

STATE BOARD OF COMMUNITY COLLEGES

**CURRICULUM PROGRAM APPLICATION
(New-to-the-System Program)**

The State Board will be asked to approve the new-to-the-system curriculum program at the college listed on the condition that equipment funds are available to the college and operating funds generated by the budget formula will permit the offering of this program without any special allocation of funds.

**Central Piedmont Community College
Sustainability Technologies (A40xxx)**

**PROGRAM APPLICATION
SUMMARY EVALUATION REPORT**

**Central Piedmont Community College
Sustainability Technologies (A40xxx)**

I. Program Planning

Central Piedmont Community College (CPCC) is seeking approval for the Sustainability Technologies (A40xxx) program, to begin Fall 2009. The planning area is defined as the college's service area of Mecklenburg County.

All colleges were notified of the planning process for this program, and a planning meeting was held. The college conducted an employment availability survey within the planning area with the following results:

Currently:	311 full-time employment positions available
1st graduating class:	341 full-time employment positions available
2nd graduating class:	304 full-time employment positions available

The average entry-level salary is \$15/hr.

II. Impact of the Proposed Program on Other Programs

An impact assessment form was sent to each college approved to offer the Environmental Science Technology (A20140) program. No negative impact responses were received.

III. Feasibility Plan

CPCC surveyed current college students. The results indicated the following:

Full-time:	52 potential students
Part-time:	52 potential students

Projected enrollment for the first two classes:

1st class:	20 full-time	6 part-time
2nd class:	20 full-time	6 part-time

The college has adequate space on campus to accommodate the program. Start-up costs are estimated at \$30,000 for facilities and equipment, and \$70,000 for faculty. The on-going annual cost is \$20,000 for facilities and equipment, and \$75,000 for a full-time instructor. The funds necessary to operate the program will come from regular budget FTE.

IV. Implementation of Collaborative Plan

Not Applicable

V. Curriculum Design

The advisory committee participated in the development of the program competencies. The proposed curriculum standard is in compliance with State Board requirements. The proposed program of study is in compliance with the proposed curriculum standard.

Proposed

Class Lab Credit

ALTERNATIVE ENERGY TECHNOLOGY

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

ALT 220	Photovoltaic Sys Tech	2	3	3
Prerequisites:	None			
Corequisites:	None			

This course introduces the concepts, tools, techniques, and materials needed to understand systems that convert solar energy into electricity with photovoltaic (pv) technologies. Topics include site analysis for system integration, building codes, and advances in photovoltaic technology. Upon completion, students should be able to demonstrate an understanding of the principles of photovoltaic technology and current applications.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

ALT 221	Adv PV Sys Designs	2	3	3
Prerequisites:	ALT 220			
Corequisites:	None			

This course introduces specific elements in photovoltaic (pv) systems technologies including efficiency, modules, inverters, charge controllers, batteries, and system installation. Topics include National Electrical Code (NEC), electrical specifications, photovoltaic system components, array design and power integration requirements that combine to form a unified structure. Upon completion, students should be able to demonstrate an understanding of various photovoltaic designs and proper installation of NEC compliant solar electric power systems.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

ALT 240	Wind & Hydro Power Sys	2	2	3
Prerequisite:	None			
Corequisites:	None			

This course introduces concepts, designs, tools, techniques, and material requirements for systems that convert wind and water into usable energy. Topics include the analysis, measurement, and estimation of potential energy of wind and water systems. Upon completion, students should be able to demonstrate an understanding of the technologies associated with converting wind and water into a viable energy source.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

ALT 250	Thermal Systems	2	2	3
Prerequisites:	None			
Corequisites:	None			

This course introduces concepts, tools, techniques, and materials used to convert thermal energy into a viable, renewable energy resource. Topics include forced convection, heat flow and exchange, radiation, the various elements of thermal system design, regulations, and system installation and maintenance. Upon completion, students should be able to demonstrate an understanding of geothermal and solar thermal systems and corresponding regulations.

Proposed

Class Lab Credit

CIVIL ENGINEERING TECHNOLOGY

*Effective Term Fall 2009 [2009*03] – SBCC ____*

CIV 115	Geotechnical Engineering	2	6	4
Prerequisites:	CIV 110 or MEC 250			
Corequisites:	None			

This course introduces soil origin, classification, composition, and mechanics, for the purpose of determining strength and stability. Topics include analyzing and testing soil chemistry, taxonomy, permeability, compression, stress analysis, stabilization, and settlement. Upon completion, students should be able to demonstrate an understanding of soils, subsurface exploration techniques, science of earth materials, and fundamental concepts of particulate mechanics.

INDUSTRIAL SCIENCE

*Effective Term – Fall 2009 [2009*09] – SBCC ____*

ISC 120	Industrial Ecology	2	2	3
Prerequisites:	None			
Corequisites:	None			

This course introduces concepts and tools used for estimating business costs and environmental risks incurred through the lifetime of projects and associated environmental regulations. Topics include performance audits, examining inputs and outputs of materials and energy, and the associated environmental impacts created within the context of business operations. Upon completion, students should be able to demonstrate an understanding of performance audits and their use to ensure efficiency, quality control, and environmental protection.

*Effective Term – Fall 2009 [2009*09] – SBCC ____*

ISC 220	Lean Manufacturing	2	2	3
Prerequisites:	None			
Corequisites:	None			

This course introduces students to the concept of lean manufacturing as a means of waste reduction. Topics include the examination of manufacturing operations and the incorporation of lean techniques to reduce waste, cost, time, and materials in manufacturing processes. Upon completion, students should be able to demonstrate an understanding of lean manufacturing systems and how they benefit the environment and business.

MECHANICAL

*Effective Term – Fall 2009 [2009*03] – SBCC ____*

MEC 155	Env Benign Manufacturing	2	2	3
Prerequisites:	None			
Corequisites:	None			

This course introduces environmental issues involving the generation and management of hazardous materials and wastes in manufacturing operations. Topics include the analysis of manufacturing trends, pollution minimization strategies, and the advantages of incorporating a sustainable approach to manufacturing. Upon completion, students should be able to discuss analysis and modification of industrial processes in manufacturing facilities toward a sustainable end.

Sustainability Technologies

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 110 Intro to Sustainability 3 0 3

Prerequisites: None

Corequisites: None

This course introduces sustainability issues and individual contributions toward environmental sustainability. Topics include management processes needed to maximize renewable/non-renewable energy resources, economics of sustainability, and reduction of environmental impacts. Upon completion, students should be able to discuss sustainability practices and demonstrate an understanding of their effectiveness and impacts.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 120 Energy Use Analysis 2 2 3

Prerequisites: None

Corequisites: None

This course introduces the principles of analyzing energy use, energy auditing tools and techniques, conservation techniques, and calculating energy savings. Topics include building system control theory, calibrating digital controls, energy loss calculations, and applicable conservation techniques. Upon completion, students should be able to demonstrate an understanding of energy use, audits, and controls in the analysis of energy consumption.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 130 Modeling Renewable Energy 2 2 3

Prerequisites: None

Corequisites: None

This course introduces software and other technologies used for modeling renewable energy systems. Topics include renewable energy modeling software applications, data analysis, renewable energy sources, and cost of renewable energy systems. Upon completion, students should be able to use appropriate technology to model the effectiveness of renewable energy systems.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 140 Green Building Design 1 3 2

Prerequisites: None

Corequisites: None

This course introduces green building design, Leadership in Energy and Environmental Design (LEED) and comparable certifications, and their significance in modern building construction. Topics include LEED certification or similar rating systems, energy efficiency, indoor environmental quality, and sustainable building materials. Upon completion, students should be able to incorporate ecological awareness and sustainable principles within the context of design and construction.

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 210 Issues in Sustainability 3 0 3

Prerequisites: SST 110

Corequisites: None

This course introduces the long-term impacts and difficulties of applying sustainability concepts in an organization, business, or society. Topics include the application of sustainable technologies and the analysis of affordability, efficiencies, recycling, and small and large-scale design. Upon completion, students should be able to recognize the possible limitations of sustainable technologies and be prepared to reconcile such conflicts.

Proposed

Class Lab Credit

*Effective Term –Fall 2009 [2009*03] – SBCC _____*

SST 250 Sustain Capstone Project

1 6 3

Prerequisites: SST 110

Corequisites: None

This course introduces an integrated team approach to a sustainability topic of interest to students, faculty, or professional community. Topics include problem identification, proposal preparation, conceptual design, and an effective project work schedule. Upon completion, students should be able to integrate the many facets of a topic based on environmental sustainability into a completed project.

Curriculum Program Title

Sustainability Technologies

Code

A40xxx

Concentration

(not applicable)

Curriculum Description

The Sustainability Technologies curriculum is designed to prepare individuals for employment in environmental, construction, alternative energy, manufacturing, or related industries, where key emphasis is placed on energy production and waste reduction along with sustainable technologies.

Course work may include alternative energy, environmental engineering technology, sustainable manufacturing, and green building technology. Additional topics may include sustainability, energy management, waste reduction, renewable energy, site assessment, and environmental responsibility.

Graduates should qualify for positions within the alternative energy, construction, environmental, and/or manufacturing industries. Employment opportunities exist in both the government and private industry sectors where graduates may function as manufacturing technicians, sustainability consultants, environmental technicians, or green building supervisors.

Curriculum Requirements*

[for associate degree, diploma, and certificate programs in accordance with 23 NCAC 02E.0204(3)]

- I. General Education.** Degree programs must contain a minimum of 15 semester hours including at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural sciences/mathematics. Degree programs must contain a minimum of 6 semester hours of communications. Diploma programs must contain a minimum of 6 semester hours of general education; 3 semester hours must be in communications. General education is optional in certificate programs.
- II. Major Hours.** AAS, diploma, and certificate programs must include courses which offer specific job knowledge and skills. Work experience, including cooperative education, practicums, and internships, may be included in associate in applied science degrees up to a maximum of 8 semester hours of credit; in diploma programs up to a maximum of 4 semester hours of credit; and in certificate programs up to a maximum of 2 semester hours of credit. *(See second page for additional information.)*
- III. Other Required Hours.** A college may include courses to meet graduation or local employer requirements in a certificate, diploma, or associate in applied science program. These curriculum courses shall be selected from the Combined Course Library and must be approved by the System Office prior to implementation. Restricted, unique, or free elective courses may not be included as other required hours.

	AAS	Diploma	Certificate
Minimum General Education Hours	15	6	0
Minimum Major Hours	49	30	12
Other Required Hours	0-7	0-4	0-1
Total Semester Hours Credit (SHC)	64-76	36-48	12-18

Proposed

Major Hours

[ref. 23 NCAC 02E.0204(3)]

- A. Core.** The subject/course core is comprised of subject areas and/or specific courses which are required for each curriculum program. A diploma program offered under an approved AAS program standard or a certificate which is the highest credential level awarded under an approved AAS program standard must include a minimum of 12 semester hours credit derived from the subject/course core of the AAS program.
- B. Concentration** (if applicable). A concentration of study must include a minimum of 12 semester hours credit from required subjects and/or courses. The majority of the course credit hours are unique to the concentration. The required subjects and/or courses that make up the concentration of study are in addition to the required subject/course core.
- C. Other Major Hours.** Other major hours must be selected from prefixes listed on the curriculum standard. A maximum of 9 semester hours of credit may be selected from any prefix listed, with the exception of prefixes listed in the core or concentration. Work experience, including cooperative education, practicums, and internships, may be included in associate in applied science degrees up to a maximum of 8 semester hours of credit; in diploma programs up to a maximum of 4 semester hours of credit; and in certificate programs up to a maximum of 2 semester hours of credit.

Sustainability Technologies A40xxx

	AAS	Diploma	Certificate
Minimum Major Hours Required	49 SHC	30 SHC	12 SHC
A. CORE <i>A diploma offered under this AAS degree requires a minimum of 12 SHC extracted from the required subject/course core of the AAS degree.</i> Required Courses: ENV 110 Environmental Science 3 SHC SST 110 Intro to Sustainability 3 SHC SST 120 Energy Use Analysis 3 SHC SST 210 Issues in Sustainability 3 SHC Required Subject Areas: Select one subject area: Alternative Energy. Select 9 SHC: ALT 120 Renewable Energy Tech 3 SHC ALT 220 Photovoltaic Sys Tech 3 SHC <i>or</i> ALT 240 Wind and Hydro Power Sys 3 SHC SST 130 Modeling Renewable Energy 3 SHC Environmental Engineering Technology. Select 10-12 SHC: CIV 110 Statics/Strength of Mater 4 SHC <i>or</i> MEC 250 Statics & Strength of Mat 5 SHC CIV 111 Soils and Foundations 3 SHC <i>or</i> CIV 115 Geotechnical Engineering 4 SHC CIV 211 Hydraulics and Hydrology 3 SHC Sustainable Manufacturing. Select 9 SHC: ISC 120 Industrial Ecology 3 SHC ISC 220 Lean Manufacturing 3 SHC MEC 155 Env Benign Manufacturing 3 SHC Green Building. Select 12 SHC: ARC 111 Intro to Arch Technology 3 SHC CMT 210 Prof Construction Superv 3 SHC ARC 210 Intro to Sustain Design 2 SHC <i>or</i> SST 140 Green Building Design 2 SHC SRV 110 Surveying I 4 SHC <i>or</i> SRV 112 Landscape Arch Surveying 4 SHC	21-24 SHC	12 SHC	
<i>Continued on next page</i>			

Sustainability Technologies A40xxx (Continued)

B. CONCENTRATION <i>(Not applicable)</i>	NA	NA	NA
C. OTHER MAJOR HOURS <i>To be selected from the following prefixes</i> AHR, ALT, ARC, ATR, BIO, BPR, BUS, CHM, CIS, CIV, CMT, COE, CSC, CST, DBA, DFT, EGR, EHS, ELC, ENV, EPP, FMW, FOR, GEL, GEO, GIS, HOR, ISC, LAR, MAC, MEC, PHS, PLU, PME, PMT, SRV, SST, and WAT			