

**Program Planning Summary to Offer a  
Masters of Science Degree in Energy and Environment**

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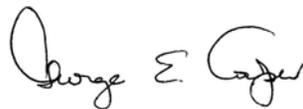
South Carolina State University  
College of Science, Mathematics, Engineering, and Technology

Submitted to the Director of the Division of Academic Affairs  
And Licensing  
South Carolina Commission on Higher Education

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Dr. George E. Cooper  
President

## Program Planning Summary

<b>Institution:</b>	South Carolina State University
<b>Program Designation:</b>	Program Planning Summary for a New Program (M.S. degree in Energy and Environment—36 credit hours)
<b>Designation of Program:</b>	Two-Year Graduate STEM Program (Qualified for Supplemental Palmetto Fellows Scholarship and LIFE Scholarship Award)
<b>Proposed Date of Implementation:</b>	Fall 2011
<b>Academic Unit Involved:</b>	Department of Civil and Mechanical Engineering Technology and Nuclear Engineering, Department of Biological and Physical Sciences, and the Department of Electrical and Mechanical Engineering Technology within the College of Science, Mathematics and Engineering Technology
<b>Delivery Mode:</b>	Traditional – Day and Evening
<b>CIP Code:</b>	TBD

### SUMMARY

This Master's program is an interdisciplinary program involving Chemistry, Biology, Physics, Nuclear Engineering and Engineering Technology at South Carolina State University. Other STEM disciplines, in particular computer science, will become involved as advanced research develops. The degree will have two focus areas: (1) coursework, research and development of alternative energy sources, including hydrogen evolution from biomass, bio-diesel fuel development, nuclear battery development, and fuel cells, and (2) on assessing the environmental impact of these sources. This would include courses that emphasize monitoring the atmosphere, water resources and aquifers, and soil. The Masters program will be available in either a thesis or non-thesis(project oriented) option.

### Justification of need for the proposed program

The need for trained energy workers who have knowledge of the environment is now a state and national imperative. Clean methods for producing energy must be developed and implemented not just as a matter of meeting societal demands for energy, but as a matter of national security. Nuclear energy will fill some of the national energy need, but it can only be a part of the solution. Other alternative energy sources must be sought. The United States must drastically reduce its dependence on foreign oil, or risk being held as an "energy" hostage by nations that are not friendly towards this nation. South Carolina State University can serve as training ground for the new energy and environment work force that will be needed to meet twenty first century demands. The prepared Masters degree student will be employable in pertinent local, state, and national industries or as workers at national laboratories.

### **Anticipated program demand and productivity**

It is highly probable one of the next major bills that will come before the U.S. congress will be an Energy Bill. With concern for the environment now being seriously discussed internationally, any such bill must consider this aspect as it relates to any alternative or new form of energy production . Given that the development of alternative energy sources is a national imperative, a new workforce that understands these emerging areas must concurrently be developed. Thus as with South Carolina State's nuclear engineering graduates, we anticipate a very strong demand for professionals knowledgeable of energy production methods who can also assess the environmental impact of such methods.

Productivity is measured in the number of students graduated, the number of scientific papers published, and the number of patents emanating from the research. Through grants already received, there are currently to graduate students conducting research in wind turbine energy generation and in bio-fuels production. Faculty in chemistry and biology have already presented papers on hydrogen generation by bio-mass; and a provisional patent has been issue for some of the work already completed. Undergraduate students have flocked to the new alternative energy teams that we have formed hoping to get involved in the research. Thus we anticipate that the Masters program proposed will be a sustainable and viable program at this university for years to come.

### **Assessment of extent to which the proposed program duplicates existing programs in the state**

This program does not duplicate any other program in the state. It is unique in that it combines at study of alternative methods of producing consumable energy, while studying the environmental impact of such. Thus it cannot be considered a purely engineering or environmental science program.

### **Relationship of the proposed program to existing programs at the proposed institution**

The proposed program is an interdisciplinary program that makes use of existing faculty at the university in the fields of Chemistry, Biology, Physics, Nuclear Engineering, and Mechanical and Electrical Engineering Technologies.

### **Relationship of the proposed program to other institutions via institutional cooperation**

At present, there is institutional cooperation between South Carolina State University the Savannah River National Laboratory, where the South Carolina State Environmental Field Station is located. This Field Station will be used to train Masters students in practical aspects of Environmental Science.

### **Proposed Curriculum**

#### **Core Courses (Thesis & Non-thesis students 7 of 9 courses =19 Credits \*=required)**

- P531 Atmospheric Physics and Climatic Impacts (3)
- \*ENV550 Environmental Policy and Law (3)
- TRP633 Transportation, Energy and Air Quality 3
- \*MET 594 Energy Economic Analysis (3)
- MET 591 Energy Production Systems (3)
- ENV 610 Environmental Restoration Technology (3)
- \*ENV 510 Patterns and Processes in Environmental Pollution and Remediation (3)
- \*AGBU561 Advanced Statistics (3)
- \*ENV690 Seminar in Energy and Environmental Science (1) New Course
- \*\*ENV699 Thesis Preparation (6)

#### **Energy Option Courses**

- NE 597 Nuclear Energy (3)
- TRP633 Transportation, Energy and Air Quality,
- TRP 634 Hazard Material Transportation and Risk Analysis
- MET 591 Energy Production Systems (3)

MET 596 Electrical Controls in Energy (3)  
NE 511 Nuclear Reactor Engineering (3)

**Environmental Science Option**

ENV 600 Ground Water Monitoring and Remediation  
ENV 610 Environmental Restoration Technology  
P531 Atmospheric Physics and Climatic Impacts  
TRP 642 Environmental Transportation Policy 3  
ENV698 Special topics in Environmental Science (3)  
TRP 641 Application of GIS and GPS in Transportation 3  
MET 530. Introduction to Air Pollution Control (3)  
MASC501 Marine and Estuarine Ecology (3)

**Total new cost associated with implementing the proposed program (general estimates)**

No new costs will be incurred with the implementing of this program; a grant from the Department of Defence in 2007 allowed South Carolina State University to purchase about \$250,000 in state-of-the-art equipment to conduct research in alternative energy. A grant from the U.S. Department of Education has allocated at least \$300,000 over the six years (beginning in 2009) for development of this program. These funds allow for the purchase of 25% release time for about three faculty members to conduct research in alternative energy and environmental science over the next five years. This same grant also supports up to four graduate students studying in the Masters in Transportation program who are involved in bio-mass, bio-diesel fuels, or fuel cell research. Additional grants for scholarships, undergraduates, and equipment have been applied for through the Department of Defence and other agencies.