

MISSION TRAILS REGIONAL OCCUPATIONAL PROGRAM

1. **COURSE TITLE:** GREEN CAREERS/SUSTAINABLE CONSTRUCTION
2. **CBEDS TITLE:** Introduction to Green Construction Technology
3. **CBEDS NUMBER:** 5526
4. **JOB TITLES:**
 - Hydrologist
 - Environmental Engineer
 - Pest Control Technician
 - Conservation Biologist
 - Toxicologist
 - Pollution Control Technician
 - Ecologist
 - Economist
 - Forester
 - Environmental Health & Safety Technician
 - Landscape Architect
 - Waste Disposal Manager
 - Corporate Waste Compliance Coordinator
 - Urban & Regional Planner
 - Agricultural Inspector
 - Wastewater Water Operator
 - Pollution Control Engineer
 - Construction Manager
 - Insulation Installer
 - Project Manager/Construction Material Coordinator
 - Energy Efficiency Project Manager
 - Green Consultant
 - Sustainability Research Analyst
 - Architect
 - General Contractor
 - Pervious Concrete Installer
 - Home Energy Assistant Professional
5. **COURSE DESCRIPTION:** This is a course that will provide high school students with an introduction into the growing field of Green Technologies and Sustainable Construction, such as; alternative energy, sustainable development/careers, green building assessment (LEED accreditation and certification) and more. In this one year course, students will participate in a combination of interactive classroom instruction, internships and externships with green businesses, agencies and non-profit organizations. In addition, internships will provide students the exposure to the green career opportunities and sustainable development and higher education choices. The curriculum will emphasize a global view of environmental monitoring and the economic analysis of the building with green technologies. The program will be enhanced with guest speakers, presenters and field trips.

6. **HOURS:** up to 360 Hours

7. **PREREQUISITES:** None

8. **REVISION DATE:** May 13, 2009

9. **COURSE OUTLINE:**

1. Introduction to Green Technologies/Sustainable Construction
 - a. Define Sustainable Construction
 - b. Rationale for high performance green building
 - c. Green building process and obstacles
 - d. Emerging directions
 - e. Legislation for the year 2030
 - f. AB 32
2. Sustainable Development/Careers
 - a. Careers
 - b. Introduction into LEED-NC rating system
 - c. How LEED is set up
 - d. Accreditation and certification of projects
 - e. New and future developments
 - f. Green building terms
3. Benefits of Sustainability/Green Practices
 - a. Reducing carbon emissions
 - b. Energy conservation
 - c. Reuse of materials
 - d. Reduce water use
 - e. Incentives and tax credits
 - f. Sales tax relief
 - g. Grants and low cost loans
4. Green Building Foundations
 - a. Ethics and sustainability
 - b. Basic concepts
 - c. Major environmental and resource concerns
 - d. Green building movement
5. Green Building Assessment (LEED)
 - a. USGBC LEED building assessment standards
 - b. LEED certification process
 - c. Green globe building assessment
 - d. Building assessment systems
 - e. Examples of LEED-NC building
 - f. Beyond the LEED rating systems

6. Green Building Process
 - a. Conventional vs. Green building delivery systems
 - b. Executing a green building project
 - c. Integrating the design process
 - d. Green building documentation requirements
7. Water Efficiency
 - a. Minimizing water consumption
 - b. Building fixtures
 - c. High performance building water cycle
 - d. Waste water use
 - e. Landscaping water efficiency
 - f. Connection to LEED
8. Energy & The Atmosphere
 - a. Building energy issues
 - b. High performance building design
 - c. Passive design
 - d. Building envelope
 - e. Active mechanical systems
 - f. Electrical power systems
 - g. Innovative energy optimization
 - h. Smart building and energy management systems
 - i. Ozone depleting chemicals (HVAC)
 - j. Connection to LEED
9. Materials and Resources
 - a. Issues in selecting green building materials and products
 - b. Distinguishing between green building products and green building materials
 - c. Priorities in selecting building materials and products
 - d. Emerging construction materials and products
 - e. Deconstruction and disassembly
 - f. Closing the materials loop
 - g. Connection to LEED
10. Indoor Environmental Qualities
 - a. Issues
 - b. Factors
 - c. HVAC systems
 - d. Building materials
 - e. Best practices
 - f. Managing IEQ during construction
 - g. Connection to LEED

11. Ecological Design

- a. Design vs. ecological design
- b. Historical perspective
- c. Contemporary ecological design
- d. Future ecological design

12. Green Building Implementation

- a. Site protection planning
- b. Health and safety planning
- c. Construction and demolition waste management
- d. Subcontractor training
- e. Reduce footprint of construction operations

13. Economic Analysis of Green Building

- a. Business case for high performance green building
- b. Economics of a green building
- c. Green building benefits
- d. Managing costs during construction
- e. Getting through the cost barriers

CONTENT AREA SKILLS:

- i. EXPECTED STUDENT OUTCOMES**
- ii. HOURS OF INSTRUCTION**

COURSE OUTLINE

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
Instruction will include:	Student will be able to:	CL	CC	CP
<p>I. Green Technologies/Sustainable Construction: To give students an introduction to Green Technologies/Sustainable.</p>	<p>1. Sustainable Construction A. Define Sustainable Construction B. Understand the principles of sustainable construction. C. Identify the 5 areas of sustainable construction. 2. Rationale for High Performance Green Building. A. Define Green Building. B. Identify the 3 primary reasons for high performance green building. C. To understand state and local guidelines for high performance construction. D. Understand the three principles for high performance guidelines. 3. Green Building process and its obstacles. A. Understand the Green Building process and its obstacles. B. Understand the trends to Green Building in the United States. C. Understanding the barriers to Green Building in the United States. 4. Emerging Directions A. Understand the Emerging directions that exist in the Green Building delivery systems. B. Identify the 3 powerful approaches that coexist to ensure creation of a truly Green Building. C. Understand the use of Performance based fees. D. Define “The Charrette” E. The purpose of the Building commission as a critical component of the Green Building Process. 5. Legislation for the year 2030. A. Understand the Rationale for the Legislation for the year 2030. B. Understand the mandates for greenhouse gas reduction and architecture for 2030. C. Understand how to minimize their carbon footprint by the year 2030. 6. AB32. A. Understand the rationale behind AB32. B. Define the Global Warming Solutions Act (AB32). C. Understand how this assembly bill will put the state on a more stable economic path to the future.</p>	15		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
<p>II. Sustainable Development/Careers: To identify future careers or employment opportunities in Green Careers. To identify current trends and changes in out society towards Green Construction and how the Standard of this process has been developed.</p>	<ol style="list-style-type: none"> 1. Green Careers. <ol style="list-style-type: none"> A. Define Green Careers. B. Identify current and future employment opportunities in Green Careers. C. Develop a “Green Careers” portfolio from internships and class experience. D. Describe different “Green Careers” by definition of required duties and skills, pay level, and educational requirements. E. Research careers in Green Businesses/Agencies with internships, as well as class lectures, assignments, student presentations, papers and portfolio’s. 2. Introduction into LEED-NC rating system. <ol style="list-style-type: none"> A. Define LEED. B. Define USGBC. C. Understand the concept of building assessment. 3. LEED Standards <ol style="list-style-type: none"> A. Understand LEED Standards B. Become familiar with USGBC LEED Suite of standards. C. Become familiar with LEED-NC2.2. D. Understand the brief history of LEED for New Construction. 4. LEED Accreditation and Certification. <ol style="list-style-type: none"> A. Understand the difference between LEED Accreditation and Certification. B. The process of LEED Certification. C. Understand the LEED Certification rating system. D. Understand the process of and individual becoming LEED Accredited. E. Understand benefits of an individual being LEED Accredited. 5. New and Future Developments. <ol style="list-style-type: none"> A. Become familiar with New and Future Developments. B. Become familiar with the challenge for future Green Builds. C. Learn about the need to revamp contemporary design. D. Learn about what lies at the cutting edge and beyond the cutting edge of sustainable construction. 6. Green Building Terms. <ol style="list-style-type: none"> A. Understand Green Building Terms. B. Give a brief explanation of the 108 most important terms used in Green Building discussions such as; bio diesel, brown fields, carbon neutral, certified wood products, Ecological footprints, Green globes and more. 	20		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
<p>III. Benefits of Sustainability/Green Practices: To identify the variety of benefits to sustainability and how communities, and society can reduce/conserv the environment for future generations.</p>	<ol style="list-style-type: none"> 1. Reducing Carbon Emissions <ol style="list-style-type: none"> A. Define Carbon Footprint. B. Understand how to produce communities, homes and businesses to become carbon neutral. C. Understand hoe to reduce carbon emissions in society, homes and building. 2. Energy Conservation <ol style="list-style-type: none"> A. Understand a variety of ways to conserve energy. B. Define photovoltaic cells. C. Define Passive Solar. D. Define Daylight. E. Define Passive Solar. F. Understand how to read a PG&E Bill. 3. Reuse of Materials <ol style="list-style-type: none"> A. Understand better methods to reuse of material at work or at home. B. How to reduce construction waste on a job-site or at home. C. Maximize the material reuse on a job-site or at home. D. Understand how everyday household. materials can be used again in a different capacity. 4. Reduce Water Use <ol style="list-style-type: none"> A. Process of water reduction. B. Understand how to read a water bill. C. Define CCF on your water consumption. D. Understand ways to reduce water consumption at school, home or work. 5. Incentive and Tax Credits <ol style="list-style-type: none"> A. How incentives and tax-credits work in the Green Building Process. B. Understand state and local tax credits and incentive you can receive for building green. C. Understand the process for receiving tax credits for a building green. 6. Sales Tax relief <ol style="list-style-type: none"> A. How to receive sales tax relief by buying green. B. Understand how to locate sales tax relief through purchasing of different items such as; car, dishwasher, range, water heater. 7. Grants and Low Cost Loans <ol style="list-style-type: none"> A. How to receive Grants or Low Cost loans for building or buying in the Green Economy. B. How to research for loans or grants when purchasing a “Green product.” 	10		
<p>IV. Green Building Foundations To instruct the students on to implementation of the high performance green building delivery system.</p>	<ol style="list-style-type: none"> 1. Ethics and sustainability <ol style="list-style-type: none"> A. Define Ethics. B. Define Sustainable Development. C. Understand the Ethical Challenges. Brought by the destruction of many of our ecosystems. 	10		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>2. Basic Concepts</p> <ul style="list-style-type: none"> A. Define Industrial Ecology. B. Understand how Industrial Ecology Works in today's Society. C. Define Construction Ecology. D. Understand how the design, construction Ecology. E. Define Design for Environment. F. Define Ecological Footprint and Ecological Economics. G. Define Eco-Efficiency. H. Understand the seven Elements of Eco-Efficiency. <p>3. Major Environmental and Resource Concerns</p> <ul style="list-style-type: none"> A. Understand the major issues to do with environmental design and construction. B. Define climate change. C. Understand how changes can be made to prevent climate change in the world. D. Define ozone depletion. E. Name ways to prevent ozone depletion. F. Define Deforestation, Desertification and soil erosion. G. Understand ways to minimize deforestation, desertification and soil erosion. H. Define loss of Biodiversity. <p>4. The Green Building Movement</p> <ul style="list-style-type: none"> A. Understand the purpose of the green building movement. B. Name the 5 different Green building organizations. C. Name the 2 International Green Building Organizations. D. Understand the history behind the green building movement in the early 1970's. 			
<p>V. Green Building Assessment (LEED): To instruct students on the various types of assessment, accreditation, certification and rating system processes within the green building movement.</p>	<p>1. USGBC LEED Assessment Standards</p> <ul style="list-style-type: none"> A. Understand the differences between the green building assessment systems throughout the world. B. Understand why a building assessment system was put in place. C. Understand the structure of the LEED Suite of standards. D. Understand the history behind LEED. <p>2. LEED Certification Process</p> <ul style="list-style-type: none"> A. Understand the 7 step process for attaining LEED Certification. B. Understand the LEED rating system for buildings. C. Understand how a structure becomes eligible for LEED Certification. D. Understands the process for registering a LEED building. E. Understands the documentation and certification process for receiving an award of certification on a LEED building. 	20		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>3. Green Globes Building Protocol</p> <ul style="list-style-type: none"> A. Understand the integration of the Green Globes Protocol. B. Understand the Green Globes process and structure. C. How to have your project verified and certified by the Green Globes process. <p>4. Building Assessment Systems</p> <ul style="list-style-type: none"> A. Understand the assessment system internationally. B. Define the assessment systems in the U.K., Japan, Australia, and Europe. <p>5. Examples of LEED – NC Building</p> <ul style="list-style-type: none"> A. Illustrate through a project examples of LEED – NC Buildings with the <u>four</u> different ratings. <p>6. Beyond the LEED Rating System</p> <ul style="list-style-type: none"> A. Understand the role of LEED and the natural progression of the 5 Principal Levels of attaining sustainability. 			
<p>VI. Green Building Process: To instruct the students on the differences between standard practice and the green building process. To instruct students to pay particular attention to the highly collaborative “Charrette” process of green building.</p>	<p>1. Conventional vs. Green Building</p> <ul style="list-style-type: none"> A. Understand the delivery system of Design-bid-build B. Understand the delivery system of Construction Management-at-risk. C. Understand the delivery system of Design-build. D. Understand the process of the Green building delivery system. <p>2. Executing the Green Building Project</p> <ul style="list-style-type: none"> A. Understand the owner issues in a High Performance Green Building Projects. B. Understand how to select a Green Building Team. C. Understand the role of an Accredited LEED Professional plays in a LEED Certified Project. <p>3. Integrated Design Process</p> <ul style="list-style-type: none"> A. Understand the teamwork and interaction that will take place to insure success in a Green Building Project. B. Understand the three steps in a typical conventional design process. C. Understand the steps in a taken in a typical Green Building Project and the Role of the Charrette in the design process. <p>4. Green Building Documentation Requirements</p> <ul style="list-style-type: none"> A. Understand the process of the USGBC LEED Documentation. B. Understand the process of the Green Globes Documentation process. 	15		
<p>VII. Water Efficiency: To instruct the students on water efficiency and ways to minimize consumption, how to better use storage systems and how it connects to LEED certification.</p>	<p>1. Minimizing Water Consumption</p> <ul style="list-style-type: none"> A. Learn effective ways to minimize water consumption at home and at the workplace. B. Define moratoriums <p>2. Building Fixtures</p> <ul style="list-style-type: none"> A. Understand the EPA Act that requires that all plumbing fixtures meet ambitious targets to 	10		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>minimize water consumption.</p> <p>B. Understand the minimum requirement for fixtures in homes.</p> <p>3. High Performance Building Water Cycle.</p> <p>A. Understand the two major concepts of building the hydrologic cycle.</p> <p>B. Understand how to set goals of water consumption for a building.</p> <p>C. Define the hydrologic flow terminology for high performance building.</p> <p>D. Understand the 5 steps for developing a building hydrologic strategy.</p> <p>E. Understand how to choose the proper low flow fixtures for a high performance building.</p> <p>F. Understand the process of harvesting rainwater for a high performance buildings use.</p> <p>G. Understand the principal applications for reclaimed water.</p> <p>4. Waste Water Use</p> <p>A. Understand the use of constructed wetland for a high performance building.</p> <p>5. Landscaping Water Efficiency</p> <p>A. Understand the seven principals used to ensure a well-designed water efficient landscape.</p> <p>B. Name the 3 characteristics for a natural landscape design.</p> <p>6. Connection to LEED</p> <p>A. Understand water efficiency credits you can receive from a certified project.</p>			
<p>VIII. Energy & The Atmosphere: To instruct students to be aware of energy issues connected to the built environment and to understand how renewable energy systems can help with the depletion of our atmosphere.</p>	<p>1. Building Energy Issues</p> <p>A. Define BTU</p> <p>B. Understand what the 3 main emissions that are release with energy consumption.</p> <p>C. Understand ways you can cut energy costs in homes, businesses and schools.</p> <p>D. Understand the many innovations to use less energy and to use more renewable energy to heat, cool, ventilate and light homes, buildings and schools.</p> <p>2. High Performance Building Energy Design</p> <p>A. Understand the basic steps in designing an energy efficient building.</p> <p>B. Understand how to design targets for the building understanding high performance building best practices.</p> <p>C. Understand how to attain the energy goal setting for LEED and Green Globes.</p> <p>D. Understand how to use the building energy simulation and daylight simulation in the design process of your high performance building.</p> <p>E. Define IPMVP.</p>	20		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>3. Passive Design</p> <ul style="list-style-type: none"> A. Define Passive Design B. Understand how to integrate and infuse passive design strategies in your high performance buildings. C. Understand the factors that should be included in a passive design approach of a high performance building. <p>4. Building Envelope</p> <ul style="list-style-type: none"> A. Understand the 3 major issues of the building envelope. B. Define U-Value C. Understand window performance factors. D. Understand how to select the best types of roof for your high performance building. <p>5. Mechanical System</p> <ul style="list-style-type: none"> A. Understand the process of choosing the proper HVAC System for your high performance building. B. Understand the four types of Chillers for a high performance building. C. Understand the difference between the two types of water heating systems. Solar heating and tankless. D. Understand how to read a PG&E Bill and find ways to reduce costs due to large power consumption due to inefficient mechanical systems. <p>6. Electrical Power Systems</p> <ul style="list-style-type: none"> A. Understand ways to reduce costs in electrical systems. B. Understand the proper uses of Fluorescent lighting in a high performance building. C. Understand the two types of fiber optic lighting. D. Understand the best places to use fiber optic lighting in your high performance building. E. Define LED. F. Understand how LED's emit light. G. Understand the basic functions of lighting controls. H. Understand the <u>3</u> factors used in the purchasing of electric motors. <p>7. Innovative Energy Optimization</p> <ul style="list-style-type: none"> A. Understand the four innovative approaches in energy optimization. B. Understand the 3 main types of radiant cooling systems. C. Define Ground Coupling. D. Understand the principles of a ground source heat pump. E. Understand the 3 techniques of renewable energy systems. F. Understand the advantage and disadvantages of renewable energy systems. 			

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>G. Understand the use of photovoltaic cells in high performance building.</p> <p>H. Understand the use of wind energy to produce electricity for a high performance building.</p> <p>I. Define Biomass Energy.</p> <p>J. Understand how biomass energy can be produced to provide energy for your high performance building.</p> <p>K. Define Fuel Cells.</p> <p>L. Understand the difference types of fuel cells.</p> <p>8. Smart Building and Energy Management Systems.</p> <p>A. Define Smart Buildings.</p> <p>B. Understand what a smart buildings automation system is composed of.</p> <p>C. Understand what building systems are typically found in a Smart building.</p> <p>9. Ozone depleting Chemicals</p> <p>A. Define CFC's.</p> <p>B. Understand the impact that these chemicals have on the ozone.</p> <p>10. Connection to LEED</p> <p>A. Understand the connection to the LEED credits.</p> <p>B. Understand how to maximize your LEED credits by optimizing the E.A. performance of your high building.</p>			
<p>IX.</p> <p>Materials and Resources:</p> <p>To instruct students of the materials and products used for a high performance green building projects.</p>	<p>1. Issues to Selecting Green Building Materials and Products</p> <p>A. Understanding how materials and products can affect the environment.</p> <p>B. Define rapidly renewable resources</p> <p>2. Distinguishing between Green Buildings Products and Green Building Materials</p> <p>A. Define Green Building products.</p> <p>B. Define Green Building materials.</p> <p>C. Define Vernacular Architecture.</p> <p>D. Know the <u>3</u> areas that green building products are recycled from.</p> <p>E. Understand the <u>4</u> steps in the “Natural Step” guidance for the choosing of materials, products, and designing of a building.</p> <p>F. Understand the “Closed Loop” building material product strategy.</p> <p>G. Understand the <u>5</u> major categories of how green building products are broken down.</p> <p>3. Priorities for selecting building materials and products</p> <p>A. Understand the <u>3</u> priorities for selecting building materials for a project.</p> <p>B. Understand the <u>two</u> major routes for recycling.</p> <p>4. Emerging construction materials and products</p> <p>A. Understand the variety of many new wood and</p>	15		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>wood products that are categorized as green.</p> <p>B. Understand the variety of many new metal products that are categorized as green.</p> <p>C. Understand the new variety of concrete and concrete products that are categorized as green.</p> <p>D. Understand how steel and aluminum play a significant role in the green building process.</p> <p>E. Define Polymers.</p> <p>F. Understand the roll plastics play in the green building process.</p> <p>5. Design for deconstruction and disassembly</p> <p>A. Understand the principles of Design for the disassembly as applied to buildings.</p> <p>B. Understand the distinct benefits to deconstruction over demolition.</p> <p>6. Closing the materials loop</p> <p>A. Understand the seven steps in material and project waste management in closing the construction loop.</p> <p>7. Connection to LEED</p> <p>A. Understand how to maximize the credits in the materials and resources of recycling materials to attain the maximum points.</p>			
<p>X.</p> <p>Indoor Environmental Qualities: To instruct students on the importance of the benefits to health and productivity in the workplace when the indoor air quality of a high performance building is excellent. To ensure this is evident is the payback in energy saving in a high performance green building.</p>	<p>1. Issues</p> <p>A. Understand the two main issues wit Indoor Air Quality.</p> <p>B. Understand the economic impact to do with Indoor Air Quality</p> <p>C. Define Multiply Chemical Sensitivity</p> <p>D. Know the two main bacterial diseases related to poor indoor air quality.</p> <p>E. Understand the process in reducing allegoric reactions to do with indoor air quality</p> <p>2. Factors</p> <p>A. Understand the two main areas that problems come form with poor indoor air quality</p> <p>B. Understand the5 areas affecting Indoor Environmental air qualities.</p> <p>C. Understand the importance t minimizing sound/noise transmission.</p> <p>D. Understand how different lighting colors can have negative affects on people working in a building.</p> <p>E. Understand the different colors of different types of light bulbs and the light characteristics</p> <p>F. Understand how Thermal conditions can have an affect on Indoor environmental qualities.</p> <p>G. Understand the affect odors can have on the work environment</p> <p>3. HAVC</p> <p>A. Understanding why the design of the HVAC system is the single most important thing in the ventilation</p>	15		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
	<p>of a high performance green building.</p> <p>B. Understand the difference in system designs relative to a building design</p> <p>C. Understand the psychometric properties of the air in the design of the system</p> <p>4. Building Materials</p> <p>A. Understand the “engineering out” of materials that will have an adverse effect of the Indoor Environmental Qualities.</p> <p>B. Understand the particular concern for the Indoor Air Qualities.</p> <p>C. Understand the effects of adhesives, sealants and finishes can have on Indoor Air Qualities</p> <p>D. Define VOC’s</p> <p>E. Understand the effects particleboard and plywood can have on indoor air quality.</p> <p>F. Understand the floor and wall covings can have on Indoor Air Quality.</p> <p>G. Understand the types of materials that can be used in place to prevent harmful Indoor Air Quality.</p> <p>5. Best Practices</p> <p>A. Understand the ten points in the green building movement for creating good indoor air quality for a high performance green building.</p> <p>6. Managing the IEQ During Construction</p> <p>A. Understand the proper techniques to material storage during the construction project.</p> <p>7. Connection to LEED</p> <p>A. Understand the two prerequisites to IEQ.</p>			
<p>XI. Ecological Design: To instruct students on the key component to creating a high performance green building.</p>	<p>1. Design vs. Ecological Design</p> <p>A. Understand the 4 fronts to ecological design.</p> <p>B. Define ecological design.</p> <p>C. Understand the key problem facing ecological design.</p> <p>D. Understand the benefits of ecological design.</p> <p>2. Historical Perspective</p> <p>A. Know the seven architects and designers that laid the foundation for today’s ecological or green design.</p> <p>3. Contemporary Ecological Design</p> <p>A. Know the green building publications of the early 1900’s and the start of the green building movements.</p> <p>B. Understand the 5 Hanover principals to Ecological design.</p> <p>4. Future Ecological Design</p> <p>A. Understand the general management rules for sustainability.</p>	10		
<p>XII. Green Building Implementation: To instruct students on the execution of a green</p>	<p>1. Site Protection Planning.</p> <p>A. Understand the seven areas critical in site protection planning.</p>	10		

CONTENT AREA SKILLS	EXPECTED STUDENT OUTCOMES	HOURS CL = Classroom CC = Comm. Class. CP = Co-op Ed.		
building project.	<ul style="list-style-type: none"> B. Understand the process required in minimizing ecological and other damage to the site. 2. Health and Safety <ul style="list-style-type: none"> A. Understand the process to follow in the buildings air quality design B. Understand the steps in managing the IAQ during the steps in managing the IAQ during construction. 3. Construction and Demolition Waste Management <ul style="list-style-type: none"> A. Understand the measures for builders to follow to ensure safety during demolition and waste management. B. Understand the measures and requirements to follow in the salvaging of materials, recycling, packaging, removal of hazardous materials and other waste prevention measures. 4. Subcontractor Training <ul style="list-style-type: none"> A. Following the key areas necessary in the construction waste management plan and the construction IAQ plan. 5. Reducing the footprint of Construction Operations. <ul style="list-style-type: none"> A. Understand the seven methods to reducing the physical footprint of the construction process. 			
<p>XIII. Economic Analysis of Green Building: To instruct students of the economics of a construction project, but especially a high performance green building.</p>	<ul style="list-style-type: none"> 1. Business case for High Performance Green Building. <ul style="list-style-type: none"> A. How to justify a high performance green building is good business sense. B. Understand the advantages of a high performance Green Building. C. Understand the many benefits to society to a high performance green building. 2. Economics of Green Building <ul style="list-style-type: none"> A. Understanding the two schools of thought to building a high performance green building. B. Understand the two cost strategies to a high performance green building. C. Understand the four key points to be considered when attempting to develop a high performance green building. 3. Green building benefits <ul style="list-style-type: none"> A. Understanding the benefits to energy savings. B. Understanding the benefits to waste and wastewater savings. C. Understand the health and productivity benefits D. Understand the benefits reducing emissions and solid waste E. Understand the benefits to reduction of maintenance, repair, and miscellaneous costs. 4. Getting through the cost barrier <ul style="list-style-type: none"> A. Understand the four principles to aiding in the cost barrier. 	10		
		180		