on society and the economy of technological developments since 1945…11.11.5 Students trace the impact of, need for, and controversies associate with environmental conservation, expansion of the national park system, and the development of environmental protection laws, with particular attention paid to the interaction between envrionmental protection advocates and property right advocates.

Science Standards

Biological Science Standards (partial listing)
6.c Students know how Earth's climate has changed over time, corresponding to changes in Earth's geography, atmospheric composition, and other factors...; 6.d Students know how computer models are used to predict the effects of the increase in greenhouse gases on climate for the planet as a whole and for specific regions. 7.b Stduents know the global carbon cycle: the different physical and chemical forms of carbon in the atmosphere, ocean, biomass, fossil fuels, and the movement of carbon among these reservoirs. 8. Students know that life has changed the Earth's atmosphere, and that changes in the atmosphere affect conditions for life.

Investigation and Experimentation

1. Students know that scientific progress is made by asking meaningful questions and conducting careful investigations. 1.d Students formulate explanations by using logic and evidence. 1.h Students read and interpret maps. 1.l Students analyze situatuions and solve problems that require combining and applying concepts from more than one area of science. 1.m Stduents investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings.

CTE Foundation Standards

2.2 Communication:
(1.6) Develop presentations by using clear research questions and creative and critical research strategies (e.g., field studies, oral histories, interviews, experiments, electronic sources)

2.3 Written and Oral English Language Conventions
2.4 Listening and Speaking Skills including delivery of a research presentation.

3.0 Career Planning and Management
Students understand how to make effective decisions, use career information, and manage personal career plans. (3.1-3.7)

4.0 Technology
Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments (4.1-4.3)

5.0 Problem Solving and Critical Thinking
Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques (5.1-5.3)

CTE Energy and Environmental Technology Pathway

B1.0 Stduents understand energy resources and the effects of these resources and systems on the environment.
B2.0 Students understand the environmental implications of energy convrstion processes and energy transmission systems.
B3.0 Stduents understand the applications and envrionmental effects of energy extraction processes, energy convervation systems, and storage systems.
B4.0 Students understand and apply specific career preparation and planning requirements for employment in the envrionmental technology industry and understand how these requirements apply across all

standards for students planning to successfully enter or advance in the industry.

CTE Environmental and Natural Science Engineering Pathway
E2.0 Students study and understand the fundamentals of earth science as they relate to environmental engineering:
E3.0 Students understand the effects of the weather, the hydrosphere, and the atmosphere on the environment:

E5.0 Students understand the design process and how to solve analysis and design problems:
E.5.1 Understand the steps in the design process; E.5.2 Determine what information and principles are relevant to a problem and be able to justify choices in determining a solution. E.5.3 Choose between alternate solutions in solving a problem and be able to justify choices in determining a solution. 3.5 Understand the process of developing multiple details into a single solution. E.5.6 Build a protoype from plans… E.5.7 Evlauate and redesign a protype on the baisis of collected test data.
E9.0 Understand the effective use of environmenatl and natural science equipment.

Course Outline:

(*=writing assignment, **=reading assignment, ***=technology based, != career focus, Q=quiz, T=Test, R= Research,)

Semester 1

Unit 1: Geography Shapes an Urban Society (3 weeks)
In this unit students will:

1. Learn fundamental elements of geography including climate, weather patterns, atmosphere (Physical Geography: The Global Environment)**.
2. Analyze how geography shapes the development of cities. *, **
3. Learn how to navigate and collect feature data such as points, lines, and polygons using using a compass and a Trimbell Global

Positioning system (GPS unit). Students will download data points into a geographic information systems environments (ARCs)
4. Analyze fundamentals of reading paper maps ** R
5. Analyze the functions of major on line mapping tools including Google Earth and Google Maps. ***
6. Compare and Contrast digital and paper forms of mapping. *
7. Learn fundamentals of working with a Smart board and PowerPoint to make a presentation***, !
8. Research and present a case study of how a geographic element effected the development of a city. *, ** T

Text: Section 1 of the Urban Design Toolkit: Understanding the Urban Context and Character

Unit 3: Green Building (3 weeks)

In this unit students will:

1. Analyze the elements that make a sustainable building site * and **
2. Analyze sustainable building materials. * and **
3. Evaluate the components of a LEED certified building. * and **
4. Use paper sketching to create a 3 dimensional model of a sustainable building. Q
5. Learn Goggle Sketch Up to design a model of a new sustainable building. **, ***
6. Learn how to use Google Earth within Google Sketch up to put a model at a sustainable site. **
7. Hear from a group panel about career opportunities available within this field. *!
8. Visit with the group the San Leandro LEED certified Senior Center. *!
9. Present to the class their own redesigned sustainable building on campus using the Smart board, PowerPoint, and Sketchup*** T

Text: *Sustainable Urbanism*, Chapters 1, 2, 3

Unit 4: Green Transportation (3 weeks)

In this unit students will:

1. Evaluate various automobiles and their emissions rate. * and **
2. Analyze road systems and their implications for urban development. * and **
3. Distinguish key structural and functional elements of bridges, boats, and rail. **
4. Analyze the relative cost and benefits of types of transportation within an urban environment. * and **
5. Students will question a panel of experts in the field of green transportation including (Cycles of Change and Safe Routes to

School, Transform, MUNI) Students will take notes and summarize learnings. Students will reflect on relationships between the work of the "green transportation experts and concepts read about and discussed in class. *

6. Visit web-sites such as Walkscore and Public Transport Accessibility and write summaries of what can be found on each of the sites: http://www.intelligentspace.com/modelling/transportaccessiblity.htm http://walkscore.com , R
7. Explore the use of accessiblity assessments using data from their own class regarding how each student travels to and from school. Students will identify barriers to accessibility and resources available to address those barriers. Students will develop an accessibility action plan. R

Text: *Sustainable Urbanism*, 1,2

Unit 5: Green Public Spaces (2 weeks)

In this unit, students will:

1. Read and compare/contrast three different case studies on green public spaces in specific locales. Students will also make recommendations for the Bay Area based on their new learnings. * and **
2. Students will read and respond to an article about what makes a public space and its role in society. **, *
3. Analyze on line examples of public spaces and artwork through images and Google earth ***
4. Analyze what makes a public space part of a sustainable space (Text excerpt: Sustainable Urbanism)** and *
5. Visit a local skate park to analyze its design in light of our readings about open space and the community *!,

Unit Q and Semester Exam, including essay questions

Text: *Sustainable Urbanism*, pt. Chapter 8; sections on "Open Space"; "Public Darkness"; "Walkable Streets and Networks"

Semester 2

Unit 6: Green Business (2 weeks)

In this unit students will:

1. Analyze several articles from business magazines to determine what makes a strong business. *,**
2. Read and respond to an article about green washing and false advertising *,**

3. Analyze criteria for green businesses * and **
4. Create a model of their own green business **
5. Tour the Moutainview campus of Google to learn about their green model program. *!
6. Use various technology including the Smart board , PowerPoint, and Google Earth to present their green business in its urban location. ***

Text: Sustainable Urbanism,

Unit 7: Green Public Health (2 weeks)

In this unit students will:

1. Use the city of Chicago case study to analyze the public health problems created by extreme pollution and proposed solutions. They will further analyze how this model may have created a better health for the community and quality of life.**, *
2. Indivdiually research health issues that have resulted from the areas of air pollution, water pollution, poor waste management, and overpopulation. They will use their research to share with a small group potential disease hazards and potential solutions.
3. Question and Answer session with our on site health facility about types of issues seen in The community ., *!
4. Analyze case studies of cities that are trying to correct these types of pollution through Google Earth ***, T
5. Careers in Community Health and Sustainability: Panel Discussion
6. Reading: Policy Briefing from Health in the Green Economy series, World Health Orgnaization http://www.who.int/hia/green_economy/en/index.html Students will read a policy briefing related to Health in the Green Economy and write a summary of the briefing, using summary guidelines provided in class * and **
7. Research and write an essay Essay: Our Responsibility to Future Generations: What Are the Health Co-Benefits of Climate Change Reduction Policies? (3-5 page essay) * and **

Unit 8: Sustainable Urban Planning Policy (3 weeks)

In this unit, students will:

1. Learn how professional urban designers come to understand the context for the community for which they will develop a green urban design * and **
2. Learn how professional urban designers work with all community stakeholders to explore the possibilities of potential, community-specific green urban designs * , **

3. Learn how professional urban designers develop their actual green urban designs (includes processes and tools of the urban design professional *, **
4. Analyze major advocacy groups and laws surrounding urban planning. **,*
5. Compare and Contrast various laws that are used in urban planning organizations historically. **, *
6. Read David Karr's chapter 'The Three steps of Sustainable Urbanism.' And 'The Santa Monica Sustainable City Plan' and analyze through writing how Santa Monica did and did not achieve its goal of sustainability. ** and *
7. Use the tools from Karr's steps of sustainability to assess how The community was designed, and how it should be altered in the future to make it more sustainable ** and *
8. Ask questions of an environmental lawyer who will visit the class to discuss urban planning restrictions. T Students will take notes and write a summary of his presentation. * and **
9. Read and discuss a United Nations Habitat report on "Planning Sustainable Cities: Policy Decisions, Global Report on Human Settlements 2009," which assesses the effectiveness of urban planning as a tool for dealing with the challenges facing 21st century cities and for enhancing sustainable urbanization. Students will analyze the policy recommendations regarding a new role for urban planning in building a sustainable world.
   Working in small groups, students will "interrogate the text" of an assigned section of the report, carefully and strategically reading the assigned text, and preparing a classroom presentation regarding key ideas advanced. **, ***, *

Text: Report: *Planning Sustainable Cities: Policy Directions: Global Report on Human Settlements 2009* (84+ pages)

Unit 9: Intro to GIS technology (3 weeks)

In this unit, students will:

1. Get an introduction to fundamentals of GIS and their application in mapping urban patterns. *, **
2. Visit the Chabot College GIS laboratory to practice the use of this software. (Note: Students who successfully complete this unit with a B or higher as graded by The community instructor AND Chabot instructor will earn one credit in Intro to GIS Lab from Chabot College.)
3. Demonstrate their understanding of how to map various elements and layers of society including green businesses, asthma rates, LEED certified buildings, and bicycle paths., T

4. Analyze GIS Careers in the news: Students read an interview with a GIS Technology expert regarding career futures and GIS knowledge. http://www.americansentinel.edu/blog/2011/08/02/gis-technology-expert-discusses-industry-career-fields-and-future-job-market/ (note published on an Information Technology blog associated w. American Sentinel University)

   Text: *Introduction to Geographic Information Systems*. Chang, Kang-tsung. Fourth Edition. Copyright 2008.

Unit 10: Urban Design and Technology Capstone Project (3 weeks)

In this unit students will:

1. Analyze one major issue within the Bay area. (Themes for student groups include: building, transportation, public spaces, business, and health) Students will write a summary of research findings. *, **,
2. Use their GIS skills and Google Earth to map the issue and propose steps towards a sustainable future. ***
3. Utilitze their knowledge and skills as urban designers to create an urban design prototype of their choice. Students will follow professional urban planning processes and protocoles in ordr to render an effective design.
4. Use the technology tools of the Smartboard, Sketchup, and PowerPoint to create a professional presentation of their findings to one representative from the community. *!
5. Complete an urban design project that addresses a real urban design challenge in the community. Students will follow all elements of a professional urban design process. They will work with urban design mentors and will present their final Urban Design projects to an audience of community, civic, professional, and postsecondary stakeholders. Studnets will be assessed using a project rubric.

Text*: Urban Design Toolkit*, especially Section 2: Community Participation Tools, including, Design Workshop (charette, community planning forum, inquiry by design, planning day, ideas workshop, action planning, urban design assistance team), focus group, interactive display, interactive model, participatory appraisal, etc

Texts and Supplemental Instructional Materials

Urban Design Toolkit, Ministry for the Environment, New Zealand, 2009 (3rd edition)
ISBN: 978-0-478-33152-3 (print); 978-0-478-33153-0 (electronic)
entire text: 128 pages)
Urban Design Case Studies, Ministry for the Environment, New Zealand, 2005. (104 pages)

Excerpts from the following textbooks:

- *Sustainable Urbanism*. Farr, Douglas. Wiley 2008
- *Living in the Environment*. Miller and Spoolman Brooks, 2009.
- *Physical Geography: The Global Environment*. Third Edition. Blij, Muller, Williams. Oxford University Press. Copyright 2004.
- *Introduction to Geographic Information Systems*. Chang, Kang-tsung. Fourth Edition. Copyright 2008.
- *The Urban Design Handbook, Techniques and Working Methods*, Urban Design Associates, W.W. Norton & Company, Inc., 2003

Supplemental Resources (refers to the unit used)

Green Building:

- City of Austin: Sustainable Building Sourcebook http://www.greenbuilder.com/sourcebook
- U.S. Green Building Council (USGBC) http://usgbc.org (sustainable design tools and resources)
- Why build Green? http:www.epa.gov/greenbuilding
- "A sustainable Future Regnerative Development, http:www.mfe.govt.nz/publicans/sus-deve/towards-a-susatinable-future/page 3.html
- Green school buildings http://www.greenschoolbuildings.org
- Sketch up tutorials http://sketchup.google.com/intl/en/training/videos.html
- U.S. Green Building Council www.usgbc.org
- Bay Area Green Business Programhttp://www.greenbiz.ca.gov

Green Transportation:

- Sections on "The Integration of Transportation, Land Use and Technology"; "Car-Free Housing"; "Managing Travel Demand"; and "Car Sharing."The University of California Transportation Center (papers, journal articles, magazine (ACCESS), etc.) http://www.uctc.net

- Centre for Sustainable Transportation (Canada) http://www.cstctd.org/
- World Bank: Urban Transport http://www.worldbank.org/transport/ut_over.htm
- U.S. Department of Transportation, Federal Highway Administration (FHWA) http://www.fhwa.dot.gov/

Green Public Spaces

- National Building Museum: What makes a great Green Place? http://www.nbm.org/about-us/multimedia/great-green-places-1.html
- Green Public Spaces Mapping and Priorities: http://www.openspace.eca.ac.uk/pdf/appendixf/OPENspacewebsite_APPENDIX_F_resource_17.pdf
- Project for Public Spaces: http://www.pps.org/great_public_spaces/one?public_place_id=183

Green Business:

- New York Times Green Blog and http://www.nytimes.com/greenblog
- Adding Green to Urban Design: A city for us and the Future. (http://www.cityofchicago.org/content/dam/city/depts/zlup/Sustainable_Development/Publications/Green_Urban_Design/GUD_booklet.pdf
- Ethical Soles: 'Why Green Washing is a threat to Cultural Change' , Adbusters http://www.adbusters.org/blogs/blackspot/ethical.soles.html
- Newsweek: Top 10 business ideas of 2010.

http://www.newsweek.com/2010/10/18/the-100-greenest-companies-in-america.html
http://www.pdc.us/pdf/dev_serv?pubs/dev_rosequarter_planning_analysis.pdf

- Planning Sustainable Cities: Policy Directions: Global Report on Human Settlements 2009, United Nations, 2010.

Public Health:

- Bay Area Organization for waste management http://www.stopwaste.org
- http://www.chooseclimate.org

- HUD Office of Sustainable Housing and Communities http://www.hud.gov/sustainability
- EPA Office of Sustainable Communities http://www.epa.gov/smartgrowth/osc/index.htm
- EPA Office of Environmental Justice http://www.epa.gov/compliance/environmentaljustice/index.html

Urban Design:

- http://www.unhabitat.org/downloads/docs/GRHS2009Abridged.pdf (84 pages)

full report: http::/www.unhabitat.org/grhs/2009
Urban Design Simulations and learning "games" on the web:
Community Planning Website (United Kingdom)
http://www.communityplanning.net/
Lincoln Institute of Land Policy (U.S.), Building Blocks – A Density Game
http://www.lincolnst.edu/subcenters/visualizing_density/blockgame/index.aspx
My Sust House – creating a sustainable environment and a sustainable house http://mysusthouse.org/

Intro to GIS:

- Article: "GIS: An Integrating Technology," Kenneth E. Foote and Margaret Lynch, Univeristy of Colorado at Boulder, 2009 (revised from 2000 edition) http://www.colorado.edu/gerography/gcraft/notes/intro/intro_f.html
- "Geogrphic Information Systems," USGS, (detailed "on line poster" http://egsc.usgs.gov/isb/pubs/gis_poster/
- "GIS in the Cloud: The New Age of Cloud Compuing and Geographic Information Systems," Victoria Kouyoumjian

http://www.esri.com/library/ebooks/gis_in-the-cloud.pdf (free online publication, 30 pp.)

- "What is GIS," Caitlin Dempsey, GIS Lounge http://gislounge.com/what-is-gis/

Support for Capstone Project:

- International Association for Public Participation: http://www.iap2.org
- National Charrett Institute: The Charrette Handbook

http://www.charreteinstitute.org/programs/charrette_handbook.html

- National Park Service (NE Region Philadelphia Office) community toolbox, description on charettes http://www.nps.gov/phso/rtcatoolbox/gatherings_charettes.htm
- SmartGrowth Toolkit, British Columbia, Community Design Charettes

http://66.51.172.116/Portals/0/Downloads/J1_ToolkitPart_III.pdf

- The Architecture Foundation: http://www.architecturefoundation.org.uk/creativespaces/cs.html (participatory urban design)
- Community Planning Website, United Kingdom http://www.communityplanning.net/

Western Australia Planning Commission, The Enquiry-by-Design Workshop Process, 2003
http://www.wapc.wa.gov.au/Publications/28.aspx

Movies:

- Geography: When the Levees Broke (with accompanying curriculum), Earth
- Green Building: Frontline Green Builders Speak
- Green Transportation: Who Killed the Electric Car
- Public Health: Erin Brokovitch, Gas Land, Flow

Sample Writing Assignments:

The following types of writing will be embedded throughout the course:

Urban Design and Green Technology Blog/Log/Journal: Students write frequently, including forms of analytical, expository, & reflective writing. Students are regularly asked to respond articles and/or to writing prompts, to record their learning and thinking about urban design and sustainability concepts, and to describe in writing their progress in achieving mastery of essential college and career readiness standards. (Included in course syllabus)

Writing Professional Field Reports and Project Reports:
Student understanding of urban design and sustainability and her/his ability to scientifically observe environmental and geographic phenomena in the field as well as aspects of the built environment and/or to design, conduct, and communicate results of an experiment or design project is demonstrated in field reports and/or lab/project reports. For every major field experience, lab activity and project, each student will write a formal field report or lab/project report. The field observation report and/or lab/project report should encompass all the customary sections. Such sections include: * Title Page * Purpose * Research and Theoretical Background (if appropriate) * Procedure (and/or Observation) * Data and Calculation (as applicable) * Graphs and/or Maps and/or Drawings * Discussion of Results * Self-Assessment Reflection on New Learning (as appropriate) * Bibliography (as appropriate)
NOTE: Field Experience Reports and lab/project reports are evaluated using the Academy Field Experience Report or Lab/Project Report Scoring Rubric included in the course syllabus.

Examples of Writing Assignments by Unit:

Unit 1: Geography shapes Urban Society

- Read the fact sheet on the Partnership for Sustainable Communities http://www.sustainablecommunities.gov/pdf/FactSheet.pdf then describe the six "livability principles." Also, explain what President Obama means by saying that "these things aren't mutually exclusive" in the Obama quote: "…by working together, (these) agencies can make sure that when it comes to development – housing, transportation, energy efficiency – these things aren't mutually exclusive; they go hand in hand. And that means making sure that affordable housing exists in close proximity to jobs and transportation. That means encouraging shorter travel times and

lower travel costs. It means safer, greener, more livable communities." In your opinion, what should be the relationship between housing, transportation, and energy efficiency?

- Urban Design Journal Log/Blog: Over half of the world's population now lives in cities. Discuss the ideas that "cities are our best opportunity for a sustainable future" and that "recent studies on land use and population density show that cities are more environmentally friendly than their rural or suburban counterparts." Support your opinion/s about cities being our best opportunity for a sustainable future using your knowledge of green urban design and sustainability. (2-3 pages)
- Write a 2-4 page paper describing and analyzing the advantages and disadvantages of Google maps and Google Earth in creating accurate geography.
- Write a one-page summary of a place you have visited within an urban setting that made a lasting impression on you. Relate this impression to some of the content covered in class.

Unit 2: Green Building

- Describe your proposal to transform one current building on the campus to a sustainable, green building. Your proposal must include a clear explanation of why you are making this change, an enclosed plan using the program sketch up to make this change and a proposed budget for its transformation.

- Review the EPA Climate Change recommendations for climate changes you can make at home http://www.epa.gov/climatechange/wycd/home.html, and then write a detailed action plan for "going green" changes you and your family might make in your own home. (Action Plan Template Provided in Class). (included in portfolio)

Unit 3: Green Transportation Systems

- One of the Livability Principles for the Partnership for Sustainable Communities involves transportation: "Provide more transportation choices. Develop safe, reliable, and economic transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse emissions, and promote public health." Given what you have learned in this unit, in a 1-2 page essay, identify how the Bay Area has already achieved this goal and how it may grow in sustainable transportation in the future. (included in portfolio)

- Students will research the transportation options available for students at various neighboring schools. They will then research the ones available at the High School. In a 1-2 page letter, they will write a sample letter to the school board explaining recommendations for greener transportation options.

Unit 4: Green Open Space

- Each student will read at least three different case studies related to cities with one or more Green Open Spaces. The student will write a 1-2 page paper in which he/she compares and contrasts the different green open spaces in the case studies and make recommendations for the Bay Area based on her/his learnings.

- Use the chapter entitled 'Open Space' by Carolee Kokala in the book *Sustainable Urbanism* and your web research about open spaces in the Bay Area to propose three future steps for open space development in the East Bay. (1-2 pages)

- Write a 2-3 page proposal for adding one urban space to the high school campus. Your proposal must include a purpose, theoretical framework and rationale, procedure, and map. (Included in portfolio).

Unit 5: Green Business:

- Green Business New Technologies Research Paper: Social and economic forces strongly influence which technologies will be developed and used. Which new or emerging green technologies will prevail is affected by many factors, such as personal values, consumer acceptance, patent laws, availability of risk capital, cost of research and product development and production, the federal budget, local and national regulations, media attention, economic competition, and tax incentives. Students will be presented with information on several new green technologies. Working in pairs or small groups, they will use a decision-making process to determine potential benefits and risks associated with using (or not using) each of the new technologies. Students will make and defend their choice regarding which green technology appears to have the greatest potential to benefit society. (1 page opening argument)

- Students will write a 2 page business proposal to green one of the local businesses in the community. Their proposal must include a purpose, theoretical rationale, plan for change, map, budget, and timeline. (Included in portfolio)

- Reflective Essay: On the greenbusiness.net web site, there is a quote from Paul Hawken: "Business is the only mechanism on the planet today powerful enough to produce the changes necessary to reverse environmental and social degradation." Write a short essay in which you agree or disagree with this quote. Using your growing knowledge of sustainaiblity and urban design as well as any needed research, upport your opinion with evidence.

Unit 6: Green Public Health:

- The Center for Disease Control and Prevention, as part of its Climate and Health Program, makes four recommendations for prevention and preparedness: eat differently, travel differently, go green at home and work, and be prepared. Review the more detailed explanations of these four recommendations at: http://www.cdc.gov/climatechange/prevention.htm and write up a summary of ways you might follow/achieve these recommendations. Group members will divide up the recommendations and do additional research to analyze what steps need to be taken to achieve these goals. Students will write their proposal in the form of a recommendation from the National Medical Foundation. (included in portfolio)

Unit 7: Sustainability Urban Planning

- As part of a stimulated overview of the urban design process, students will work in small groups to prepare an urban design report that includes an overview of data collection and analysis, a description of the alternatives explored, a description of the design charrette, a plan with a focus on implementation, etc.
- After reading the two chapters of Sustainable Urbanism entitled ' Incorporating Sustainability through codes and Regulating and Plan Based Code' summarize what structures need to be in place to regulate urban planning.
- Compare and contrast the case studies listed in the Sustainable Urbanism textbook including Sydney, London, Seattle, Boulder, Atlanta, Baja, and Hanover. Identify what two principles used in these environments could be applied in the Bay Area.
- Select one city within the East Bay. Analyze the recent development patterns and write a 1-2 page professional law analysis of how they did or did not live up to a sustainable city development model as was defined by the case studies. (Included in their portfolio)

Unit 8: Intro to GIS

- Journal/Blog: Students will write a short essay explaining how to use GIS systems, including GIS benefits and drawbacks
- After learning the basic GIS tools, students will create a professional proposal to map one aspect of the Bay Area's green urban design. They will subsequently write a lab report explaining their purpose, rationale, methods, and findings, and recommendations for future change in this area. (Included in their portfolio)

Unit 9: Capstone Urban Design Project

- Green Research and Capstone Project Proposal: Students will write a 3-4 page proposal explaining how to make one part of the community more sustainable. They will select between the areas of Building, Transportation, Open Spaces, Business, or Health. Their proposal must include at a background of the suspected problems, methods of research, research on ways of improvement, and explain a methodology of the project.
- Green Research Report: Students will write a 3-5 page paper summarizing their hypothesis of the problem, the methodology of their research, the findings of their research, and an analysis that leads to a proposal for change. (included in their portfolio)
- Essay: Urbanization as a postive phenomenon. Many believe that urbanization should be viewed as a positive phenomenon and as a pre-condition for improving access to services, economic and social opportunities, etc. and as central to a sustainable society. Agree or disagree. Support your opinion with knowledge gained from course readings, guest speakers, research, etc.
- Final Writing Assignment: Students will select to write ONE of the following essays based on the themes from the year. (To be included in their portfolio)
    - Essay on an urban design and sustainability problem: Describe how green urban design approaches & methods, measurement, analysis, or modeling have played on important role in either the changing urban environment or in the development of a particular green technology. (3-5 pages)
    - The Future of Green Urban Design and Technology: Respond to the following: Wayne Clough, a science educator wrote: "It is always dangerous to talk about the future of anything. When computers were first created, T.J. Watson, the founder of IBM, predicted we might need about six of them. As recently as 1977, Ken Olsen, the founder of Digital Equipment Corp., believed that none of us would ever have a computer in our homes. These men were leaders & experts in

their fields, & they still got it wrong." Now that you know much more about Green Urban Design and Technology, what are your predictions for the future of Urban Design and Technology? In other words, what will be happening in the field of Urban Design, Urban Environmental Sustainability, and/or Green Technology 25 years from now? Provide a rationale (evidence, etc.) to support each of your predictions. (3-5 pages)

- Identify an important urban societal need, determine the magnitude of the problem and quantify the specifications for a Green Urban Design solution that includes technical, ethnical, environmental, legal and other requirements. Write an essay describing your problem and solution. Include the specific ways in which principles and practices of green urban design help you meet a particular societal need. (3-5 pages)
- Choose a green urban design concept or technology that especially intrigues you. Identify what professional elements are needed to do this work, and how these people qualify. Then write an I-search essay in which you describe the concept/technology, the significance of this concept/technology, the professions associated with this idea and its role in the future. (3-5 pages)

Key Assignments:

(Note for all units, please also refer to sample writing assignments listed above)

Unit 1: Geography

1. Students analyze the economic, environmental, and social implications of living in a rural, urban, or suburban living environment.
2. Students will analyze an overview of the infrastructure, policy and planning components used to create a sustainable community.
3. Students will learn how to read and interpret landscape features with a standard quadrangle map.
4. Students will learn the fundamentals of map and compass navigation.
5. Analyze the benefits and drawbacks to Google maps and Google Earth compared to paper maps (see writing).
6. Students create and present a tour of the geography of one city around the world using google earth features.
9. *Learning activity*: Mapping the Human Footprint. Students learn about the Human Footprint data set, analyze a map showing where and to what extent humans have influenced Earth, and participate

in a class discussion. (source: National Geographic) http://education.nationalgeographic.com/education/activity/mapping-our-human-footprint/?ar_a=1&ar_r=999

Unit 2: Green Building

1. Students will perform a special survey of campus buildings, outbuildings, and landscape features including parking structures, green spaces to assess the impact of these features on the school's overall sustainability.
2. Students will research sustainable building tools and their various costs.
3. Students will research the LEED certification process and visit a local LEED certified building. They will have a tour conducted by one engineer and architect in the city of San Leandro.
4. Students will use their survey results to select one structure on campus and redesign utilizing Google Sketch up software to create a 3 dimensional image.
5. Students will identify a city block of the community from an Arial photograph and identify green building modifications can be made to this block.

Unit 3: Green Transportation

1. Students will conduct an audit of the annual automobile usage by members of the community. From the survey results, they will approximate the emissions from car commuters in the community.
2. Students will use their GPS and Compass skills to map the existing bicycle and walkway paths surrounding community. (This will later be used in the GIS mapping unit)
3. Students will gather information to compare and contrast three schools and their transportation options. Students will then make recommendations to add to these options. (see writing assignment)
4. Students will prepare questions in anticipation of a visit by transportation planners.

Unit 4: Green Public Spaces

1. Students will research an American city that is a model city for public spaces and present that to the class in a 'Model City Exposition.'
2. Students will visit local public spaces such as parks, retail centers, and a restored wetland to analyze its design and how well it has met the criteria for a healthy public space.
3. Students will create a public space to complement the building they have designed on the high school campus.

Unit 5: Green Business

1. Research what makes a business 'green' and create a list of the top five Bay Area Green businesses and what criteria was used in this assessment.
2. Conduct an Energy Audit of a small business.
3. Write a business plan to make one business within the community more sustainable.
4. Create a list of questions for the Green Business panel at Google.

Unit 6: Green Public Health

1. Conduct an energy, waste, and water audit to evaluate the environmental impact of the High School.
2. Participate in a food audit of the cafeteria to analyze the nutritional benefits.
3. Write a medical action alert for the High School campus explaining the waste and recommendations for change.

Unit 7: Sustainability Urban Planning Policies

1. Students participate in a simulation that involves them in gaining knowledge and understanding of the basic urban design process and "practicsing" the various phases of urban design.
2. Students learn how to gather and analyze data as part of the Understanding Phase.
3. Stduents learn a design process for exploring alternatives and for developing an urban design "charette" (Design as a tool for "decision-making.")
4. Students prepare and present a Final Urban Design Report that includes authentic public participation, involvement of stakeholders.
5. Green Urban Design Poster Talk: Individual students or pairs of students will be assigned/chose one key urban design and sustainability concept and assume responsibility for teaching the concept to others. Presentations should include a poster/graphic representation of the concept and/or other multimedia. All presentations will involve a demonstration of the concept. Students will also use Cornell Note-taking.
6. Students will analyze the laws that govern the planning of at least five major cities. Each student will participate in a Socratic seminar around the question of 'what laws are essential for sustainable development'. The stakeholders will include health officials, businesspeople, builders, environmental activists, and transportation specialists.

Unit 8: Intro to GIS

1. Students will analyze the collection methodology and a data subset of the United States Census Bureau.
2. Students will learn how to transfer data points from a GPS receiver to the GIS software environment. Students will then create a GIS map that spatially addresses one key urban problem/issue.

Unit 9: Capstone Project

1. Create a proposal for one area of change on the High School campus or within the community and a way to implement this change. Utilize and apply spatial techniques with GPS and GIS technology.
2. Create a professional presentation (including map) about the problem and proposed solution.
3. Working in a small group, students complete a professional unban design project and present their work to an audience of community, civic, professional, and postsecondary stakeholders.

Instructional Methods and/or Strategy:

A variety of instructional strategies will be utilized to accommodate all learning styles and to reinforce language, math and scientific skills while learning urban design and sustainability concepts. This entire course is taught with the lens of experiential and hands on learning approach. All of the units are infused with the following:

- Inquiry-based explorations and urban design projects.
- Direct Instruction (lectures, interactive dialogues).
- Multimedia presentations, including presentations by students.
- Demonstrations of urban design principles and procedures.
- Seminars, forums, and debates related to concepts of urban design and sustainability
- Small and large group discussions.
- Team teaching with professional urban designers, environmentalists, green technology experts, and other industry/postsecondary partners.
- Use of urban designers and urban design students as project consultants, panelists for student exhibitions of work, etc.

- Strategic Reading, analysis and use of a variety of instructional materials, text and resources related to urban design, environmental science and technology, and sustainability (professional journals, reference materials, textbooks, electronic media, environmental and scientific literature).
- Frequent writing assignments, including reports, essays, field observations, technical writing, journals/logs/blogs, etc.
- Use of technology-based resources (scientific instrumentation, simulations, internet, computer-based instruction, computer-based design).
- Use of multimedia (smart board, digital media, photography, etc.)
- Self-directed, cooperative, and collaborative learning projects (project-based learning, problem-based learning, inquiry learning).
- Investigative research (both library and internet) and analytic and expository writing
- Use of online curriculum, including readings, videos, animations, and interactive tools.
- Web Analysis: Students learn about urban design and environmental sustainability resources available on the World Wide Web and how to effectively use the web as a learning tool in both their immediate project work and in their future education and careers.
- Field observations and research in schools and communities that enable students to apply course concepts in real world applications.
- SDAIE (Specially Designed Academic Instruction in English).
- Complex Instruction/Group work: Throughout most unit, students will work collaboratively with other members of a learning group. Each student will need to demonstrate the ways that s/he has contributed to the end product.
- Community Service: All students are expected to perform at least three hours of community service related to each unit through the Green Academy. Community service opportunities range from working on the school farm or garden to working as an academic mentor for another green student.
- Service Learning: All students are expected to participate in the planning of at least one major service learning activity for Earth Week.

Assessments:

- Authentic Assessments: Professional and community evaluation of exhibitions of individual/group project work, including formative and summative assessments
- Exams and quizzes, including essay exams and benchmark tests

- Portfolio reviews and presentations of student work that demonstrate learning, growth, and achievement of standards.
- Demonstrations of knowledge and skill applications and mastery.
- Rubrics used to assess projects and presentations.
- Quizzes and Benchmark Tests: Most units involve pre- and post-assessments. At the end of each unit, there is a comprehensive, benchmark test that measures individual student's understanding of key concepts.
- Exams and quizzes, including essay exams.