DOE/SR/18445--T5

Infrastructure Support for a Waste Management Institute

Final Project Report

To DOE's Savannah River Office
September 12, 1994 Through September 11, 1997

Submitted by
The Waste Management Institute

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1.0 SUMMARY

North Carolina A&T State University has completed the development of an infrastructure for the interdisciplinary Waste Management Institute (WMI). The Interdisciplinary Waste Management Institute (WMI) was approved in June, 1994 by the General Administration of the University of North Carolina as an academic support unit with research and public service functions. The mission of the WMI is to enhance awareness and understanding of waste management issues and to provide instructional support including research and outreach. The goals of WMI are as follows: increase the number of minority professionals who will work in waste management fields; develop cooperative and exchange programs involving faculty, students, government, and industry; serve as institutional sponsor of public awareness workshops and lecture series; and support interdisciplinary research programs. The vision of the WMI is to provide continued state-of-the art environmental educational programs, research, and outreach.

Dr. Godfrey A. Uzochukwu is the WMI Director. He is assisted by an Administrative Assistant, Student Assistants, and Faculty. The WMI office is wired for computer networking.

The WMI has accomplished the following:

WMI Enrollment: Enrollment in WMI Core Courses -5962 students (5622 undergrad. and 340 grad.) courses were taught in 149 WMI program areas, enrollment increased (+100%) in programs with an environmental focus. A list of WMI courses is published every semester.

Waste Management Certificate Program: WMI stands out among the environmental programs of the HBCU's. The Institute has an advisory committee and an external advisory board. Waste management certificates were awarded to 133 students in May 1995, May 1996 and May 1997. Certificates were awarded with the B.S. degree at commencement.

Waste Management Instructional Projects: WMI departments are involving their students in innovative special projects/topics in waste management. Examples include: GEEN 666 (practice of hazardous waste barrel removal), BUAD 538 (marketing research in waste management), and Masters thesis (integrated GIS/RS for hazardous waste transportation and analysis of nuclear waste sites).

Undergraduate Scholarship/Stipend and Faculty/student Development Projects: DOE-SR scholarships were awarded to 168 students. WMI supported 40 faculty members and 80 students for various faculty and student development activities in Waste Management. Scholarship students were encouraged to participate in environmental internships. Eleven students completed a summer internship at the USDOE-SR site (May - July 1996).

Waste Management Outreach Projects: The WMI participated in more than 20 outreach projects. More than 200 persons from high schools, colleges/universities, and environmental agencies participated in the Environmental Awareness and Issues Symposium" on April 11, 1995. High school students competed for prizes in the environmental essay contest (1st prize - $100, 2nd prize- $50, and 3rd prize - $30). On April 11, 1996, more than 300 persons from high schools, colleges/universities, and environmental agencies participated in the "Environmental Expo". High school students (10th and 11th graders) and college/university students participated in an environmental poster contest (1st prize - $200, 2nd prize - $100, and 3rd prize - $50). The WMI conducted waste management workshops for precollege students and teachers and also sponsored an environmental science summer institute for teachers. The WMI is a member of the Greensboro Environmental Business Partners. The above outreach projects were evaluated by participants. The majority of participants indicated that the facilities, topics, and speakers were excellent. The WMI was selected First Place for Education by the Greensboro Chamber of Commerce for innovative waste management practices.

The WMI is successfully making a transition from educational activities to environmental technology research activities (technology assessment, evaluation, and testing).

2.0 INTRODUCTION

North Carolina Agricultural and Technical State University (NCA&TSU) has completed the development of an infrastructure for the interdisciplinary Waste Management Institute. The University is a comprehensive state university with more than 90 academic programs (Certificate, B.A, B.S., M.A., M.S., and Ph.D.) offered through the Schools of Agriculture, Business and Economics, Education, Nursing, Technology, College of Engineering and the College of Arts and Sciences. The University implemented a certificate in Waste Management in May 1995. The University enrolls 8,000 students from nearly every county in North Carolina, 40 states, and 61 foreign countries. Faculty and staff number nearly 1,300.

NCA&TSU is a member of the Historically Black Colleges and Universities/Minority Institutions Environmental Technology and Waste Management Consortium (HBCU/MI-ET/WM Consortium) are involved in environmental curriculum development and community outreach programs.

The Interdisciplinary Waste Management Institute (WMI) was approved in June, 1994 by the General Administration of the University of North Carolina. An infrastructure support grant $1.5 million - $722,070, 1st and 2nd installments was awarded by the USDOE - Savannah River Office in September 1994 and September 1995. The Waste Management Institute is an academic support unit with research and public service functions. The Institute has the following additional responsibilities:

- Coordination of waste management and environmental efforts (instruction, research, outreach, internships, and faculty/staff development) of the University which now exist in individual departments

- Implementation of a certificate program in Waste Management and helping to insure that waste management/environmental concepts are infused into the University's designated interdisciplinary waste management courses

- Advisement of students who are interested in environmental/waste management careers, and

- Clearing house for the University's environmental/waste management activities

The board members are from industry, government, and public school. A list of the board members is in the Appendix. The board members participated in a conference call on October 21, 1996.

2.6 ORGANIZATION AND ADMINISTRATION

The following academic units are participating in the activities of the Waste Management Institute: Animal Science, Agricultural Education, Agricultural Economics, Architectural Engineering, Biology, Business Administration, Curriculum and Instruction, Chemical Engineering, Chemistry, Computer Science, Civil Engineering, Electrical Engineering, Economics, Graphic Communications, History, Human Environment and Family Science, Industrial Engineering, Construction Management and Safety, Mechanical Engineering, Natural Resources and Environmental Design(Agricultural and Environmental Systems Engineering, Environmental Science, Landscape Architecture, Plant Science, and Soil science), Nursing, Political Science, Physics, Psychology and Social Work. The Institute coordinates the waste management efforts of the University. An organizational chart is in the Appendix. As a unit of NCA&TSU, the Institute is governed by the policies of the University and is accountable to its administration. The Institute conducts its activities through faculty members and facilities of the participating departments. WMI faculty and waste management specialty areas are listed in the Appendix.

2.7 MANAGEMENT STRUCTURE

The director of the WMI reports directly to the Vice Chancellor for Academic Affairs. The director is a member of the administrative council of the division of academic affairs.

- The director is point of contact for the University's waste management programs.
- The director maintains a schedule for WMI review.
- The director monitors waste management resources
- The director works closely with the offices of the Vice Chancellor for Research and Contracts and Grants; they report financial and project control data to DOE Savannah River Operations Office.

The following DOE/SR staff have been very helpful in the implementation of this project:

1.	Cynthia Anderson	Ms. Anderson made a presentation about DOE-SR activities during the environmental awareness symposium on April 13, 1995. The presentation was made on behalf of Tom Heenan. She was the keynote speaker at the April 11, 1996 Environmental Expo in Greensboro.
2.	Gail Whitney	Ms. Whitney attended the environmental awareness and issues symposium on April 13, 1995. She is providing technical expertise and guidance on WMI infrastructure development.
3.	Vickie Wheeler	Ms. Wheeler is assisting the WMI with meeting the objectives of the DOE-SR funded project.
4.	Tonya Smith	Ms. Smith is assisting the WMI with budgetary matters needed to meet the project objectives. She attended the Environmental Expo on April 11, 1996 in Greensboro.
5.	Clinton McGill	Mr. McGill is helping the WMI with budget logistics needed to implement the project. He attended the Environmental Expo on April 11, 1996.

3.0 DETAILED ACCOMPLISHMENTS OF THE WASTE MANAGEMENT INSTITUTE (WMI)

The WMI office is staffed by the following individuals:

Director (1/2 time) - Godfrey A. Uzochukwu, Ph.D., Professor, L.S.S.
Administrative Assistant - Ms. Carolyn Davis-Ruff, A.A.S. (Jan. 1995 - July 1997)
Outreach Coordinator - Mr. Broadus Funderburk, B.S., and assist. to director (Dec. 1994 - Dec. 1996)
Technical Officer - Ms. Susan Talley, M.S. (Fall 1995)
Student Assistant - Mr. Michael Murphy (Spring and Summer 1995)
Student Assistant - Mr. Christopher Hill (Spring 1995)
Student Assistant - Mr. Harvey Campbell (Spring 1994 - Fall 1996)
Student Assistant - Mr. Wilfred Nixon (Spring 1995)
Student Assistant - Ms. Tonya P. Cash (Spring 1995)

Program Officer - Stacy Kyle (Jan - June 1996)
Program Officer - Stella O'Lawrence (May - August 1997)
Admin. Asstistant - Ms. Beverley Jones (August 15, 1997 - Present)
Student Assistant - Mr. Kelvin Jordan (Spring 1995)
Student Assistant - Mr. Michael Regan (Spring 1997 and Summer 1997)
Student Assistant - Ms. Laura Stout (Spring 1997 and Summer 1997)
Student Assistant - Mr. Benjamin Pratt (Summer 1995)
Student Assistant - Mr. Linwood Peele (Spring 1995)
Student Assistant - LaKenya Chancey (Fall 1995, Spring 1996, and Fall 1996)
Student Assistant - Kyra Marshall (Summer 1996)
Student Assistant - Faheem Khabeer (Work Study)
Student Assistant - Monica Fuller (Work Study)

The WMI office is equipped with the following: 4 AT&T three line telephones, 1 power Macintosh 7100/80 with keyboard and monitor, 1 LaserWriter 16/600 (8MB), 1 transparency maker, 1 overhead projector, 1 cassette recorder, 1 panel table top (12" x 36") display, 1 panel display with logo (13 1/2" x 23"), 2 panasonic 20" VCR/TV combination, 1 computer work center, I fax machine, 1 VCR, 2 adjustable bookcases, 1 swivel chair, and 2 side chairs, 1 camcorder and 1 tripod, 2 electric typewriters, 1 laminator, 2 LCD panels, 1 LCD projector,1 IBM Laptop and 1 color scanner. The WMI office is completely wired for computer networking: e-mail, homepage, and world wide web.

3.1 ENVIRONMENTAL DEGREE AND WASTE MANAGEMENT PROGRAMS

B.S. In Agricultural Science (Earth and Environmental Science)/Waste Management Certificate
B.S. In Chemical Engineering /Waste Management Certificate
B.S. In Civil Engineering/Waste Management Certificate
B.S. In Agricultural Engineering /Waste Management Certificate
B.S. In Occupational Safety and Health/Waste Management Certificate
B.S. in Biology/Waste Management Certificate
B.S. In Chemistry/Waste Management Certificate
B.S. In Business Administration (Management)/Waste Management Certificate
B.S. In Economics (Transportation)/Waste Management Certificate
B.S. in Landscape Architecture/Waste Management Certificate
B.S. in Social Work/Waste Management Certificate
B.S. in Industrial Engineering/Waste Management Certificate
B.S. in Animal Science/Waste Management Certificate
B.S. in Architectural Engineering/Waste Management Certificate
B.S. in Marketing/Waste Management Certificate
B.S. in Soil Science/Waste Management Certificate
B.S. in Mechanical Engineering/Waste Management Certificate

M.S. In Chemistry
M.S. In Biology
M.S. In Plant, Soil, and Environmental Science
M.S. In Engineering

3.2 ENROLLMENT IN ENVIRONMENTAL/WASTE MANAGEMENT COURSES

The enrollment in environmental/waste management courses are summarized below:

Semester	Number of WMI Core Courses	Student Enrollment Graduate	Student Enrollment Undergraduate
Fall 1994	24	30	660
Spring 1995	20	46	563
Fall 1995	28	53	769
Spring 1996	41	47	942
Fall 1996	36	104	1029
Spring 1997	42	60	1659
Totals	191	340	5,622

The above figures indicate a steady increase in the number of WM courses and WM students. Enrollment increased (+100%) in WM departments with an environmental degree program focus (Animal Science, Chemical Engineering, Civil Engineering, Agricultural Engineering, Ag. Sci. - Earth and Environmental Science, and Occupational Safety and Health). The departments of Business Administration, Economics, History, Architectural Engineering, Mechanical Engineering, Agricultural Economics and Education were involved in special topics and projects in environmental/waste management. A list of WM courses are in the Appendix.

3.3 WASTE MANAGEMENT CERTIFICATE PROGRAM

The Interdisciplinary Waste Management Institute stands out among the environmental programs of the Historically Black Colleges and Universities in the nation. The Institute has an advisory committee which meets two times per year. An external advisory board is in place to start work in Fall 1996. Members of the advisory board participated in a conference call on October 21, 1996. The WMI has an unique "certificate program" in Waste Management. A Waste Management Certificate is awarded to students who have completed a minimum of 18 credit hours of recommended waste management core courses. The Certificate in Waste Management complements the student's B.S. degree.

3.4 CERTIFICATE IN WASTE MANAGEMENT (MAY 1995*)

	Name	Major
1.	Joseph Lewis Brown, Jr.	Civil Engineering
2.	Kulema Jakell Hubbard	Occupational Safety and Health
3.	Herman Milton McDowell, Jr.	Occupational Safety and Health
4.	Keith LaMont McCullough	Occupational Safety and Health
5.	Krista Lynn Rogers	Occupational Safety and Health
6.	Russell Hargrove Hicks	Occupational Safety and Health
7.	Benita Carlotta Byrd	Occupational Safety and Health
8.	Eulanda Tomolyn Grigg	Ag. Sci (Earth & Envir. Science)
9.	Telora Twinette Thatch	Ag. Sci (Earth & Envir. Science)
10.	Reginald Arthur Robinson	Ag. Sci (Earth & Envir. Science)
11.	Sharon Lanette Burton-Foster	Ag. Sci (Earth & Envir. Science)
12.	Katina Natasha Lee	Ag. Sci (Earth & Envir. Science)
13.	Achebe Camara Hope	Chemical Engineering
14.	Joseph K. Mensah	Chemical Engineering
15.	Karen Maltese McIlwain	Chemical Engineering
16.	Trinia L. Jones	Chemical Engineering

CERTIFICATE IN WASTE MANAGEMENT (MAY 1996*)

	Name	Major
1.	Travis Chapman	Ag-Earth&Envir. Sci.
2	Wilfred Nixon	Ag-Earth&Envir. Sci.
3.	Lori Laxton	Ag-Earth&Envir. Sci.
4.	Harvey W. Campbell	Ag-Earth&Envir. Sci.
5.	Shaja R. Brothers	Ag-Earth&Envir. Sci.
6.	Crystal A. Spruill	Ag-Earth&Envir. Sci.
7.	Timothy S. Forrest	Arch. Engineering
8.	Willie J. Breeden	Arch. Engineering
9.	Deidre L. Battle	Arch. Engineering
10.	Balvinder Sing	Arch. Engineering
11.	Allen Dannyell	Arch. Engineering
12.	Avis Woods	Arch. Engineering
13.	Yuen Kijiji Avent	Chemical Engineering
14.	Vonzella E. Pritchard	Chemical Engineering
15.	George A. Page	Chemical Engineering
16.	Sharnay E. Torrance	Chemical Engineering
17.	LaQuinta N. Smith	Chemical Engineering
18.	Michele S. Ray	Chemical Engineering
19.	Corey M. Curties	Chemical Engineering
20.	Chineyere Ijeoma	Chemical Engineering

21. Taril Gravely	Marketing
22. Traci Goins	Arch. Engineering
23. Gregory Staton, Jr.	Civil Engineering
24. Herbert Byrd*	OSH
25. Tonya Cash	Ag-Earth&Envir Sci.
26. Stacey A. Smith	Civil Engineering
27. Robert I. Armond	Civil Engineering
28. Bryan D. Morton	Civil Engineering
29. Lindsey C. Nelson	Civil Engineering
30. Mondez J. Holloman	Civil Engineering
31. Damon D. Martin	Civil Engineering
32. Tonya A. Alexander	Chemistry
33. DeWuan L. Booker	Const. Mgt.
34. Candance C. Byrdsong	OSH
35. Fernell Patterson	OSH
36. Kevin N. Jeffries	OSH
38. Bryan G. Lutz	OSH
39. Sylvia Graves	Ag&Envir. Engineering
40. Katrecia Wilder	Chemistry
41. Trellis Simon	Chemistry
42. Vickie Meadows	Marketing
43. Donald Brandon	Chemical Engineering
44 Celena Owens	Chemical Engineering
45. Timothy Carvana	Ag-Earth&En. Sci.
46. Juan Tremble	Ag-Earth&En.Sci.

CERTIFICATE IN WASTE MANAGEMENT (MAY 1997*)

Name	Major
1. Larry R. Absher, Jr.	Civil Engineering
2. Lillie M. Alston	Arch. Engineering
3. Antoine J. Alston	Agr. Education
4. Shuronica Anderson	Lab. Animal Science
5. TaShara C. Bailey	Agr. & Envir. Engineer
6. Monica D. Baker	Chemical Engineering
7. Ruth M. Barnes	Chemical Engineering
8. Timothy S., Barrow	Civil Engineering
9. Cassandra F. Blaine	Chemical Engineering
10. Shawonda Brockington	Chemical Engineering
11. LaKenya B. Chancey	Earth&Envir. Science
12. Wilbur E. Christmas	Civil Engineering
13. Gary B. Cooper	Lab. Animal Science
14. Eldurante' V. Davis	Occup. Safety&Health
15. Antonya D. Dawson	Earth&Envir. Science

16. Kathy Ann Degraffenreid	Lab. Animal Science
17. Aldea C. Douglas	Earth&Envir. Science
18. Felix J. Ekwem	Business Management
19. Lisa L. Elliot	Lab. Animal Science
20. Lydia N. Gibson	Landscape Horti. Design
21. Carrey E. Gripper	Chemistry
22. Katetia L. Hargrove	Lab. Animal Science
23. Tonya W. Harris	Civil Engineering
24. Michael L. Herndon	Chemical Engineering
25. Willie E. Hester	Chemical Engineering
26. Kaisha T. Holman	Chemical Engineering
27. Felicia A. Holmes	Chemical Engineering
28. Michael L. Jakubiak	Ag. & Envir.
29. Jonathan R. James	Chemical Engineering
30. Todd D. Johnson	Chemical Engineering
31. Robyn M. Johnson	Lab. Animal Science
32. Stephanie D. Jones	Chemical Engineering
33. Murphy G. Jones, III	Occup. Safety & Health
34. Kiforu L. Jones	Chemical Engineering
35. Manu J. Kennedy	Occup. Safety & Health
36. Keisha M. Lisbon	Chemical Engineering
37. Roddy E. Locust	Civil Engineering
38. Weston Lyall	Civil Engineering
39. Tandet R. Mazo	Chemical Engineering
40. Charla F. McKoy	Lab. Animal Science
41. Tessa K. Mercer	Civil Engineering
42. Craig L. Mills	Civil Engineering
43. Williams S. Nott	Arch. Engineering
44. Joneice C. Peppers	Chemistry
45. Edwin A. Peters	Civil Engineering
46. Panya J. Porter	Arch. Engineering
47. Allen D. Roberts	Earth&Envir. Science
48. Robert J. Saunders	Agri&Envir. Engr.
49. Bryant J. Shaw	Arch. Engineering
50. Carlton J. Shaw	Ind. Engineering
51. Sara M. Smith	Chemical Engineering
52. Hipatia E. Smith	Earth&Envir. Science
53. Lottie K. Smith	Occup Safety & Health
54. Terri Smith	Chemical Engineering
55. Bryan G. Spangler	Arch. Engineering
56. Alfred T. Strange	Arch. Engineering
57. Kamal M. Syed	Chemical Engineering
58. Terence E. Thomas	Civil Engineering
59. Damien Thomas	Civil Engineering

60. Alichia L. Thornton	Chemical Engineering
61. Regina Timmons	Earth&Envir. Science
62. Ryan L. Urquhart	Ind. Engineering
63. Corey J. Veal	Civil Engineering
64. Zahara N. Wadud	Chemical Engineering
65. Jebrille M. Walls	Arch. Engineering
66. Meika R. Washburn	Chemical Engineering
67. Susan A. White	Civil Engineering
68. Jacinta N. Williams	Chemical Engineering
69. Tabitha N. Williams	Occup. Safety&Health
70. Kyha D. Williams	Lab. Animal Science
71. Danyelle R. Woodard	Occup. Safety&Health

* Certificate was awarded at commencement with the B.S. degree.

The approach to waste management education at NCA&TSU rests upon a solid foundation of applied and social sciences, engineering, technology and law/policy. This approach gives students the opportunity to broaden their education beyond their chosen academic fields of study.

3.5 SELECTED WASTE MANAGEMENT INSTRUCTIONAL PROJECTS

The WMI participating departments are involving their students in innovative special topics and projects in Waste Management, including seminars and term papers. A competition entitled "Bridging the Gap Between Theory and Practice Hazardous Waste Barrel Removal" involving NCA&TSU students and NCSU student was held on April 21, 1995 on NCA&TSU's campus. The competition developed all semester (NCA&T - GEEN 666, special project and NCSU - CE 497 M, current topics). Each team designed and tested the removal of a leaking barrel of "hazardous waste" from a 12 foot square area. The demonstration was timed and judged to determine the best design for emergency hazardous waste cleanup. The project was sponsored by an NSF funded Engineering Education Coalition of eight engineering schools in the Southeastern, USA. A&T's course was coordinated by Dr. Kenneth Murray, chairperson of the Department of Civil Engineering. Business Administration students were also involved in marketing research projects (BUAD 538 - marketing research). The course was coordinated by Dr. Japhet Nkonge and involved marketing of waste products from industrial manufacturing processes, including hazardous wastes. A distance learning course titled, "Introductory Environmental Marketing: Concepts, Practices, and Opportunities" is being developed by the Department of Business Administration.The above three projects in Civil Engineering and Business Administration are examples of how NCA&TSU implements its waste management projects.

3.6 UNDERGRADUATE SCHOLARSHIPS/STIPENDS/INTERNSHIPS

Waste Management Institute/DOE-SR Scholarships ($700/student) were awarded to 45 students in spring and fall semesters 1995, 31 students ($1,000/student) in spring 1996, 53 students ($700 - $1,000) in fall 1996, 17 students ($500/student) in spring 1997, and 22 students ($300/student) in fall 1997.

The scholarship recipients are as follows:

SPRING 1995
$700/student

NAME	MAJOR	CLASSIFICATION	GPA
1. Andrews, Alonzo L. (African American Male)	Civil Engineering	Junior	3.01
2. Bailey, TaShara (African American Female))	Agr. & Envir. Sys. Eng.	Sophomore	3.20
3. Barnes, Jade L. (African American Female))	Business Admin..	Junior	3.15
4. Brown, Joseph L., Jr. (African American Male)	Civil Engineering	Senior	3.30
5. Campbell, Harvey W. (African American Male)	Earth & Envir. Sci.	Junior	3.30
6. Carter, Jewel Cherie (African American Female))	Occup Safety & Health	Junior	3.10
7. Cash, Tonya P. (African American Female))	Earth & Envir. Sci.	Senior	3.30
8. Cecil, Karri D. (White Female)	EASC/Waste Mgmt.	Junior	3.38
9. Exum, Regina N. (African American Female))	Marketing	Sophomore	3.76
10. Gibbs, Rodney W. (African American Male)	Civil Engineering	Junior	3.80
11. Hubbard, Kulema J. (African American Female))	Occup. Safety & Health	Senior	3.40
12. Holloman, Mondez (African American Male)	Civil Engineering	Junior	3.19
13. Jakubiak, Michael (White Male)	Agr. & Envir. Sys. Eng	Junior	3.92
14. James, Jonathan (African American Male)	Arch. Engineering	Senior	3.40

15. Johnson, Lisa (White Female)	Social Work	Sophomore	3.62
16. Langford, Kimbery (African American Female))	Arch. Engineering	Sophomore	3.10
17. Leak, Roland L (African American Male)	Management	Junior	3.80
18. Lee, Katina N. (African American Female))	Earth & Envir. Sci.	Junior	3.27
19. Martin, Damon D. (African American Male)	Civil Engineering	Junior	3.30
20. Monroe, Roosevelt J. (African American Male)	Envir. Engineering	Senior	3.09
21. Nixon, Wilfred (African American Male)	Envir. Science	Junior	3.50
22. Roberts, Allen (African American Male)	Earth & Envir. Sci.	Sophomore	3.86
23. Tennant, Lois (White Female)	Elementary Ed.	Sophomore	3.64
24. Walton, Camille L (African American Female)	Civil Engineering	Senior	3.50
25. Watson, Dionne M. (African American Female)	Economics	Junior	4.00

FALL 1995
$700/student

NAME	MAJOR	CLASSIFICATION	GPA
1. Barnes, Jade (African American Female)	Bus. Mgt.	Senior	3.2
2. Brothers, Shaja (African American Female)	Envir. Sci.	Senior	3.0
3. Carter, Jewell (African American Female)	OSH	Senior	3.4
4. Cecil, Karri (White Female)	Envir. Sci.	Junior	3.7
5. Chandler, Jermal (African American Male)	Chemistry	Sophomore	3.0
6. Cook, Larry (African American Male)	Biology	Sophomore	3.5
7. Dawson, Antonya (African American Female))	Earth & Envir.	Junior	3.1
8. Foust, Yvonne (African American Female))	Bus. Mgt.	Junior	3.4
9. Gibbs, Rodney (African American Male)	Envir. Eng.	Senior	3.4
10. Goins, Ricky (African American Male)	Graphic Com.	Senior	3.0
11. Jakubiak, Michael (White Male)	Ag. Envir./Sys.	Senior	3.9

12. Jeffries, Kevin (African American Male)	OSH	Senior	3.4
13. Johnson, Lisa (White Female)	Soc. Work	Junior	3.6
14. Jones, Laikhe (African American Female)	Ag. Ed.	Senior	3.0
15. Laxton, Lori (White Female)	Envir. Sci.	Senior	4.0
16. Lynch, Sean (White Male)	Animal Sci.	Sophomore	3.6
17. Mayfield, Shawna (African American Female)	OSH	Senior	3.0
18. Powell II, Eddie (African American Male)	Biology	Junior	3.0
19. Staton, Gregory (African American Male)	Civil Eng.	Senior	3.0
20. Watson, Dionne (African American Female)	Economics	Senior	4.0

SPRING 1996 WMI/DOE - SR SCHOLARSHIP $1000/STUDENT

NAME	MAJOR	CLASSIFICATION	GPA
1. Bailey, TaShara (African American Female)	Agr. & Envir. Sys. Eng.	Sophomore	3.20
2. Brothers, Shaja (African American Female)	Envir. Sci	Senior	3.054
3. Campbell, Harvey W. (African American Male)	Earth & Envir. Sci.	Junior	3.30
4. Campbell, Nicole (African American Female)	Elm. Ed.	Senior	3.324
5. Carter, Jewel Cherie (African American Female)	Occup Safety & Health	Junior	3.10
6. Cecil, Karri D. (White Female)	EASC/Waste Mgmt.	Junior	3.38
7. Chandler, Jermal (African American Male)	Chemistry	Sophomore	3.0
8. Dawson, Antonya (African American Female)	Earth & Envir	Junior	3.1
9. Ekwem, Felix (African American Male)	Management	Junior	3.053
10. Foust, Yvonne (African American Female)	Bus. Mgt	Junior	3.407
11. Gibbs, Rodney W. (African American Male)	Civil Engineering	Junior	3.80
12. Grant, Sabriya (African American Female)	Civil Engineering	Senior	3.172
13. Herbin, Keysha (African American Female)	Social Work	Sophomore	3.813

14. Jakubiak, Michael (White Male)	Agr. & Envir. Sys. Eng	Junior	3.92
15. Jeffries, Kevin (African American Male)	OSH	Senior	3.358
16 Laxton, Lori (White Female)	Environ.	Senior	3.4
17. Marshall, Kyra (African American Female)	Landscape Arch	Sophomore	3.3
18. Martin, Damon (African American Male)	Civil Engr	Senior	3.118
19. Morton, Bryan (White Male)	Civil Engr	Senior	3.682
20. Perdue, Donald (White Male)	Chem Engr	Sophomore	3.667
21. Pritchard, Vonzella (African American Female)	Chem Engr	Senior	3.561
22. Smith, Eugene (African American Male)	Envir Sci	Senior	3.274
23. Timmons, Regina (White Female)	Envir Sci	Senior	3.923
24. Thomas, Damien (African American Male)	Civil Engr	Junior	3.9
25. Totten, David (African American Male)	IT/Mtg	Junior	3.410
26. Washburn, Meika (African American Female)	Chem Engr	Senior	3.395
27. Watson, Amy (African American Female)	Chemistry	Sophomore	3.028
28. Watson, Dionne M. (African American Female)	Economics	Junior	4.00
29. White, Susan (White Female)	Civil Engr	Senior	3.075
30. Williams, Tabitha (African American Female)	OSH	Junior	3.846
31. Woodard, Danyelle (African American Female	OSH	Junior	3.123

WASTE MANAGEMENT INSTITUTE
UNDERGRADUATE SCHOLARSHIP AWARDS
FALL 1996
($1,000)

NAME	MAJOR	CLASSIFICATION	GPA
1. Bailey, TaShara (African American Female)	Agri & Biosyst Engr	Senior	3.173
2. Baird, Maritza (African American Female)	Animal Science	Junior	3.024
3. Brice, Angela (African American Female)	Animal Science	Junior	3.3

4.	Brown, Jonathan (African American Male)	Civil Engineering	Senior	3.137
5.	Campbell, Harvey (African American Male)	Earth & Envir .. Sci.	Graduate Student	3.54
6.	Cecil, Karri (White Female)	Agr. & Biosyst. Engr	Sophomore	3.684
7.	Chancey, LaKenya (African American Female)	Earth & Envir.. Sci	Senior	3.0
8.	Chiles, Ethel (African American Female)	Marketing	Senior	4.0
9.	Collins, Tameka (African American Female)	Electronics	Senior	3.116
10.	Crump, Tommie (African American Male)	Civil Engr	Junior	3.576
11.	Dalton, Tamala (African American Female)	Animal Science	Sophomore	3.7
12.	Davis, Angela D. (African American Female)	Earth & Envir .. Sci.	Sophomore	3.07
13.	Davis, Angela Y. (African American Female)	Electronics & OSH	Senior	3.182
14.	Dawson, Antonya (African American Female)	Earth & Envi. Sci.	Senior	3.19
15.	Douglas, Aldea (African American Female)	Earth & Envir.. Sci.	Senior	3.011
16.	Ealge, Michael (White Male)	OSH	Senior	3.67
17.	Enahora, Basheerah (African American Female)	Mech. Engr.	Senior	3.796
18.	Exum, Regina (African American Female)	Marketing	Senior	3.845
19.	Gracia, Gerald (African American Male)	Biology	Senior	3.55
20.	Harris, Tonya (African American Female)	Civil Engr.	Senior	3.05
21.	Hazel, Jewun (African American Female)	Landscape Arch.	Sophomore	3.559
22.	Herbin, Keysha (African American Female)	Social Work	Junior	3.8
23.	Herndon, Michael (White Male)	Chemical Engr.	Senior	3.54
24.	Holley, LaKeshia (African American Female)	Earth & Envir . Sci.	Junior	3.146
25.	Hyler, Wesley (White Male)	Landscape Arch.	Junior	3.893
26.	Johnson, Lisa (White Female)	Social Work	Senior	3.75
27.	Jones, Stephanie (African American Female)	Chemical Engr.	Senior	3.625
28.	Lynch, Sean (White Male)	Animal Science	Junior	3.67

29.	McKoy, Marcia (African American Female)	OSH	Sophomore	3.9
30.	Moore, George (African American Male)	Industrial Tech.	Senior	3.876
31.	Pearson, LoisAnn (White Female)	Constr. Mgt. & OSH	Sophomore	3.0
32.	Peters, Edwin (African American Male)	Civil Engr.	Senior	3.111
33.	Powell, Myron (African American Male)	Biology	Sophomore	3.5
34.	Saunders, Robert (White Male)	Agri. & Biosys. Engr.	Junior	3.757
35.	Tennant, Lois (White Female)	Elem. Edu.	Senior	3.855
36.	Thomas, Damien (African American Male)	Civil Engineering	Senior	3.192
37.	Totten, David (African American Male)	Ind. Technology	Senior	3.25
38.	Veal, Corey (African American Male)	Civil Engineering	Senior	3.016
39.	Washburn, Meika (African American Female)	Chemical Engr.	Senior	3.477
40.	West, Donald (Native American)	Constr. Mgt.	Sophomore	3.9
41.	White, Susan (White Female)	Civil Engr/Envir..	Senior	3.04
42.	Williams, Tabitha (African American Female)	OSH	Senior	3.89
43.	Woodard, Danyelle (African American Female)	OSH	Senior	3.1

NEW FRESHMAN
ENVIRONMENTAL SCIENCE

	NAME	MAJOR	CLASS.	GPA/SAT	Amount
1.	Adams, Nina (African American Female)	Envir. Sci.	Freshman	860	800.00
2.	Etheridge, Donald (African American Male)	Envir. Sci.	Freshman	890	700.00
3.	Flake, Brico (African American Male)	Envir. Sci.	Freshman	840	800.00
4.	Jones, Vernetta (African American Female)	Envir. Sci.	Freshman	800	800.00
5.	Manning, William (African American Female)	Envir. Sci.	Freshman	930	1000.00
6.	Mattewson, Chadd (African American Male)	Envir. Sci.	Freshman	850	900.00

7.	Porch, DaJuan (African American Male)	Envir. Sci.	Freshman	3.269	800.00
8.	Simpson, Kimberly (African American Female)	Envir. Sci.	Freshman	830	800.00
9.	Rogers, Sammie (African American Male)	Envir. Sci.	Freshman	730	700.00
10.	Turner, Raymond (African American Male)	Envir. Sci.	Freshman	960	800.00

WMI SCHOLARSHIP AWARD
SPRING 1997
($500.00/STUDENT)

NAME	MAJOR	CLASS	GPA
1. Crump, Tommie (Black Male)	Civil Engr.	Junior	3.506
2. Davis, Angela Y. (African American Female)	Elec. & OSH	Senior	3.207
3. Dawson, Antonya (African American Female)	Earth & Envir.. Sci.	Senior	3.25
4. Ekwem, Felix (African American Male)	Bus. Admin..	Senior	3.01
5. Farr, Elizabeth (White Female)	Civil Engr.	Sophomore	3.75
6. Howard, Beverly (African American Female)	Early Chldhd Dev.	Senior	3.65
7. Holley, LaKeshia (African American Female)	Earth & Envir.. Sci.	Junior	3.241
8. Holman, Kaisha (African American Female)	Chem. Engr.	Senior	3.179
9. Nooh, Uduak (African American Male)	Chem. Engr.	Sophomore	3.68
10. Stout, Laura (White Female)	EASC	Junior	3.378
11. Strickland Tanyetta (African American Female)	OSHA	Junior	3.0
12. Strudwick, Casandra (African American Female)	Arch. Engr.	Senior	3.94
13. Washington, Eugenia (African American Female)	Arch. Engr.	Sophomore	3.2
14. West, Donald (Native American Male)	Constr. Mgt.	Junior	3.78
15. Williams. Erica (African American Female)	Civil Engr.	Junior	4.00
16. Hazel, Jewun (African American Male)	Lands. Arch.	Sophomore	3.2
17. Jones, Stephanie (African American Female)	Chem. Engr.	Senior	3.614

WASTE MANAGEMENT SCHOLARSHIP AWARD
FALL 1997 (8-21-97 TO 9-11-97)
$300.00

	NAME	MAJOR	CLASS	GPA
1.	Bailey, Carrie E. (African American Female)	OSH	Junior	4.0
2.	Boney, Corey E. (African American Male)	Industrial Eng.	Senior	3.707
3.	Brown, Anita C. (African American Female)	Transportation	Junior	3.2
4.	Bryson, Kamali T. (African American Male)	Civil Eng.	Senior	3.374
5.	Crump, Tommie C. (African American Male)	Civil Eng.	Senior	3.406
6.	Eagle, Michael T. (White Male)	OSH	Senior	3.5
7.	Engram, April E. (African American Female)	Animal Science	Sophomore	3.58
8.	Farr, Elizabeth A. (White Female)	Civil Engineering	Senior	3.846
9.	Gardner, LaRonda A. (African American Female)	Industrial Eng.	Senior	3.645
10.	Hazel, Jewun L. (African American Male)	Landscape Arch.	Junior	3.166
11.	Holley, LaKeshia M. (African American Female)	Earth & Envio Science	Senior	3.320
12.	Hyatt, Sonya R. (White Female)	Civil Engineering	Soph/Junior	3.244
13.	McDougal, Tosha R. (African American Female)	Argi. Ed./Envr. Sci.	Junior	3.43
14.	McKoy, Marcia C. (African American Female)	Occupational Safety&Health	Junior	3.688
15.	Miller, Anna C. (White Female)	Occupational Safety&Health	Senior	3.483
16.	Newell, Darrell A. (African American Male)	Occupational Safety&Health	Junior	3.0
17.	Powell, Myron S. (African American Male)	Biology	Junior	3.526
18	Richardson, Lori A. (African American Female)	OSH	Junior	3.5
19.	Stout, Laura A. (White Female)	EASC	Senior	3.259
20.	Strickland, Tanyetta K. (African American Female)	OSH	Senior	3.0
21.	Whitaker, Dianna T. (African American Female)	Agricultural Edu.	Junior	3.956
22.	Williams, Erica S. (African American Female)	Civil Engineering	Junior	3.794

3.7 ENVIRONMENTAL SUMMER INTERNSHIP AT USDOE-SR

The following environmental students at NC A&T State University completed a summer internship at DOE-SR site in Aiken, SC from May 15, 1996 to July 31, 1996:

	Name	MAJOR
1.	Shaja Brothers	Environmental Science
2.	Harvey Campbell	Environmental Science
3.	Nicole Campbell	Elementary Education
4.	Antonya Dawson	Earth & Envir.. Science
5.	Felix Ekwem	Business Administration
6.	Regina Exum	Marketing
7.	Basheerah Enahora	Mech. Engr (ORISE program)
8.	Keysha Herbin	Social Work
9.	LaKeshia Holley	Earth & Envir Science
10.	Wilfred Nixon	Environmental Science
11.	Donald Perdue	Chemical Engineering

The internship is an important partnership between the USDOE-SR and NCA&TSU. The purpose of the internship is to offer a program of experience including opportunity for career exploration in environmental professions. Students will be paid $43,600/10 weeks ($4,360/ student):

May 31, 1996	600.00
June 30, 1996	1200.00
July 31, 1996	1200.00
Travel Allowance	510.00
Housing Allowance	850.00
	$4360.00./student

3.8 FACULTY/STUDENT DEVELOPMENT IN ENVIRONMENTAL AND WASTE MANAGEMENT

Forty faculty members and sixty-nine students from the departments of Chemistry, Chemical Engineering, Animal Science, Natural Resources, Construction Management/Safety, Curriculum and Instruction, Manufacturing Systems, Landscape Architecture, and Civil Engineering were financially supported to participate in Waste Management and related activities.

The names of faculty and students who attended conferences are as follows:

K. T. Davis*, F. G. King, M.S. Alp, and S. Ilias (Department of Chemical Engineering) Effect of Environmental variable on C02 Diffusion through Tuffs." This paper was presented in May 1995 at the International High-Level Radioactive Waste Management Conference in Las Vegas. ($1,643)

Dr. Derek Norford (Department of Animal Science) attended the "Mid-American Toxicology Course" in April 1995, in Kansas City, MO. Dr. Norford is an Assistant Professor of Toxicology and hopes to develop environmental courses in toxicology. ($1,137)

Dr. Dilip Shah, School of Technology attended the Industrial Hygiene Conference in October 1994 with the following OSHA students. ($845.):Terrell Smith, Candance Byrdsong, Tabitha Williams, Travis Montague, William Fletcher, and Anthony Alston

Mr. John Lee, a graduate student in Plant, Soil, and Environmental Sciences, attended the National Agronomy meetings in Seattle, WA on November 12 - 17, 1994. He participated in Waste Management presentations. ($1,336)

Ms. Karri Cecil, an environmental science major, attended a Waste Management Conference in Chicago, on June 18, 1995. ($60.)

Dr. Pamela Hunter, School of Education, attended a Conference in December 1994 on environmental curriculum development for pre-college students in North Carolina. ($26.)

Dr. Lanell Ogden, attended an environmental toxicology conference in Kansas City in April 1995. ($1,215)

Dr. Michael Taggart, (Occupational Safety and Health) attended a environmental conference in May 1995 at Kansas City, MO. ($749.)

Dr. G. B. Reddy, attended a Bioremediation of waste conference in April 1995 at San Diego, CA. ($1,036) Harvey Campbell (environmental science senior), Donna Day (graduate student) and Dr. Godfrey A. Uzochukwu attended the clay minerals society meeting in Baltimore on June 3 - 6, 1995. ($541. for Donna Day)

Dr. Godfrey A. Uzochukwu, Waste Management Institute, attended the International Waste Management Congress in Atlanta June 7 - 9, 1995. ($734.00)

Mr. Broadus Funderburk, attended the National Association of Environmental Professionals Conference in Washington, DC on June 14, 1995. ($475.)

Ms. Taril Gravely, an environmental marketing senior presented a poster paper (Knowledge and Disposal of Hazardous Wastes) at a Waste Management Conference in San Antonio, TX., in June 1995. ($1,073)

Dr. Eugenio Lord attended the EPA - Pollution Prevention Conference in Atlanta, GA on December 13, 1994. ($348.)

Dr. Godfrey A. Uzochukwu attended the DOD/Air Force Environmental Opportunities Conference in Los Angeles on July 29, 1995. ($1,465)

Dr. Godfrey A. Uzochukwu attended the S.E. Environmental Remediation Conference on July 19,1995 in Atlanta, GA. ($1,118)

Dr. Godfrey A. Uzochukwu attended the Air Force Environmental Remediation Opportunity Conference in San Antonio, TX on June 28, 1995. ($1,542)

The following High School students were supported for a tour of environmental industries in North Carolina in July 1995. ($1,439): Shamara L. McKoy, David N. A. Sims, Kristie L. Wright, Cormanicia Moody, Kendra A. Ingram, Stacey Halbert, Dianna Whitaker, Cheree Breeden, Erica J. Buie, Shevonya M. Fogg,Natoya L. Powell, Damasi Bell, Percevial Murphy, Regin Ellis III, Calvin C. Jones, Jr., Sontiel T. Torrence, and Sean L. Walton.

Dr. Keith Schimmel, faculty members, and 50 students attended a conference on recent advances in membrane separations technology applications in environmental remediation on March 12, 1996 in Greensboro, NC ($200.)

Dr. G. B. Reddy attended a NASA sponsored workshop on instructional learning technology on April 18-20, 1996 in Washington, DC ($694.)

Dr. A. Shabazi attended a NASA sponsored conference on instruction technology on April 18-20, 1996 in Washington, DC ($710.).

Dr. F. King attended a radioactive waste conference in Las Vegas on April 29 and May 3,1996 ($1,085).

John Robinson attended an environmental degradation course in Boone, NC on April 28, May 3,1996 ($952.50).

Dr. Mufeed Basti attended a nuclear magnetic resonance conference in Keystone, CO on August 18-23, 1996 ($780.)

Dr. William Adeniyi attended the American Chemical Society meeting on August 25-29, 1996 ($755.).

Dr. J. Kumar attended the American Institute of Chemists Annual meeting in Charlotte, NC on February 8-10, 1996 ($350.)

Dr. Keith Schimmel attended a symposium on environmental biotechnology in Gatlingburg, TN on May 6-9, 1996 ($745.)

Dr. Etta Gravely attended a conference sponsored by the American Chemical Society (waste management symposia) on March 23 to March 28, 1996 in New Orleans, LA ($1,337)

Dr. Dilip Shah attended an OSHA compliance update conference on February 22 - 23, 1996 in Birmingham, AL ($670.)

SueAnne Ware attended a conference on community neighborhood and the environment on August 7-11, 1996 in Spokane, WA. ($727.)

Dr. Godfrey A. Uzochukwu and 3 students attended the HBCU/MI Research and Technology Transfer Symposium on April 2-3, 1996 in Greensboro, NC ($240.)

Dr. Godfrey A. Uzochukwu attended the HBCU/.MI waste management consortium meeting on February 29 - March 2,1996 in Atlanta ($600.)

April 11, 1996 Environmental Expo participants from small HBCU's ($6,643):
-Paine College: F. James, C. Evans, R. Kesler, M. Mims, C.R. Nair and N. Walker
-Selma University: P. Kumar, M. Danze and K. Chapatwala
-South Carolina State: S. Cantey, V. Williams, R. Dharwadkar, and F. Walker,
-Savannah State: R. Williams and K. Sajavan
-Fort Valley State: I. Crumbley, A. Dyke, and D. Hall
-Florida International: R. Tilleux, G. Nurse, and N. Monroe

Dr. Godfrey A. Uzochukwu and Dr. Charles Williams attended a program for A&T student interns in Aiken, SC on July 24, 1996 ($86.67)

Dr. Emmanuel Nzewi attended the National Association of Water Resources Congress (NAWE) on June 21-30, 1996 in Anahiem, CA ($1,304.10)

Dr. Godfrey A. Uzochukwu and Staci Kyle attended A&T's internship initiation program at DOE-SR in Aiken, SC on May 17-18, 1996 ($1,298.60)

Dr. M.R. Reddy attended an Environmental Conference and Expo on May 21-24, 1996 in Orlando, FL ($949.75)

Staci Kyle attended the National Association of Environmental Professionals (NAEP) Conference in Houston, TX on June 1-7, 1996 ($1,457.60)

Dr. Godfrey A. Uzochukwu attended the National Association of Environmental Professionals Conference in Houston, TX on June 1-7, 1996 ($1,881.85)

Dr. Godfrey A. Uzochukwu attended the Clay Minerals Society meeting in Gatlingburg, TN on June 15-20, 1996 ($913)

LaKenya Chancey, Hapatia Smith and Eric Funderburk (students) attended the Sixth Council for undergraduate research meeting in Durham, NC on June 26-29, 1996 ($1,174.46)

Dr. Godfrey A. Uzochukwu attended the Environmental Excellence Conference in Toronto, Canada on July 17-20, 1996 ($1,795)

Dr. Godfrey A. Uzochukwu attended an video and internet instructional meeting at Georgia Tech. on August 19, 1997 ($630.00)

Carolyn Ruff (WMI Admin. Asst) attended a skills development workshop in Boone, NC on August 7-9, 1996 ($443.25)

Dr. Godfrey A. Uzochukwu attended the Agronomy meetings and presented a paper in Indianapolis on November 2-7, 1996 ($1,572.90)

Dr. Godfrey Uzochukwu attended a Geoscience Education Conference on Sulfurdioxide Emissions in Hilo, Hawaii on July 26 - August 2, 1997 ($1800)

Dr. Godfrey Uzochukwu Attended the US. Air force HBCU/MI Conference on Environmental Research Opportunities in San Antonio, TX on May 17 - May 20, 1997 ($979).

3.9 INNOVATIVE WASTE MANAGEMENT RESEARCH PROGRAM

The Waste Management Institute provided support for a research project entitled "Integrating GIS/RS in the Assessment of Hazardous Waste Transportation." Linwood Peele, an African American male and a graduate student (M.S., Civil Engineering) has completed a thesis on the above waste management area. The project is summarized below:

As the generation of hazardous waste increases, so does the transportation of hazardous waste thus increasing the potential of accidents severe enough to result in the contamination of groundwater sources. With a significant portion of the Southeastern United States population depending upon groundwater for potable water, the contamination of aquifers is a problem that needs attention. In this study, Geographic Information System (GIS) technology was exploited in coordination with the use of remote sensing imagery, to examine the hydrogeological vulnerability of aquifers in the vicinity of hazardous waste generation sites and transportation corridors. The major objective of this research was to develop a tool to identify vulnerability indices for known groundwater sources. These indices indicate the level of threat to groundwater in the areas studied. The modeling technique include an integrated GIS model to develop a management system which may be used to select sites for hazardous waste disposal and transportation routes which minimize risk to groundwater contamination. Broadus Funderburk (M.S. student in plant, soil, and Environmental Sciences) is working on a project titled "GIS Analysis of Disqualified Nuclear Waste Sites in S. E. United States".

3.9-1 WASTE MANAGEMENT OUTREACH PROJECTS

3.9-2 Environmental Technology and Waste Management Workshops

The WMI conducted an Environmental Technology and Waste Management Workshop for 200 pre-college students (rising juniors and seniors in high schools) on June 28, 1995, June 26, 1996 and June 1997. The workshop topics are as follows: Waste Management Issues; Solar Detoxification of Waste Water, Engineering Designs and Waste Disposal, Environmental Justice and Policy, Environmental Safety, and the Impact of Pollution on Economic Development. The workshop program is in the Appendix.

3.9-3 Earth and Environmental Science Summer Institute for K-12 teachers (Summer 1995)

The WMI hosted an Earth and Environmental Science Summer Institute for 15 grades 6-12 teachers on June 26 - 30, 1995. The topics covered are as follows: Forest Ecology, Project Learning Tree, Air Quality, Nuclear Wastes, Principles of Environmental Remediation, Waste Management Issues, Tour of Waste Management Facilities, and Hands-on Waste Management Activities. A comprehensive program for the summer institute for grades 6-12 teachers is in the Appendix.

The WMI was involved in the following outreach activities in North Carolina community colleges and public schools:

(I) Rockingham Community College (Waste Management presentations) April 19, 1995

(ii) G.T.C.C., Jamestown (students from G.T.C.C. visited NCA&TSU and were briefed about the WMI programs)

(iii) Hillside High School, Durham, N.C. (Waste Management presentations) December 8, 1994

(iv) Avery County High School, Newland, N.C. (Waste Management presented) - December 19, 1994

(v) E.E. Smith High School, Fayetteville, N.C. (Waste Management presentations) - December 15, 1994

(vi) Smithfield Selma High School, Smithfield, N.C. (Waste Management presentations) - March 10, 1995 and 1996

(vii) Western Harnett High School, Lillington, N.C. (Waste Management presentations) - January 25, 1995 and 1996

(viii) State Science Fair, NCA&TSU (Waste Management presentations to parents) - April 28, 1995 and 1996

(ix) Small Farms Week, NCA&TSU (Waste Management information was distributed to participants)

(x) Central Davidson High School, Lexington, N.C.(Waste Management presentations) - February 16, 1995

(xi) Environmental Awareness Day at RTP (Waste Management information was displayed and distributed)

(xii) Environmental Exposition in Atlanta (Waste Management information was displayed and distributed)

(xiii) USDOE Fossil Fuel Energy International Conference in Houston, TX (Waste Management information was displayed and distributed)

(ix) Environmental Science Summer Institute for Teachers (June 26-30 and July 10-14, 1995)

(x) Pre-College Environmental Technology and Waste Management Workshops (June 28, 1995).

3.9-4 WMI ENVIRONMENTAL ISSUES AND AWARENESS SYMPOSIUM (April 13, 1995)

The WMI held a successful environmental issues and awareness symposium and a luncheon on April 13, 1995. The symposium's keynote speaker was Dr. Dorothie T. Clark, Diversity Manager, Bechtel Inc., Aiken, S.C. The symposium attracted more than 250 people including 100 high school students and teachers. Other participants include industry managers, government officials, and community groups. The Symposium topics are summarized below:

Overview of the WMI at NCA&TSU, Keynote Address, Solid Waste Management Problems, Waste Recycling and Management, Business Perspectives of Waste Management, Public Perception of Environmental Restoration, Overview of DOD Sites Cleanup, Bioremediation of Waste, and Guidelines for Environmental Management. Nineteen high school students competed in an environmental essay contest. The essay winners and awards are listed below:

1st Dawn Snider- High Point Andrews High School	($100)
2nd Seth Carr- High Point Andrews High School	($50)
3rd Jermique Nixon - Smith High School	($30)
4th Tiffany Moseley- Grimsley High School	($20)

Certificates were awarded to all the high school symposium participants. A comprehensive symposium program is in the Appendix.

3.9-5 ENVIRONMENTAL EXPO APRIL 11, 1996

The Waste Management Institute (WMI) of North Carolina A&T State University hosted an Environmental Expo and a Luncheon for more than 300 people on April 11, 1996 (Thursday) from 8:00 am to 5:00 p, at the Greensboro Hilton. The Environmental Expo highlighted environmental career opportunities, challenges, and professional development. This unique Expo was designed to build on the successful April 13, 1995 Environmental Issues and Awareness Symposium. The 1996 Environmental Expo highlighted networking among high school students, college/university students/faculty and environmental exhibitors from government and industry.

Forty-five students (10th and 11th graders) from four high schools (Andrews High School, Parkland High School, Reidsville High School, and Dalton McMichael High School) participated in an environmental poster contest. The poster winners are as follows:

1 st place ($200)	Parkland High School "Is Your Garbage Biodegradable"
2nd place ($100)	Reidsville High School "The Lost Fate of the Wolfe"
3rd place ($50)	Dalton McMichael High School "Human Greed Makes the Earth Bleed"

Twenty representatives (faculty and students) from HBCU/MI's (Winston-Salem State, South Carolina State, Selma University, Fort Valley State, Savannah State, Paine College, Florida International and Alabama A&M participated in the Environmental Expo. The student environmental poster winners are as follows:

1 st place (tie $200)	Christopher Huggins - NC A&T State University "Simultaneous S02/NO Separation from Flue Gas Using Hollow Fiber Membranes"
1st place (tie $200)	Michelle Mims - Paine College "Evaluation of Five Specific Wood Degrading Fungi for Levels of Tolerance to Creosote"
2nd place ($100)	Taril Gravely - NC A&T State University "A Study of the Knowledge and Disposal of Selected Household Hazardous Products in NC Piedmont"
3rd place ($50)	Mamie Danzey- Selma University "Mineralization of Mineral Water containing Cyanides by Using Fluidized Beds Air Uplift Type Reactor"

More than thirty environmental exhibitors (industry and government) participated in the Environmental Expo. Some of the notable agencies represented include: Oak Ridge National Laboratory, USDOE-Savannah River Site, Bechtel Environmental Inc., NASA, USEPA, National Association of Minority Contractors, US General Services Administration, Sandia National Laboratory, US Army Corporation of Engineers, US Air Force, City and State governments and private environmental companies. The Environmental Expo featured three speakers: **Keynote Speaker:** Ms. Cynthia Anderson, USDOE - SR. **Other Speakers:** Mr. Horance Morancie - US General Services Admin.. Ms. Renee Wesley - Air Force Small Business Office in San Antonio. The Expo program is in the appendix.

3.9-6 ENVIRONMENTAL DAY APRIL 11, 1996

NCA&TSU students participated in an Environmental Day activities on April 10, 1996. The Environmental Day was sponsored by various campus organizations in collaboration with the Waste Management Institute. Students were involved in campus clean-up and recycling. The keynote address was delivered by Dr. Sullivan Welborne, Vice Chancellor for Student Affairs. The Environmental Day was coordinated by Ms. Taril Gravely, environmental marketing major at NCA&TSU. (see Appendix for program).

4.0 WMI PUBLICATIONS/DELIVERABLES

1. Waste Management Institute Brochure
2. Capabilities in Waste Management Brochure
3. Enviro News (WMI Newsletter)-3 Volumes
4. DOE Massie Funded Chair Brochure
5. Earth and Environmental Sciences Flyers
6. WMI Courses and Certificates Flyers
7. Certificate in Waste Management
8. Selected Employment Opportunity Flyers

The above materials are being distributed locally, regionally, nationally, and internationally. The materials are used to educate the public about waste management issues.

5.0 PARTICIPANT EVALUATION SYMPOSIUM AND OTHER OUTREACH PROJECTS

The WMI Symposium, Precollege Workshop, and Summer Institute for Teachers participant evaluations were highly rated (very good to excellent). The components of the symposium, workshop and institute rate include: quality of topics and facilities, speakers, usefulness and awareness. The evaluation results are in the appendix.

5.1 ENVIRONMENTAL EXPO EVALUATION

The Environmental Expo was highly rated (excellent/very good) by participants. Results of the Expo are in the Appendix.

5.2 PROJECT EVALUATION

The evaluation results of the infrastructure project are in the Appendix. The WMI is very well supported by faculty, students, and administrators of NCA&T State University.

6.0 AWARD TO THE WASTE MANAGEMENT INSTITUTE

The WMI - North Carolina A&T State University was selected in First Place for Education by the Environmental Affairs Council of the Greensboro Chamber of Commerce for innovative waste management practices. The award letter and certificate are in the Appendix.

7.0 WEB BASED COURSE FOR TQP (www.ncat.edu)

The objective of the Web Based Course at North Carolina A&T State University is to provide environmental technology and related courses to DOE employees. Dr. Godfrey A. Uzochukwu is the University's Web-Based Waste Management Lead Professor. Dr. Uzochukwu is currently developing a comprehensive course outline for the waste management courses . The waste management course and other courses will be delivered to DOE employees via the web. A certificate in Waste Management may be earned via the web without a residency requirement. Single courses for degree program will be available to the student who is seeking information on a specific degree program. Students registering for the Waste Management course will receive detailed information about the course (syllabus, textbook requirements, reference lists, instructor's background and contact numbers). Dr. Jothi Kumar attended a TQP workshop at Northern Arizona University in June 1997. The information obtained by Dr. Kumar will be used to develop a web-based waste management course for DOE employees by August 1998.

Funds from other sources will be used for enhancement of computer networking, development of web pages, and acquisition of materials and supplies for the waste management courses. A web-based waste management workshop is planned for June 1998.

7.1 THE ENVIRONMENTAL CERTIFICATE AND DEGREE PROGRAMS OF THE UNIVERSITY ARE AS FOLLOWS:

- •Certificate in Biotechnology
- •Certificate in Waste Management
- •B.S. in Ag. Science (Earth and Environmental Science)/Waste mgt. certificate
- •B.S. in Ag. and Biosystems Engineering/ Waste mgt. certificate
- •B.S. in Landscape Architecture/Waste mgt. certificate
- •B.S. in Chemical Engineering/Waste mgt. certificate
- •B.S. in Civil Engineering/Waste mgt. certificate
- •B.S. in Biology/Waste mgt. certificate
- •B.S. in Chemistry/Waste mgt. certificate
- •B.S. in Architectural Engineering/Waste mgt. certificate
- •B.S. in Agricultural Education/Waste management certificate
- •B.S. in Construction Mgt/Waste mgt. certificate
- •B.S. in Business Management/Waste mgt. certificate
- •B.S. in Marketing/Waste mgt. certificate
- •M.S. in Plant and Soil Science (Environmental)
- •M.S. in Animal Science (Environmental)
- •M.S. in Engineering (Environmental)
- •M.S. in Chemistry (Environmental)
- •M.S. in Biology (Environmental)

The development of computer and telecommunications technology for learning provides an opportunity for full time workers including DOE employees to keep their skills up-to-date without being physically present in a specific classroom or tied down to a schedule. There is a growing trend to offer programs for mature students outside the classroom environment because these students have to work and have family responsibilities that prevent them from attending regular campus classes.

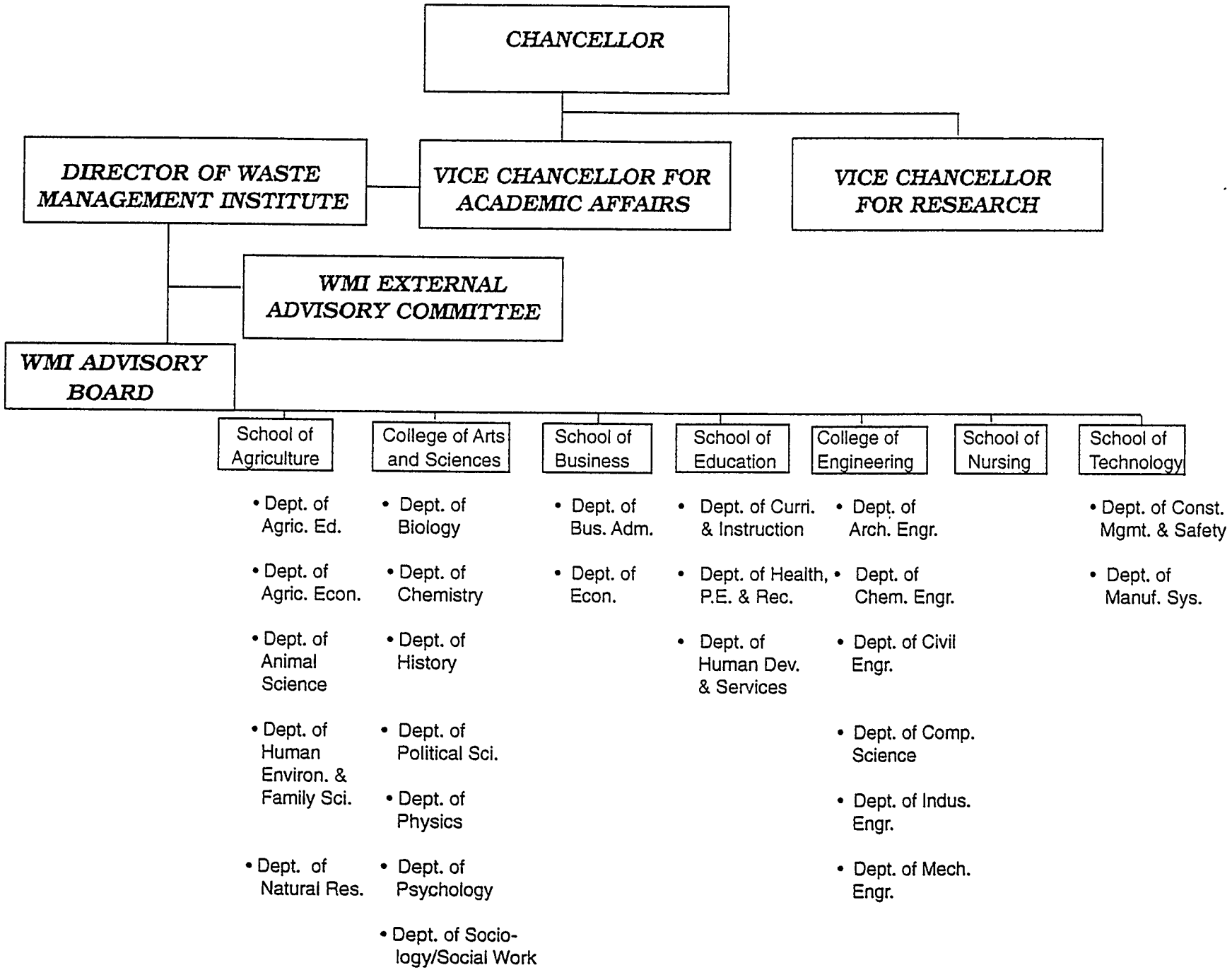
APPENDIX

WMI Organizational Chart
WMI Advisory Committee
WMI External Advisory Board
WMI Capabilities in Waste Management
WMI Courses and Certificate
Environmental Summer Institute for Teachers
Environmental Issues and Awareness Symposium Program (1995)
Environmental Expo Program (1996)
Environmental Day Program (1996)
Precollege Environmental Technology and Waste Mgt Workshop
Greensboro Chamber of Commerce Award
Employment Opportunity Flyers
Project Evaluation Results
Resume

journal newsletters removed.

ORGANIZATIONAL CHART

WASTE MANAGEMENT INSTITUTE (WMI)



Waste Management Institute
Advisory Committee

Dr. Shoou-Yuh Chang, Civil Engineering
Dr. Godfrey Gayle, Natural Resources & Envir. Design
Dr. Ronald Helms, Architectural Engineering
Dr. Pamela Hunter, Curriculum & Instruction
Dr. George Johnson, Animal Science
Dr. Mel Johnson, Business Administration
Dr. Franklin King, Chemical Engineering
Dr. Sara Kirk, Sociology and Social Work
Dr. Peter Meyers, History
Dr. Kenneth Murray, College of Engineering
Dr. G. B. Reddy, Natural Res. & Environmental Design
Dr. George S. Robinson, Psychology
Dr. Gary White, Chemical Engineering
Dr. Dilip Shah, Construction Mgt & Safety
Dr. Michael Simmons, Economics
Dr. Godfrey Uzochukwu, Waste Mgt Institute
Dr. Joseph Whittaker, Biology
Dr. Alex Williamson, Chemistry
Dr. Eui Park, Industrial Engineering
Dr. Shih-Liang Wang, Mechanical Engineering

Waste Management Institute

External Advisory Board

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North Carolina
A&T State University

WASTE MANAGEMENT INSTITUTE

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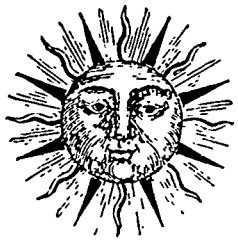


The University

North Carolina Agricultural and Technical State University (NCA&TSU) is a comprehensive state university with more than 90 academic programs (B.A., B.S., M.A., M.S., and Ph.D.) offered through the Schools of Agriculture, Business and Economics, Education, Nursing, Technology, College of Engineering and the College of Arts and Sciences. NCA&TSU enrolls 8, 000 students from nearly every county in North Carolina, 40 states, and 61 foreign countries. Faculty and staff number nearly 1,300. NCA&TSU is a member of the Historically Black Colleges and Universities/ Minority Institutions Environmental Technology and Waste Management (HBCU/MI-ET/WM) Consortium. The colleges and universities that hold membership in the Consortium are involved in curriculum development , community outreach programs and research.

The Waste Management Institute

The Waste Management Institute (WMI) of North Carolina Agricultural & Technical State University (NCA&TSU) is an interdisciplinary academic support unit with research and public service functions. The Institute has the following additional responsibilities.

- Coordination of environmental and waste management instruction, research, outreach, internship, faculty development, and student development which exist in individual departments.

- Implementation of a certificate program in Waste Management.

- Advisement of students who are interested in environmental and waste management careers.

- Clearing house for the University's environmental and waste management activities.

Global, national, and local concerns for environmental problems and waste management present an opportunity and a challenge for NCA&TSU to mobilize academic resources and capabilities for developing solutions.

Mission

The mission of the Waste Management Institute is two-fold:

- Enhance awareness and understanding of waste problems and their management in our society.

- Enhance instruction, research, and outreach which are needed to improve the quality of life and protect the environment.

Goals

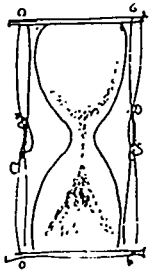
The goals of the WMI are:

- Increase the number of minority professionals available to work in environmental and waste management fields.

- Prepare graduates who will have an in-depth knowledge of environmental and waste management issues and societal well-being.

- Provide "hands-on" waste management experience for pre-college students and teachers.

- Develop cooperative and exchange programs involving faculty, students, government, and industry.



- Serve as an institutional sponsor for public awareness workshops and lecture series.
- Provide guidance for the training of managerial personnel in waste management.

The Waste Management Institute and Environmental Issues

The University initiated the Waste Management Institute to help raise public consciousness of environmental and waste management issues. Americans and the rest of the world are producing an increasing amount of waste with decreasing disposal space. The Waste Management Institute at NCA&TSU develops action plans and programs to address the many aspects of waste management. The Waste Management Institute also has the added function of helping to prepare minority professionals for careers in waste management fields.

Facilities

The University has modern research and teaching facilities in various academic units. The Waste Management Institute at NCA&TSU strengthens the University's academic and research programs and also engages community members in long term environmental planning and action.

Organization

The following academic units are participating in the activities of the Waste Management Institute: Animal Science, Agricultural Education and Economics, Architectural Engineering, Biology, Business Administration, Chemical Engineering, Chemistry, Civil

Engineering, Computer Science, Construction Management and Safety, Economics, Education, Electrical Engineering, History, Human Environment and Family Science, Industrial Engineering, Mechanical Engineering, Nursing, Natural Resources, Physics, Political Science, Psychology, Sociology and Social Work.

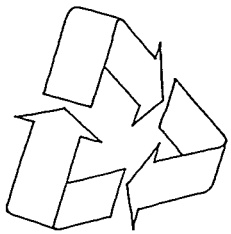
Administration

The WMI director has full responsibility for administration of the Institute. The director is assisted by an administrative assistant, faculty and students. The Interdisciplinary Advisory Committee (IAC) consists of faculty from the participating departments. The purpose of this committee is to advise the director on all matters pertaining to the organization and conduct of the Institute's activities. The IAC also promotes cooperation among faculty members of various disciplines. External guidance and evaluation is provided through the External Advisory Board (EAB). Members of the EAC are from government, industry, the community, private foundations, as well as other universities and colleges.

Environmental & Waste Management Instruction

Environmental and Waste Management courses at NCA&TSU are taught by the participating departments. The Waste Management Institute (WMI) coordinates the environmental instruction at NCA&TSU including the development of new courses and modification of existing courses.

What goes around



comes around or should – recycle

Waste Management Certificate Program

The Waste Management Institute administers an undergraduate certificate program. The certificate program courses include "core" and "supporting" courses. Participating departments offer these courses. To receive a Waste Management Institute certificate, students are required to complete 18 - 20 credit hours from the Institute's core courses. The WMI certificate program complements the student's academic major and will enhance the value of the degree. Other students may complete any number of credit hours from the Institute's core/supporting courses, depending on interest and departmental requirements. The WMI listed courses described beginning on page 14 of this brochure have been carefully selected to help students understand the natural environment and their role in it. The approach to environmental and Waste Management education at NCA&TSU rests upon a solid foundation of applied and social sciences, engineering, technology, law, and policy. The advantage of this approach is that it gives students the opportunity to broaden their education beyond their chosen academic fields of study.

Core Courses

The core courses include but are not limited to Earth-Man's Environment • Environmental Problems • Environmental Science Seminar • Waste Management • Environmental Engineering • Water and Waste Water Engineering • Environmental Engineering Design • Water Quality Modeling • Air Pollution Control • Water Resources System Analysis • Air Quality • Hazardous Materials Handling • Industrial Hygiene • Flammable Materials • Soil Environmental Chemistry • Environmental Planning and Natural Resources Management • Fundamentals of Environmental Chemistry • Sampling and Monitoring of Air

Toxins • Environmental Toxicology • Modeling of Contaminants • Design Courses • Biochemical Engineering • Advanced Biochemical Engineering • Air Pollution • Special Problems/Topics. These courses are described beginning on page 14 of this brochure.

Supporting Courses

These include any course which complements the student's program of study in environmental and Waste Management. Supporting courses are determined by participating departments and may include special topic/problem courses.

Environmental and Waste Management Research

The faculty at NCA&TSU is committed to both interdisciplinary and multidisciplinary approaches to research in environmental and waste management. Faculty and students in the various Schools and Colleges at NCA&TSU are conducting research in many environmental and Waste Management areas. The research activities complement instructional and outreach programs. The University is a leader among HBCU's/MI's in the area of funded research.

Research coordinated through the WMI generates empirical and theoretical results on a variety of field and laboratory experiments; it advances the development of principles, methods, models, design criteria and monitoring strategies for the formulation and evaluation of environmental problems, especially waste management.

Environmental and Waste Management Community Outreach

North Carolina A&T State University has two comprehensive Waste Management outreach programs titled, "The Pre-college Environmental Technology and Waste Management Workshop" and "Environmental Science Summer Institute." These outreach programs are designed for selected students and teachers in grades K-12 in the public schools of North Carolina

Environmental Technology Transfer Program and Information Services

The WMI's technology transfer and information services include:

• Technology transfer and training for government and industry • Education, training, and curriculum enhancement for faculty and students • Scientific and engineering consulting to industry and government • Strengthening of minority environmental business enterprises • Technology evaluation and testing • New technology development • Faculty and student capabilities • Facilities and environmental projects • Industry, small business, and government partnership information • Project opportunities with government and industry • Environmental technology information via government and industry technology databases • Health and safety training and monitoring programs.

Directory Of WMI Faculty
Waste Management Areas

Department of Animal Science

George A. Johnson, M.S., Cornell University; DVM., Tuskegee Institute; Professor and Chairperson
Waste Management Area: Diseases of Animals.

John Allen , B.S., University of Georgia; M.S., Ph.D., University of North Carolina
Waste Management Area: Environmental Biotechnology.

Tracy L. Hanner , B.S., North Carolina Central University; DVM, North Carolina State University
Waste Management Area: Animal Diseases.

Ray McKinnie , B.S. North Carolina A&T State University; M.S. Ohio State University; Ph.D., N.C. State University; Agricultural Extension Faculty
Waste Management Area: Radioactive Tracers/Physiology.

Derek Norford , B.S., North Carolina A&T State University; DVM, Tuskegee University; M.S., North Carolina State University; Ph.D. Candidate, N.C. State University
Waste Management Area: Pathology/Animal Diseases.

LaNell Ogden, Ph.D., Auburn University; MS, Oklahoma State University; DVM, Tuskegee University; BS, Fort Valley State College
Waste Management Area: Environmental Toxicology

Willie Willis, B.S., Fort Valley State College; M.S., Ph.D., Colorado State University, Associate Professor
Waste Management Area: Poultry Diseases.

Department of Natural Resources and Environmental Design

Godfrey A. Gayle , B.S., North Carolina A&T State University; M.S., Ph.D., N.C. State University at Raleigh; Professor, Coordinator of Agricultural Engineering Program and Chairperson
Waste Management Area: Land Application of Agricultural Waste, and Waste Water Management.

Charles W. Raczkowski , B.S. M.S., Kansas State University; Ph.D., N.C. State University; Post Doctorate - USDA/ARS
Waste Management Area: Agricultural Waste Utilization/Composting.

G. Bhaskar Reddy , B.S., M.S., A.P.A.U.,India; Ph.D., University of Georgia Professor
Waste Management Area: Xenobiotic Chemicals Biodegradation; Site Assessment; and Bioremediation by Plants.

M. Raj Reddy, B.S., Osmania University, India; M.S.A.P.A.U, India; Ph.D., University of Georgia; Professor
Waste Management Area: Land Application of Wastes; Waste Water Treatment, and Heavy Metals.

Abolghashem Shahbazi, B.S., University of Tabriz; M.S., University of California; Ph.D., Penn State University; Associate Professor
Waste Management Area: Bioprocessing/ Alternate Energy.

Godfrey A. Uzochukwu, B.S., M.S., Oklahoma State University; Ph.D., University of Nebraska; Professor, EASC Coordinator and WMI Director
Waste Management Area: Waste Site Selection and Characterization.

Department of Biology

David W. Aldridge, B.S., M.S. University of Texas-Arlington; Ph.D., Syracuse University; Postdoctoral, Woods Hole Marine Biological Laboratories; Associate Professor
Waste Management Area: Aquatic Ecology and Toxicology.

Jerry Bennett, B.S., Tougaloo College; M.S., Atlanta University, Ph.D.; Iowa State University; Associate Professor.
Waste Management Area: Altered Environments and Insect Development.

Roy Coomans, B.S., Eckerd College; Ph.D., University of N.C. at Chapel Hill; Assistant Professor
Waste Management Area: Environmental Impacts and Plant Populations.

Doretha B. Foushee, B.S., Shaw University; M.S., N.C. Central University; Ph.D., University of Maryland at College Park; Associate Professor
Waste Management Area: Viral Diseases of Aquatic Animals and Environmental Estrogens.

Thomas L. Jordan , B.A., Rockhurst College; M.S., University of Washington, Seattle; Ph.D., University of Wisconsin-Madison; Associate Professor
Waste Management Area: Organic Solvents and Microbial Ecosystems.

Bette McKnight, B.A., Barber-Scotio College; M.A. N.C. Central University; Ph.D. Meharry Medical College; Assistant Professor
Waste Management Area: Molecular Biology and Epidemiology of Bacterial Pathogens.

Joseph White, B.S., North Carolina Central University; M.S., North Carolina Central University-Durham; Ph.D., University of Illinois; Professor
Waste Management Area: Environmental Effects and Arthropod/Mammalian Populations.

Joseph J. Whittaker, A.B., Talladega College; Ph.D., Meharry Medical College; Postdoctoral, Purdue University and Washington University; Associate Professor and Chairperson
Waste Management Area: Environmental Regulation and Microbial Protein Synthesis.

Department of Chemistry

William K. Adeniyi, B.S., Hampton Institute; M.S. Loyola University (Chicago); Ph.D., Baylor University; Assistant Professor
Waste Management Area:
Environmental Contaminants.

Vallie Guthrie , B.S., North Carolina A&T State University; M.S., Fisk University; Ed.D., American University; Associate Professor
Waste Management Area:
Precollege Outreach Programs.

Jothi V. Kumar, B.S., Annamola University; Ph.D., Kansas State; Associate Professor
Waste Management Area: Water Pollution.

Lynda M. Jordan, B.S., North Carolina A&T State; M.A., Atlanta University; Ph.D., Massachusetts Institute of Technology; Associate Professor
Waste Management Area: Radioistopes.

Abdul K. Mohammed, B.S. University of Benin-Nigeria; Ph.D., Louisiana State University; Assistant Professor
Waste Management Area: Radioactive Waste/Tracers; Heavy Metal Interactions.

Alex N. Williamson, B.S., Jackson State University; Ph.D., University of Illinois at Urbana; Associate Professor and Chairperson
Waste Management Area: Trace Metals.

Department of History

Dorothy S. Mason, A.B., University of North Carolina at Greensboro, M.A., University of Georgia; Ph.D., University of North Carolina at Chapel Hill, Professor
Waste Management Area:
Waste Geography.

Peter V. Meyers , B.A., Wesleyan University; M.A., Ph.D., Rutgers University; Professor and Chairperson
Waste Management Area: Environmental History.

Department of Physics

Sekazi K. Mtingwa, B.S., Massachusetts Institute of Technology; M.S. and Ph.D. Princeton University; Professor and Chairperson
Waste Management Area: Theoretical Analyses.

Elvira S. Williams, B.S., North Carolina Central University; M.S., Ph.D., Howard University; Associate Professor
Waste Management Area: Experimental Physics.

Department of Sociology/SocialWork

Robert Davis, B.A., Southern Univerity; M.A., Atlanta University; Ph.D., Washington State Univ. Postdoctoral, University of Wisconsin, Madison; Professor
Waste Management Area: Sociological Theory of Toxic Waste Dumps.

Sarah Kirk , B.A., St. Augustine College; M.S.W., Atlanta University; M.S., University of Pittsburgh; Ph.D., Associate Professor and Chairperson
Waste Management Area: The Impact of the Environment on the Family.

Department of Business Administration

Chiekwe Anyansi-Archibong , B.S., M.B.A., Ph.D., University of Kansas; Associate Professor
Waste Management Area: Environmental Policy.

Willard Bagwell , B.S. University of North Carolina at Chapel Hill; M.B.A., Ph.D., Georgia State University; Associate Professor
Waste Management Area: Actuarial.

Melvin N. Johnson, B.S., North Carolina A&T State University; M.A., Ball State University M.B.A., Indiana University D.B.A., Indiana University Professor and Chairperson
Waste Management Area: Resource Management and Environmental Economics.

Japhet H. Nkonge, B.A., North Carolina A&T State University; M.B.A., Rutgers University; Ph.D., University of North Carolina at Chapel Hill; Professor
Waste Management Area: Marketing Issues in Waste Management

Danny H. Pogue , B.A., Texas College; M.A., Texas Southern University; Ph.D., The Ohio State University; Professor and Assistant Dean
Waste Management Area: Hazardous Working Environment.

Issiah O. Ugboro , B.S., Utah State University; M.B.A., Ph.D., University of North Texas; Assistant Professor
Waste Management Area: Environmental Policy.

Department of Construction Management And Safety

Horlin Carter, Sr., B.A. Marshall University; M.S. Marshall University; Ph.D. Michigan State University
Waste Management Area: Safety Management.

Walter E. Dukes , B.S., Alcorn Agricultural and Mechanical College, M.S., Indiana State University; Ph.D., Purdue University; Professor and Chairperson
Waste Management Area: Safety Management

Dilip T. Shah, B.E., Poona, India; M.S., Illinois State University; Ph.D., Texas A&M University; Associate Professor
Waste Management Area: Safety Management.

Department of Graphic Communication Systems and Technological Studies

Robert Pyle, B.S., Trenton State University, M.S. Trenton State University , Ph.D. University of Pittsburgh; Professor and Chairperson
Waste Management Area: Applications of ozone technology for air and water pollution in the workplace.

Jane Smink, B.S., Winthorp College, M.S. Appalachian State University, Ed.D. North Carolina State University; Assistant Professor
Waste Management Area: Waste minimization/pollution prevention in printing and allied industries.

Eugenio Lord, B.A., Manchester Polytechnic, M.Ed. Bowling Green State University, Ph.D. Iowa State University; Assistant Professor
Waste Management Area: Waste minimization/pollution prevention in printing and allied industries Environmental TQM.

Department of Architectural Engineering

Peter Rojeski, Jr., P.E., B.S., Clarkson College of Technology; M.S., Cornell University; Ph.D. Cornell University; Associate Professor
Waste Management Area: Energy and the Environment.

Department of Chemical Engineering

Shamsuddin Ilias , B.S., Bangladesh University of Eng. and Tech.; M.S. University of Petro and Min. (Saudi Arabia); Ph.D., Queen's University; Assistant Professor
Waste Management Area: Bioremediation; Water and Waste Water Treatment .

Vinayak N. Kabadi , B. ChE., Bombay University; M.S. S.U.N. Y at Buffalo; Ph.D., Pennsylvania State University; Associate Professor
Waste Management Area: Solar detoxification; Mineral Processing.

Franklin G. King , B.S., Pennsylvania State University; M.S., Kansas State University; M.Ed. Howard University; D.Sc., Stevens Institute of Technology; Professor and Chairman
Waste Management Area: Nuclear Waste Disposal Site Characterization.

Keith Schimmel , B.S., Purdue University; M.S., Ph.D., Northwestern University; Assistant Professor
Waste Management Area: Bioremediation of Waste Sites.

Gary B. Tatterson , B.S., University of Pittsburgh; M.S. Ph.D., Ohio State University; Professor
Waste Management Area: Sludge Suspension.

Gary L. White , B.S. M.S., Brigham Young University; Ph.D., Michigan State University; Assistant Professor
Waste Management Area: Supercritical Water Oxidation; Physical Separations.

Yusuf G. Adewuyi , B.S., Ohio State University; M.S.; Ph.D., University of Iowa; Associate Professor
Waste Management Areas: Hazardous Waste Destruction and Management; Solid Waste Management.

Department of Civil Engineering

Kenneth H. Murray , B.S., M.S., Ph.D., Virginia Polytechnic Institute and State University; Professor and Chairperson (P.E.)
Waste Management Area: Waste Materials for Structural Applications.

Shoou-Yuh Chang , B.S., M.S., National Taiwan University; M.S., University of North Carolina at Chapel Hill; Ph.D., University of Illinois at Urbana-Champaign; Professor (P.E)
Waste Management Area: Waste Water Treatment/Solid and hazardous waste disposal.

Richard E. Norris , B.S., Washington State University; M.S., D. Eng., University of California at Berkeley, Assistant Professor,
Waste Management Area: Debris Disposal; Recycling, and Design for Waste Reduction.

Emmanuael U. Nzewi , B.S., Michigan Tech University; Ph.D. Purdue University; Assistant Professor (P.E.)
Waste Management Area(: Hazardous Waste Transportation/Routing; Waste Facilities Location.

M. Reza Salami , B.S., M.E., Virginia Polytechnic Institute and State University; Ph.D., University of Arizona; Associate Professor, (P.E.)
Waste Management Area: Underground Storage Design for Low and High Level Nuclear Wastes.

Gary S. Spring , B.S., M.S., Ph.D., University of Massachusetts at Amherst; Associate Professor (P.E.)
Waste Management Area: Hazardous Waste Transportation/Routing; Waste Facilities Location.

Department of Economics

Anwar Khan , B.A., M.A., University of Punjab; M.A., Ph.D., University of Wisconsin; Professor
Waste Management Area: Agricultural Resource Management.

Gregory Price , B.S., Morehouse; M.A., University of Wisconsin at Milwaukee; Ph.D. University of Wisconsin-Milwaukee; Assistant Professor
Waste Management Area: Resource Pricing and Optimization.

Michael Simmons, B.S., Arkansas AM&N; M.A., University of Wisconsin; Ph.D., Washington State University; Assistant Professor and Chairperson
Waste Management Area: Resource Management

Department of Agricultural Education

Daniel M. Lyons, B.S., M.S., North Carolina Agricultural & Technical State University; Ed.D., Virginia Polytechnic Institute and State University; Agricultural Extension Faculty
Waste Management Area: Environmental Education.

Francis O. Walson, B.S., North Carolina A&T State University; Ed.D., Virginia Polytechnic Institute and State University; Assistant Professor
Waste Management Area(s): Career Exploration and Environmental Education.

Agricultural Economics and Rural Sociology

Godfrey Ejimakor , B.S., North Carolina State University; M.S., North Carolina A&T; State University; Ph.D., Texas Tech.; Assistant Professor
Waste Management Area: Environmental/ Resource Management.

John O'Sullivan , B.A., Stanford University; M.S., Auburn University; Ph.D., University of California at Los Angeles; Agricultural Extension Faculty
Waste Management Area: Sustainable Agriculture.

Alton Thompson , B.S., North Carolina Central University; M.S., Ph.D., Ohio State University; Associate Professor
Waste Management Area: Perception of Waste Management Issues/Survey Research of Waste Management Issues.

Human Environment and Family Science

Chung Woon Seo , B.S., M.S., Korea University; Ph.D., Florida State University; Professor
Waste Management Area: Waste Water Treatment by Agricultural Byproducts (Peanut Shells and Corncobs).

Department of Industrial Engineering

Bala Ram, B.S.,M.S., Indian Institute of Technology at Madras; Ph.D., State University of New York at Buffalo, Associate Professor
Waste Management Area: Automated Materials Handling.

Sanjiv Sarin , B.S., M.S., Indian Institute of Technology at Delhi; Ph.D., State University of New York at Buffalo, Associate Professor

Waste Management Area: Tracking Hazardous Materials by AutolD; Mathematical Modelling for Storage and Transportation of Hazardous Materials, and Quality Control and Compliance to ISO 9000.

Silvanus J. Udoka , B.S., Weber State University; M.S., Ph.D., Oklahoma State University
Waste Management Area: Plastic and Rubber Waste Remedial Measures and Recycling.

School of Nursing

Dorothy Burns, A.D.N., R.N., Brooklyn College; B.S.N., North Carolina A&T State University; M.S.N., University of North Carolina at Greensboro; Lecturer
Waste Management Area: Medical Terminology, Bio Disease/Care

Elizabeth W. Cooper, B.S.N., North Carolina Central University; M.P.H., University of N.C. at Chapel Hill; MS. Ed. N.C. A&T State University; Ed.D. Texas Southern University. Assistant Professor.
Waste Management Area: Medical Terminology Bio Disease/Care

Carol Henry, B.S.N., Winston-Salem State University; M.S.N., Medical College of Georgia; Instructor
Waste Management Area: Medical Terminology, Bio Disease/Control and Prevention

Margaret C. Warren, B.S.N., North Carolina A&T State University; M.S., University of Maryland; Associate Professor
Waste Management Area: Medical Terminology, Bio Disease/Control and Prevention

Department of Electrical Engineering

Abdollah Homaifar, B.S., M.S., State University of New York-Stony Brook; Ph.D., University of Alabama; Assistant Professor
Waste Management Area: Statistical Modeing of Waste Contaminants

Parag Lala, M.S., University of Karachi; M.S.E., King's College of London; Ph.D., The university of London; Research Professor
Waste Management Area: Waste Data Acquisition
Gary Lebby, B.S., M.S., (Physics), University of South Carolina, Ph.D., Clemson University; Associate Professor
Waste Management Area: Expert Systems in Waste Management

Earnest E. Sherrod, B.S., North Carolina A&T State University; M.S., Newark College of Engineering; Assistant Professor
Waste Management Area: Expert Systems in Waste Management

Department of Mechanical Engineering

F. S. Vainstein, B.S., M.S., Moscow Institute of Electronics; Ph.D., Boston university; Associate Professor
Waste Management Area: Analytical Models and Pollution Reduction

William J. Craft, B.S., North Carolina State University; M.S., Ph.D., Clemson University; Professor and Chairman (P.E.)
Waste Management Area: Nucler Energy

S. L. Wang, B.S., Quin Hwa University; M.S., Ph.D., Ohio State University; Associate Professor (P.E.)
Waste Management Area:
Use of Robotics in Waste Management

School of Education

Pamela I. Hunter, B.A., Livingston College, M.Ed., University of NC at Greensboro; Ph.D., Ohio State University; Associate Professor
Waste Management Area:
Waste Management Education and Outreach

Karen D. Guy, B.S., North Carolina A&T State University, M.Ed., N.C. Central University; Ed.D., University of North Dakota; Assistant Professor and Acting Director of Student Teaching and Educational Relationships
Waste Management Area:
Waste Management Education and Outreach

Larry Powers, B.S., M.Ed., Tuskegee University; Ph.D., MIchigan State University; Associate Dean and Associate Professor
Waste Management Area:
Waste Management Education

Directory of WMI Courses

DEPARTMENT OF Agricultural Education

AGED-607. Environmental Education Credit 3(3-0) Principles and practices of understanding the environment and the interrelated complexities of the environment. The course will include a study of agricultural occupations related to the environment and materials that need to be developed for use by high school teachers of agriculture and other professional workers.

AGED-664. Occupational Exploration of Middle Grades Credit 3(3-0)
Designed for persons who teach middle grades occupational exploration in the curriculum, sources and uses of occupational information, approaches to middle grades teaching, and philosophy and concepts of occupational education. These courses will be taught in cooperation with the Department of Business Education and Administrative Services, Home Economics, and Industrial Education.

AGED-665. Occupational Exploration in the Middle Gades-Agricultural Occupations Credit 3(3-0) Emphasis will be placed on curriculum, methods and techniques of teaching, and resources and facilities for teaching in the agricultural and environmental occupations cluster including Agribusiness and Natural Resources, Environmental Control, Hospitality and Recreation, and Marine Science.

AGED-760. Thesis Research in Agricultural Education and Extension Credit 3(3-0)

DEPARTMENT OF Agricultural Economics

AGEC-440. Environmental and Resource Economics Credit 3(3-0)
Analysis of economic problems of resources use and management. Perception of and definition of problems in terms of allocation mechanism. Analysis of economic relationships over time and market externalities with emphasis on welfare implications. **Prerequisite: ECON 300.**

AGEC-632. International Agricultural Trade Policy Credit 3(3-0)
This course includes a review of economic and welfare theory applications relative to trade of agricultural commodities. Topical issues include the analysis of linkages among commodity programs, fiscal and trade policies for the U.S. and other countries in an interdependent world, development of an understanding of international institutions and their role in formulating aliments of strategic agricultural trade policy. **Prerequisite: Consent of instructor.**

AGEC-638. Special Problems in Agricultural Economics Credit 3(3-0)
Designed for students who desire to work out special problems in the field of agricultural economics; problem definition, fomulation and investigation. Prerequisite: Consent of the Department Chairman.

AGEC-730. Rural Development Credit 3(3-0) This course focuses on the application of economic theory, alternative growth models, requirements for growth, and quantitative techniques to problems concerning rural economic development and growth with emphasis on agriculture.

AGEC-732. Agricultural Policy Credit 3(3-0) Advanced analysis of the role of agriculture in the general economy and of economic, political and social forces which affect development of agricultural policy is the substantive focus of this course.

AGEC-799. Thesis Credit 6(6-0)

DEPARTMENT OF Animal Science

LASC-261. Medical Terminology Credit 3(3-0) An introduction to medical terminology with emphasis on vocabulary building using Latin and Greek prefixes, suffixes, word roots and combining forms.

ANSC-413. Sanitation and Diseases of Farm Animals Credit 2(2-0) Sanitation and the common diseases of livestock with references to causes, prevention and treatment; and their relationship to the environment. **Offered in the Spring only.**

LASC-462. Principles of Medical Science Credit 3(3-0) Discussion of basic topics which provide insight to causative agents in disease and resultant biological reactions, economic losses, and decrease performance levels. **Prerequisite: Microbiology 121.**

LASC-569. Seminar in Laboratory Animal Science
Discussion of Current Topics in Laboratory Animal Science or Histechnology.

ANSC-637. Environmental Toxicology Credit 3(2-3) Study of toxic principles and identification of poisonous plants, study of toxicity in agricultural chemicals, animal feeds and other biohazards. **Prerequisite: LAS 462.**

ANSC-641. Disease Management of Livestock and Poultry Credit 3(3-0) Prevention and control of diseases will be studied in livestock species and poultry, as well as the micro-and macroenvironments that result in disease.
Prerequisite: Animal Science 413 or permission of instructor.

ANSC-701 Environmental Topics and animal Health Credit 3(3-0) The influence of the environment upon the health status of animals will be discussed within specific topics representing the disciplines of epidemiology, toxicology, pathbiology, reproductive physiology, nutrition and microbiology.

ANSC-702 Seminar in Animal Health I
Credit 1(1-0)
Seminar includes staff and guest lectures on the philosophy of research and utilization of the scientific method, preparation for research and general research methodology. Presentations will be given by students on spoecial topics in the field of animal health.

ANSC-703 Seminar in Animal Health II
Credit 1(1-0)
Presentations will be given by students on thesis research.

ANSC-708 Special Problems in Animal Health
Credit 2 Independent investigations are conducted according to the health and management of animals that are dependent upon environmentally-related factors.
Prerequisite: Permission of instructor.

DEPARTMENT OF Human Environment and Family Science

HEFS-603. Special Problems in Human Environment and Family Sciences
Credit 3(1-4) Problems in the various areas of home economics may be chosen for individual study.

HEFS-604. Seminar in Home Economics Education Credit 3(3-0)
Consideration of problems resulting from the impact of social change on the various fields of Human Environment and Family Sciences, review of research and professional development.

HEFS-612. Senior Seminar Credit 3(3-0)
Student review and presentation of major research findings in the various disciplines of home economics. (Required of Human Environment and Family Sciences majors.)
Prerequisite: Senior year only.

HEFS-613. Substance Abuse Credit 3(3-0) Alcoholism and drugs and their inherent effects upon the family and society. Problems in the family, related to the individuals, business and industry. Additional focus will be given to treatment, agencies and methods of recovering self-esteem.

HEFS-618. Food Technology Seminar Credit 1(1-0) A review and discussion of selected topics and recent advances in the fields of animal and food science. Prerequisite: Senior standing.

HEFS-637. Special Problems in Food, Nutrition or Food Science Credit 3(0-6) Independent study/research in the areas of Food, Nutrition or Food Science. Prerequisites: Junior, senior, graduate standing, and consent of instructor.

HEFS-643. Food Preservation Credit 3(2-2) A study of current methods of preserving foods - canning, freezing, dehydration, radiation, and fermentation. Prerequisite: HEFS 236 or equivalent.

HEFS-739. Thesis Research Credit 3(0-6) Research problems in food or nutrition.

HEFS-744. Seminar in Food and Nutrition Credit 2(2-0) Required of all graduates in Food and Nutrition.

Department Of Natural Resources & Environmental Design

AGEN-303 Field Machinery and Power Credit 3(2-2)
Principles of operation, design, and performance efficiency of field machinery. Optimizing of field performance which will reduce time loss and material waste. The course will focus on the internal combustion, fuel systems, and emission in order to reduce the air pollution. Prerequisite: ME 336

AGEN-304 Structures and Environment Credit 3(1-4)
Fundamentals of building construction applied to location, slection materials, foundations, planning farm structures, and environmental considerations such as temperature, humidity, condensation, and ventilation.

AGEN-410 Hydrology
Credit 3(2-2)
An introductionto the study of surface and subsurface hydrology. Topics include Hydrologic cycle, rainfall-runoff relationships, precipitation measurements and hydrographs, unit hydrograph analysis, flood routing, planning and design of runoff/ detention systems, computer applications in hydrology. Prerequisite: Math 132 or EASC 309.

AGEN-523. Biological and Agricultural Engergy Systems Credit 3(2-2) This course discusses the production, utilization, and system design for enegy in food and agricultural productions. Specific topics include: biogas, biomass, solar energy, drying, heating, evaporation, retorting, energy analysis, conseration and management, including electric power supply and motor control. Prerequisities: ELEN 200, 206.

AGEN-524/CIEN-460. Water Resources Engineering Credit 3(2-2) Analysis and design of water resources systems. Topics include: water resources planning, hydraulic structures, introduction to aquifer analysis, well development, pump selection, irrigation, drainage, flood control, and water laws.

AGEN-600. Conservation, Drainage and Irrigation Credit 3(2-2)
Improvement of soil and water use by evaluating and using present conservation practices. Water conveying and retaining structures, erosion, drainage and irrigation systems will be discussed and designed. Prerequisites: CIEN 362 and 363, AGEN 410 and AGEN 430.

AGEN-602. Design Credit 3(0-6) Special design work in Agricultural Engineering. The major objective is to enhance the design skills of the Agricultural Engineering students. Prerequisite: AGEN 600.

Earth & Environmental Science

ELON COLLEGE*

ES-110. Introduction to Environmental Science Sh 4
This course explores the fundamental principles of the biological and physical sciences behind natural ecosystems. Central focus is an investigation of the root causes of the global environmental crisis: overpopulation, natural resources depletion and pollution. Students consider different world views and the development of solutions. Satisfies the non-laboratory science requirement for General Studies. **(ES 110 is the same course as BIO 110)**

EASC-201. The Earth-Man's Environment Credit 3(3-0) A study of the earth's environment as related to climate, natural resources and physiography. The interrelationship of man with the earth's environment as revealed in the modification of natural processes. **No prerequisite.**

EASC-309. Elements of Physical Geology Credit 3(2-2) Relation of geological principles in the development of a balanced concept of the earth and earth history; rock and mineral identification, utilization of geological and topography maps, geological processes, resource conservation, urban and environmental problems. **Prerequisites: Chemistry 101 or consent of the instructor.**

ELON COLLEGE*

ES-381. Internship in Environmetnal Science Sh 2-4
An internship provides work experience at an advanced level in an environmental science field. **Prerequisite: junior/senior standing as an ES major.**

EASC-444. Earth and Environmental Science Seminar Credit 1(1-0) Group discussions, reports and guest lectures on current environmental issues.

ELON COLLEGE*

ES-461. Seminar: Environmental Impact Assessment and Policy Development Sh 4
Students cooperate in a semester-long project, conducting a complete field investigation of a land/water development proposal. The course provides an opportunity for the students to apply thier knowledge, analytical and problem-solving skills and ethical perspectives in the creation of a report that could be used by a municipal or regional planning organization. **Prerequisite: Senior standing as an ES major.**

EASC-616. Environmental Planning and Natural Resources Management Credit 3(2-2) Problems of uncontrolled use of natural resources, increased urbanization, unplanned growth and general deterioration of the man-made and natural environments; basic principles of environmental planning and natural resources management.

EASC-622. Environmental Sanitation and Waste Management Credit 3(2-2) Study of traditional and innovative patterns and problems of managing and handling waste products or urban and rural environments, their renovation and reclamation.

EASC-627. Strategies of Conservation Credit 3(2-2) An approach to the teaching of environmental conservation as an integral part of the general curriculum.

EASC-644. Problem Solving in Earth Science Credit 3(3-0) Independent field and/or laboratory research in earth and environmental science for advanced students.

EASC-666. Earth System Science Credit 3(3-0) Study of the earth as a "system." Emphasis will be on the atmosphere, biosphere, hydrosphere, and lithosphere interactions in relation to global change that will occur in the future in relation to human activity.

EASC-699. Environmental Problems Credit 3(3-0) Multidisciplinary examination of environmental problems and application of appropriate techniques of analysis to selected problems. Team taught by environmental faculty.

EASC-718. Applied Environmental Microbiology Credit 3(2-2) Discussion of interactions between micro-organisms and their physical environment, and significance of micro-organisms in eutrophication, mining

*Departmental Approval Is Required

spoils, and waste treatments. **Prerequisites: General Microbiology 121 and consent of the instructor.**

Landscape Architecture

LDAR-102. Environmental Design Ethics Credit 2(2-0)
This course is designed to emphasize issues, values, and ethics in landscape architecture. Current concerns and issues involving the environment, design and social factors will be explored. A variety of ideologies within the practice of landscape architecture and their niches within the profession will be examined.

LDAR-230. Environmental Ecology Credit 3(3-0) Basic concepts of ecology, ecosystem structure and function will be explored; energy flow and material recycling emphasized. Field trips are required. **Prerequisite: LDAR 220.**

LDAR-240. Basic Landscape Design I Credit 3(0-6) Students in this studio course will explore basic concept development and principles and elements of design. The course will give students a greater understanding of space through analysis of forms, proportions, and scale. Students will investigate design theory by proposing solutions. **Prerequisite: LDAR 220.**

LDAR-241. Basic Landscape Design II Credit 3(0-6) This studio course is designed to explore further issues of design. Course material will emphasize ideologies about scales, context, and concept development. Projects will explore creative solutions to "real" world constraints (i.e. zoning regulations, economic, environmental, social, political, etc.). The cyclic nature of the design process and its layers will also be emphasized.

LDAR-500. Special Problems in Landscape Architecture Credit 3(3-3) This is a course for landscape architecture students to work on independent study projects. **Prerequisites: Consent of the instructor and Program Director.**

LDAR-601. Environmental Perception and Design Determinants Credit 3(3-0)
Comprehensive perception of natural forces as design determinants. An assessment of systems and methods of perception, classification, analysis and synthesis of natural forces and elements as they affect physical design and human use. Lecture and workshops will emphasize perception and landscape design.

Soil Science

SLSC-632. Soil Physics Credit 4(2-4)
A study of fundamental physical principles and laws which govern the behavior of soils. Physical constitution of soil water, and soil air. The relationship of soil physical conditions to plant growth and engineering usage. **Prerequisites: Soil Science 338, Chemistry 102, and Mathematics 113, and consent of instructor. Spring of even numbered years.**

SLSC-633. Soil Genesis, Classification and Land Use Credit 4(2-4) Factors and processes of soil formation, grouping of soils based on their properties, soil mapping, soil interpretations for various uses and discussion of new concepts in soil taxonomy. **Prerequisite: SLSC 338.**

SLSC-634. Soil Chemistry Credit 4(2-4)
Application of physico-chemical principles to soil studies. Consideration of mineral composition, crystal structure, types of bonding, nutrient fixation and ion exchange. The geochemistry of soil pollution. **Prerequisites: Chemistry 102, Soil Science 338, and consent of the instructor. Spring of odd numbered years.**

SLSC-640. Wetland Management Credits 3(3-0)
Designed to provide a basic understanding of the benefits which wetlands in their natural conditions offer mankind, fish and wildlife habitat, water quality improvement, flood protection, filter traps for pollutants, erosion control, natural products, recreation, and aesthetics. Primary instructional areas will include wetland wcology, wetland systems of the southeast region, wetland law and

regulations, soil conditions of wetlands, hydrology of wetlands, methodology of delineating wetlands, wetland irrigation, plant and vegetation identification, and writing environmental reports. **Prerequisites: NARS 110, SLSC 338, AGEN 410**

SLSC-715. Soil Mineralogy Credit 3(2-2)
A study of minerals with regard to their composition, structure, classification, identification, origin, and significance. Special emphasis on primary weatherable silicates, layer silicates, and oxide minerals. **Prerequisites: Soil Science 634 and consent of the instructor.**

SLSC-717. Methodology in Soil, Plant, and Water Analysis Credit 3 (0-6) A study of principles involved in the analysis of soils, plants, and water. Emphasis on basic chemical and instrumental methods for interpretation of soil fertility and environment. Instruction in the use of special instruments.
Prerequisite: Soil Chemistry 534.

SLSC-721. Soil Microbiology
Credit 3(2-2)
Discussion of major groups of organisms, their description, taxonomy, abundance, and their significance and functions. The major role of the microflora in elemental cycle and their presence in terms of agronomic and ecological importance. **Prerequisites: Fundamentals of Soil Science 338 and Microbiology 121.**

DEPARTMENT OF Biology

BIOL-221. General Microbiology
Credit 4(2-4) A general course designed to orient the student within the world of microscopic living things, including yeasts, molds, bacteria, rickettsiae, and viruses. Detailed study is given to bacteria as the prototype of all microorganisms. Relationships among microorganisms (higher plants, animals, man) are emphasized. **Prerequisites: Biology 160, 140; Chemistry 106-116 and 107-117.**

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BIOL-310. Ecology Credit 3(3-0)
This course surveys the major principles underlying the interactions between living organisms and their environment. Both plant and animal examples will be used to illustrate the basic ecological processes. Emphasis is placed on the characterization of different physical environments; ecosystem processes such as ecological energetics and nturient cycling; and current organismal concepts of adaptation, niche, population dynamics, life-history phenomena, organismal interactions and community organization. Major environmental issues concerning humans and their cultures will also be presented.
Prerequisite: BIOL 101; CHEM 107 & 117.

BENNETT COLLEGE*

Biology-326. Environmental Biology
Credit 3
A study of the structure and function of ecosystems with reference to energy flow, nutrient cycling, population growth and regulation. **Prerequisites: Biology 100 or 101-102.**

BIOL-468. Biology, Technology, and Ethics I (Formerly Biol. 568) Credit 1(0-2)
This course evaluates recent technological advances in biology and how these advances impact societal issues and create ethical concerns. The course uses a seminar format. It is required for all undergraduate biology majors. **Prerequisite: Senior Standing.**

BIOL-621. Soil Bacteriology
Credit 4(2-4) The role of microorganisms in soil fertility. Special emphasis is on the activity of the nitrogen-fixing bacteria and also those concerned in the decomposition of organic waste materials.
Prerequisite: Biology 121.

BIOL-700. Environmental Biology
Credit 3(2-2) Problems, concepts and interpretations of relations between organisms and the environment; an analysis of environmental factors on growth, repreductions, distribution, and competition between organisms.

BIOL-701. Biological Seminar Credit 1(1-) The presentation and defense of orginial research, consideration of special tops in biology and current literature.

BIOL-702. Biological Seminar Credit 1(1-0) A continuation of Biology 701.

BIOL-760. Projects in Biology Credit 3(2-2) Special projects in biology that relate to biological instruction or research in the student's area of concentration.

BIOL-761. Seminar in Biology Credit 1(1-0) A seminar on selected topoics and recent advances in the field of plant and animal biology.

DEPARTMENT OF Chemistry

CHEM-221. Organic Chemistry I Credit 3(3-0) A study of hydrocarbons (aliphatic and aromatic) and introduction to their derivatives. **Prerequisites: Chemistry 102, 105, or 107.**

CHEM-222. Organic Chemistry II Credit 3(3-0) (Formerly Chem. 1622) Continuation of the study of derivatives of hydrocarbons and more complex compounds. **Prerequisite: Chemistry 221.**

CHEM-223. Organic Chemistry I Laboratory Credit 2(0-4) This laboratory course emphasizes the study of physical and chemical properties of aliphatic and aromatic compounds. Modern instrumentation such as gas and column chromatography, infrared and ultraviolet analyses are used. **Corequisite: Chemistry 221.**

CHEM-224. Organic Chemistry II Laboratory Credit 2(0-4) A continuation of Chemistry. However, more emphasis is placed on synthesis and qualitative analysis of organic compounds. **Corequisite: Chemistry 222. Prerequisite: Chemistry CHEM.**

ELON COLLEGE*

CHM-305. Environmental Chemistry Sh 4 Environmental Chemistry provides a survey of chemical topics applying to selected pollutants in the air, water and soil. Such topics include production and diffusion, photochemical processes, techniques for analysis, acid-base and redox chemistry, environmental and biological effects. Laboratory work includes acid/base and buffer chemistry, analysis of heavy metal pollutants, sampling techniquesand resistance of selected materials to certain pollutants. Satisfies the laboratory science requirement for General Studies. No credit toward major/minor. **Prerequisites: CHM 111, 112, 113, 114, 211, 213.**

CHEM-503. Chemical Research Credit 4(0-10) (Formerly Chem. 403) Makes use of the laboratory and library facilities in studying minor problems of research. **Prerequisite: Advanced standing and permission of the Department.**

CHEM-504. Independent Study Credit 4(0-10) (Formerly Chem. 404) Independent study or research in a particular area of chemistry. **Prerequisite: Permission of the department and advanced standing.**

CHEM-641. Radiochemistry Credit 3(3-0) (Formerly Chem. 1782) A study of the fundamental concepts, processes, and applications of nuclear chemistry, including natural and artificial radioactivity, sources, and chemistry of the radioelements. Open to advanced majors and others with sufficient background in chemistry and physics. **Prerequisites: Chemistry 442 or Physics 406.**

CHEM-642. Radioisotope Techniques and Applications (Formerly Chem 1783) Credit 2(1-3) The techniques of measuring and handling radioisotopes and their use in chemistry, biology, and other fields. Open to majors and non-majors. Prerequisites: Chemistry 102 or 105 or 107.

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CHEM-701. Credit 1(1-0) Presentation and discussion of library or laborator research problems.

CHEM-702. Credit 2-5(0.6 to 15)
A course designed to permit qualified students to do original research in chemistry under the supervision of a senior staff member. May be taken for credit more than once.

CHEM-715. Special Problems in Inorganic Chemistry Credit 1(0-2) A laboratory course designed to introduce the student to the techniques of chemical research by solving minor problems in Inorganic Chemistry. May be taken for credit more than once.

DEPARTMENT OF History

HIST-220. History of Science and Technology Credit 3(3-0) A survey of major scientific discoveries and technological innovations since the Scientific Revolution. Special attention will be paid to the Newtonian mechanistic world view, theories of evolution, relativity, industrial revolution, medical advances, nuclear energy, computers and robotics. The social, economic, and ethical impact of modern scientific and technical discoveries will also be discussed.

HIST-307. The Historical Origins of Environmental Crises
Credit 3(3-0) This course will deal with man's changing philosophical and technological relationship with his natural environment since the start of the Industrial Revolution.

HIST-415. The Automobile and the Making of Modern America
Credit 3(3-0)
No country on earth has embraced the automobile as thoroughly as the United States. This course analyzes the reasons for American love affair with the car and the impact of automobility on American society and culture from the early Twentieth century to the present. Topics discussed include the advent of mass production as pioneered by Henry Ford, the transformation of the American landscape to meet the needs of the car, the growth of big labor, the rise of consumer culture, the car as a cultural icon, environmental problems created by unchecked automobile use, the Japanese challenge to American industrial practices, and current efforts to reinvent the car to meet the needs of the future. Prerequisites: History 205 or 220.

HIST-435. Global History Since 1945
Credit 3(3-0)
At the end of World War II, the world political order was fundamentally restructured. The old European empires soon came to an end and the world was divided into two dominant blocks. The course explores the coming into being of the bipolar world order of the postwar period and its eventual demise. Special attention will be given to such issues as global vs. local cultures and social formations, development vs. underdevelopment, economic inequalitites between the northern and southern hemispheres of the globe, wars of national liberation, ethnicity, and nationalism, technological change and the environmental impact of technology, nation states vs. multinational corporations, and the transformation of global capitalism. The final section of the course will deal with the definitions of postmodernity and their relevance for analyzing the developments in the postwar world. Prerequisites: History 101

GEOG-200. Principles of Geography
Credit 3(3-0) A survey of the principles of geography.

GEOG-210. World Regional Geography
Credit 3(3-0) A survey of the geographic character of the major culture regions of the world. Contemporary cultural characteristics are examined within the framework of both environmental relationships and historical development.

PHIL-262. Logic Credit 3(3-0)
An introductory course designed to give a critical analysis of the principles, problems, and fallacies in reasoning.

ELON COLLEGE*

PHL-348. Environmental Ethics Sh 4
Students explore the bearing of philosophical and religous ethics upon practical problems regarding the natural environment. This course also considers the possible need for new ethical frameworks to address the environmental crisis we now face. (Same course as REL 348.)

DEPARTMENT OF Physics

ELON COLLEGE*

PHY-110. Energy and the Environment Sh 4
This course provides an introduction to energy concepts and the basic modes of energy production and use, focusing on environmental problems that are a consequence of such activities. Laboratory included.

PHYS-406. Introduction to Modern Physics Credit 3(3-0) A study of the basics of special relativity, quantum, atomic, molecular, statistical, solid state, nuclear, and particule physics. **Prerequisites: PHYS 242 or 226, MATH 132.**

PHYS-407. Nuclear Physics & Elem. Particles Credit 3(3-0) A study of the properties of the nucleus; radioactivity, nuclear reactions, fission and fusion, elementary particles; and particle accelerators. **Prerequisite: Physics 406.**

PHYS-500. Special Topics in Physics Variable Credit (1-3) A junior-senior level course on selected topics in physics not covered in other courses. A descriptive title, syllabus and the amount of credit will have received department approval before scheduling. Students records will carry both course number and descriptive title. **The course may be repeated to earn a maximum of six credits.**

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DEPARTMENT OF Political Science

ELON COLLEGE*

PS-428. Environmental Politics and Natural Resource Legislation Sh 4
This course explores the legislative process as it relates to the development of environmental law and policy, with emphasis on the manner in which environmental issues are addressed by political processes. The course surveys the dynamics of international cooperation on global environmental problems and enables students to become familiar with landmark environmental legislation in the U.S. **Prerequisite: PS 131.**

POLI-504. Independent Study Credit 3(3-0) Senior Political Science majors who have exhibited facility for independent study and attained a minimum grade point average of 3.0 in their major may arrange to investigate an area not covered in the regular curriculum. Permission of the supervising instructor and the Department Chairperson is required.

POLI-604. Directed Study/Research Credit 3(3-0) Directed study or research on a specific topic in political science.

POLI-653. Urban Problems Credit 3(3-0) Analysis of some of the major problems in contemporary urban America. The course includes an examination of their causes, effects and possible solutions.

DEPARTMENT OF Psychology

PSYC-440. Introduction to Psychological Research Credit 4(3-2) A survey of various research methods with an emphasis on experimental design, instrumentation, and the collection, analysis, interpretation, and reporting of research data. **Prerequisite: PSYC 322 or equivalent.**

PSYC-445. Industrial Psychology Credit 3(2-2) A consideration of the significance of individual differences in

industry; employee selection and training; reduction of monotony and fatigue and the promotion of efficiency; accident prevention; psychological factors in employee turnovers.

PSYC-500. Independent Study Credit 3-6 Independent study on a specific topic or area in behavioral science. **Prerequisite: Permission of the instructor.**

PSYC-542. Seminar in Psychology Credit 3(3-0) A study of selected major systematic views and theoretical issues in psychology. Each student participates in supervised research in psychological journals and other materials leading to an oral presentation and written paper on a substantive view or issue in psychology.

DEPARTMENT OF Sociology and Social Work

SOSW-310. Medical Sociology Credit 3(3-0) Sociological analysis of medical services, the role of the sick professional organizations and quasi professional groups; socializational structure of hospitals; sociodemographic and socioepidemiologic variables in relation to modern societies. Cultural and cross-cultural customs and traditions affecting attitudes toward health and the healing art.

ELON COLLEGE*

SOC-332. Contemporary Environmental Issues and Human Values Sh 4
This course has three distinct but interrelated components and focuses on the interaction between environmental concerns and human cultural systems. One section of study centers upon historical and macro-theoretical perspectives on environmental issues. Another specific focus is on understanding the American culture and how our particular values and priorities have manifested themselves vis-a-vis the natural environment. A third component focuses on the growing need for environmental planning on all levels from local to global.

SOCI-408. Independent Study I Credit 3(3-9) Independent research on a specific topic or a delineated area in Sociology. **Prerequisite: Permission of the instructor.**

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SOWK-525. Independent Study Credit 3(0-9) Independent research in a delineated area of social welfare. **Prerequisite: Consent of the instructor.**

SOSW-670. Law and Society Credit 3(3-0) This course examines selected and representative forms of social justice and injustices; barriers to and opportunities for legal redress, as related to contemporary issues. **Prerequisite: Senior or graduate standing.**

SOCI-672. Selected Issues in Sociology Credit 3(3-0) Topics of current interest to sociologists and the student body are explored.

DEPARTMENT OF Business Administration

BUAD-430. Marketing Credit 3(3-0) Marketing is a basic function in the firm and in the economy. Emphasis is placed on the relationship between marketing activities and the consumer. Includes functional, institutional, and ethical aspects of marketing in both domestic and international economics. **Prerequisite: Junior standing.**

BUAD-462. Business Law Credit 3(3-0) sing the background provided in Business Administration 461, topics related to the legal implications activity will be continued. Coverage includes negotiable instruments, sales of goods, security and debt, bankruptcy, commercial papers and government regulation. **Prerequisites: BUAD 461 and Senior standing.**

BUAD-520. Business Policy Credit 3(3-0) An integrative course that focuses on strategic planning, policy formulation, corporate-wide decision making. The terminal performance objectives of this course involve analysis of complex, organization in order to develop the ability to: identify major problems and opportunities; to establish strategic objectives; and to recommend implementation plans and programs. **Prerequisites: ACCT 222, BUAD 422, 430, 453; and, Senior standing.**

BUAD-538. Marketing Research
Credit 3(3-0) Types of research techniques used by business coordinated marketing activities with consumer demand. Emphasis is placed upon survey, observational and experimental techniques used in marketing. **Prerequisites: ECON 310 and BUAD 430.**

BUAD-610. Interdisciplinary Seminar in Transportation Credit 3(3-0)
Geared to current developments in urban transportation; an interdisciplinary course on urbanism and transportation. Prerequisite: Advanced status in business administration, business education, accounting, economics, political science, sociology, or architectural engineering. **Prerequisite: BUAD 470.**

DEPARTMENT OF Economics

ELON COLLEGE*

ECO-335. The Economics of Environmental Issues Sh 4
This course explores the interactions of economic forces and policies with environmental issues. What are the costs of pollution and what are we buying for those costs? Who bears the burden of environmental damage? How might we reduce environmental impact and how do we decide how much damage is appropriate? **Prerequisite: ECO 201.**

ECON-525. Economics Seminar
Credit 3(3-0) The use of economic tools in delineating, analyzing and presenting economic problems that are not included in other courses. This course will include also an exposure to recent development in economics.

ECON-599. Independent Study
Credit 3 or 6 This course is designed for students involved in Cooperative Work-Study Program.

TRAN-650. Transportation Law
Credit 3(3-0)
A detailed review of the development of transportation law will be made. An analysis of the Interstate Commerce Act and its impact on surface carriers will be completed. This course will assist those students planning to take the bar exam for the Interstate Commerce Commision or those students studying for the Transportation Law exam in the American Society of Traffic and Transportation series. **Prerequisite: BUAD 461-Legal Environment of Business or equivalent is recommended.**

TRAN-660. National Transportation Policy Credit 3(3-0)
A seminar on national transportation problems. This course will involve readings and research on several issues in transportation. Previous policy statements will be reviewed in light of current needs to determine what the current national transporation policy should be.

DEPARTMENT OF Curriculum and Instruction

CUIN-415. Curriculum Design and Instructional Planning in the Elementary School Credit 2(2-0) Emphasis on planning a developmentally appropriate and integrated classroom program which reflects proven educational practices and research. The course includes exposure to various sources of curriculum relative to content, organization and instruction.

CUIN-513. Strategies for Teaching Science in the Elementary School Credit 2(2-0)
Stresses an integrated, discovery-centered program with developmentally appropriate experiences for children in grade K-6. Emphasis on science curriculum materials and teaching strategies to achieve instructional objectives. Classroom observation/participation experiences in an elementary school.

CUIN-562. Seminar in Elementary Education Credit 3(1-0)
A consideration of selected topics and current trends in the field of elementary education. Topics differ in response to current interests, issues and research findings. Students will

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participate in group sessions during the student teaching experience. The sessions may be conducted at a selected school or on campus. To be taken concurrently with student teaching.

CUIN-724. Problems and Trends in Teaching Science Credit 3(3-0)
Attention to major problems of the high school teacher of science. Lesson plans, assignments, tests, etc., constructed and administered by each student in class. Audiovisual materials, demonstration and laboratory techniques carried out.

CUIN-S-790. Seminar in Educational Problems Credit 3(1-4)
Intensive study, investigation, or research in selected areas of education; reports and constructive criticism. Prerequisites: A minimum of 24 hours in prescribed graduate courses.

CUIN-S-791. Thesis Research Credit 3

DEPARTMENT OF Architectural Engineering

AREN-221. Building Sanitation and Fire Protection Credit 3(3-0)
Lecture-problem course: Waster water treatment, water supply and distribution. Plumbing systems and fixtures; soil, water and venting systems. Pipe sizing fire protection systems for buildings. Pumps, sprinklers, gravity and pressure vessels, and controls.

AREN-331. Architectural Design I
Credit 3(0-6) Introduction to the basic fundamentals of design: space relationships, form and visible structure. Perspective drawing; plans, elevations and sections. Shades and shadows. **Prerequisite: AREN 122 or permission of instructor.**

AREN-332. Architectural Design II
Credit 3(0-6)
Laboratory-lecture course. Presenting a series of problems in space organization and planning with the study of composition and structure. **Prerequisite: AREN 331.**

AREN-361. Heating, Ventilating and Air Conditioning Principles
Credit 3(2-2)
A study of the basic concepts of energy and building systems design. The course covers the subjects of psychrometrics and human comfort in buildings. The topics covered include heat transfer functions, heating loads, cooling loads and the refrigeration cycle. **Prerequisites: Math 132 and Physics 242.**

AREN-421. Advanced Design Methods
Credit 3(2-2) Description, comparison, and testing of methods available in design with emphasis on probelm-solving techniques.

AREN-430. Structural Engineering Design I
Credit 3(3-0)
This course will introduce the student to the design of steel, timber and reinforced concrete structures. Consideration will be given to simple structural systems as designed for each material. **Prerequisite: MEEN 336.**

AREN-431. Architectural Design III
Credit 3(0-6) Laboratory-lecture course presenting a series of problems for study of space analysis, space organization, form and function. Integration of architectural and structural components. Introduction to computer-aided drafting and design. **Prerequisite: AREN 332.**

AREN-442. Fundamentals of Illuminating Engineering
Credit 3(3-0)
A study of the basic principles of illumination, lighting concepts, analysis, design, and the application of these principles to luminous environments. Topics include physics of light, vision, and visibility, units and terminology, light sources, numerical methods and the application of these principles to lighting design. **Prerequisite: PHYS 242.**

AREN-445. Electrical Systems for Buildings I
Credit 3(3-0)
This course includes the analysis and design of electrical systems utilizing the National Electrical Code. The topics include basic circuits, ac and dc single phase, three phase power, transients, capacitance and induc-

tance, branch circuits, panelboards, motors, and electrical distribution in buildings. The course also includes design topics system sizing, overcurrent protection and voltage drop as they apply to electrical systems design for a building. **Prerequisites: MATH 132 and PHYS 242.**

AREN-462. Heating Ventilating and Air Conditioning Principles Credit 3(2-2)
Heating, ventilating and air conditioning central system components. All water-water systems, packaged systems. Introduction to air-side and waterside system design concepts. Space air diffusion and energy recovery systems. **Prerequisites: AREN 461.**

AREN-512. Senior Project Credit 3(0-4)
Preparation of final construction documents including calculations, drawings final construction cost estimate and specifications. **Prerequisite: Senior Standing.**

AREN-581. Senior Seminar
Credit 1(1-0)
This course addresses the preparation of resumes, interviewing techniques, and career alternatives. The course includes the review of material included in the Fundamentals of Engineering (FE) exam. **Prerequisite: Senior Standing and last Fall Semester.**

AREN-633. Foundations and Soils
Credit 3(3-0)
The student will study the origin and composition of soil structure. The course includes the flow of water through soils, capillary, and osmotic phenomena. Soil behavior under stress is studied along with compressibility, and shear strength. The elements of the mechanics of soil masses are studied with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. **Prerequisites: AREN 430 or consent of the Instructor.**

AREN-645. Electrical Systems for Buildings II Credit 3(2-2)
This course is a continuation of AREN 445. The course covers the design of safe and reliable electrical distribution systems for commercial and industrial buildings. The topics included are circuit protection, feeder and branch circuit design, and fault analysis. **Prerequisites: AREN 442, 445 or consent of the instructor.**

AREN-657. Foodservice Facilitites Engineering Credit 3(3-0)
This course presents an overview of restaurant dewsign including the layout of the kitchen and kitchen equipment, the dining room, and ancillary areas. The major design emphasis is on the energy efficient design of the HVAC system and the lighting. **Prerequisites: AREN 442, 462 and Senior standing or Consent of the Instructor. Corerequisites: AREN 642 or 662.**

AREN-662. HVAC Systems Design
Credit 3(3-0)
This course addresses the design methodology, sizing, and selection techniques of pumps, fans, heat-exchangers, air washers, cooling towers and terminal units. Ducts and pipe design methods are covered. Primary and secondary hydronic systems are covered including system air-control techniques. Design projects are required. **Prerequisites: Senior standing and AREN 462 or consent of the Instructor.**

AREN-670. Energy and the Environment
Credit 3(3-0)
This course covers the global energy resources, consumption and pollution generation duet to energy use. Various environmental regulations will be surveyed and the potential effect of new technologies and policies on the environment and global economy will be studied. Design projects are required. **Prerequisite: Senior standing or consent of the Instructor.**

AREN-672. Energy Conservation in Buildings Credit 3(3-0)
The energy use patterns in schools and hospitals are studied in terms of relevant IES and ASHRAE Standards. The course presents the various utility rate structures and energy auditing techniques along with the effect of operation and maitenance on building energy use. Various retrofit options and computerized Energy Management Systems are investigated, culminating in

design projects. **Prerequisite: Senior standing, AREN 361, 442, 445 or Consent of the Instructor.**

AREN-675. Energy Management for Buildings Credit 3(3-0)
This course involves the study of renewable and nonrenewable energy sources for buildings, energy estimating methods (manual and automated), optimizing building envelope design, comparative energy requirements for various HVAC systems. The student utilizes the solar energy F-chart method, and design of efficient lighting and electrical systems to solve design problems. Topics include energy management and control systems (EMCS), waste heat recovery, energy audit procedures for existing buildings, and life cycle cost techniques. **Prerequisite: Senior standing or consent of Instructor.**

AREN-684. City Planning and Urban Design Credit 3(1-4)
This courselooks at the history of city planning and urban design, general problems of city planning, and urban design-architectural space composition. The student studies regional and urban planning while investigating the scale of the plan for region and city presentations. The course includes the study of transportationin city, the city as a human unit, and the greenery in the city. The design of the neighborhood unit is implemented. **Prerequisite: Juniors enrolled in the program of the Transportation Institute and Architectural Engineering majors of Senior standing. Open to practicing design professional.**

AREN-685. Selected Topics
Credit 3(max. Total 6) The course allows a student to select an engineering topic of interest to the student to investigate in depth. The topic will be selected by the student and the student will find a faculty advisor before the beginning of the semester. The topic must be pertinent to the program the student is enrolled in and approved by the faculty advisor. **Prerequisite: Consent of Instructor.**

AREN-686. Special Topics
Credit 3(3-0)
The students must select a project on a special engineering topic of interest to the student and a faculty member, who will act as an advisor. The project and scope of work must be agreed on by the student and the faculty advisor before the beginning of the semester. The project may be analytical and/ or experimental and encourage independent thinking . The topic must be pertinent to the program the student is enrolled in and approved by the faculty advisor. **Prerequisite: Consent of the instructor.**

AREN-734. Energy & Maintenance Management Credit 3(3-2)
Topics includes: building energy-use systems and efficiencies, concepts of energy conservation, energy management and control systems, preventive maintenance, computer-based energy management and maintenance management systems. Life cycle building operation and aintenance costs.

AREN-739. Design of buildings for Wind and Earthquake Credit 3(3-0)
The course applies the principles of structural dynamics to determine the response of buildings to earthquake and wind induced forces. The response spectra is used to evaluate earthquake forces on the building. The behavior of wind and the variation in wind velocity are studied with respect to topography and the building height above ground. The course also investigates the response of building components to hurricanes and tornadoes. **Prerequisites: AREN 630 or consent of Instructor.**

AREN-776. Project Credit 3(3-0)

AREN-777. Thesis Credit 6(6-0)

AREN-784. Advanced HVAC System Design Credit 3(3-0)
Comprehensive HVAC design of complex facilities including hospitals and high rise buildings.

AREN-789. Special Topics Credit 3(3-0)

DEPARTMENT OF
Chemical Engineering

CHEN-430. Process Design I
Credit 3(2-2) The steps in creating a chemical process design from concept to completion and plant operation are studied. Topics included are engineering economics, simulation, process equipment design, ethics, and process safety. Statistical analysis of a process, including F-Tests and Chi Square Tests, is discussed. Students complete an open-ended process component design. **Corequisite: CHEN 400.**

CHEN-450. Chemical Engineering Senior Seminar Credit 1(1-0) Selected topics of interest to senior chemical engineering majors are presented. Topics include ethics, chemical plant safety, industrial careers, and interviewing techniques. Preparation for the senior comprehensive exam and the fundamentals of engineering exam is included. Prerequisite: Senior standing in chemical engineering.

CHEN-500. Chemical Engineering Seminar Credit 0(0-0) This course is the presentation and discussion of selected topics of interest to chemical engineering students such as ethics, professionalism, careers in chemical engineering, graduate school, and AIChE.

CHEN-505. Selected Topics in Chemical Engineering Credit 3(3-0)
An in-depth lecture course covering several advanced topics in chemical engineering. Topics will be selected to match student interest and faculty expertise. A specific course description will be available at the beginning of each semester that the course if offered. **Prerequisites: Senior standing in CHEN courses.**

CHEN-510. Independent Study in Chemical Engineering Credit 3(0-6)
An Independent study project is completed on a single topic in chemical engineering. Topics are arranged to fit the interest of the student and a faculty advisor. The study includes the design of an apparatus, a process or a procedure with economic, environmental, safety and other considerations. **Prerequisite: Senior standing in CHEN courses.**

CHEN-525. Fuels and Synfuels Process Design Credit 3(2-2) Design of a fuel conversion process. The design includes extraction or mining of raw fuel and conversion to energy or to useful chemicals. Economic, environmental and safety factors are also included in the design. **Prerequisite: CHEN 520.**

CHEN-540. Forest Products Engineering Credit 3(3-0)
Basic chemical and mechanical properties of forest products including pulp and paper combustion and mechanics of forest products. Conversion of forest products Into lumber paper fuels and foods and others. **Prerequisite: Senior standing in CHEN courses.**

CHEN-545. Forest Product Chemical Design Credit 3(3-0)
Design of operations in the processing of forest products including design of industrial operations in the manufacture of paper fuels foods furniture and other forest chemicals and products. **Prerequisite: CHEN 540.**

CHEN-615. Fuels and Petrochemicals Credit 3(3-0) Topics important to the production of fuels. Extraction and processing of fossil fuels, synfuels, and fuels from renewable resources. Topics include distillation, refining, fermentation, catalytic reactions, and removal of undesirable by-products. Design of different fuel processes with emphasis on economic and environmental impact.

CHEN-618/ CIEN-618. Air Pollution Control Credit 3(3-0)
The econmic, social and health implications of air pollution and its control are covered. To understand the problems better, the sources, types and characteristics of man-made air pollutants will be discussed. The course will review some of the main regulations and engineering alternatives for achieving different levels of control. And a pollution control system will be designed.

CHEN-625. Basic Food Processing Engineering Credit 3(3-0)
Basic food and processing topics including food preparation operations, slurry flow, processing operations, carcinogens, microbiology and health hazards, toxins, agrichemicals, and residues, fertilizers, pesticides, plant stimulates, diseases and medicines, and their effects on humans.

CHEN-635. Mixing Processes and Equipment Scale-up Credit 3(3-0)
The course covers practical design concepts of mixing and multiphase processing in agitated tanks. Strategies for increasing plant throughput, improving contacting and mixing, and selecting equipment will be given. This course provides information on: 1) judging the level of difficulty of a mixing process; 2) using practical elements of laminar, transitional and turbulent mxing; 3) mixing times and; 4) increasing throughput for all types of systems and power. The course treats jet mixing, gas sparged mixing and mechanical mixing. The course provides basic concepts on using pilot plant studies for process translation and scale-up. Equipment design is stressed.

CHEN-645. Environmental Remediation Credit 3(3-0)
The course introduces students to traditional and developmental methods for removal and detoxification of hazardous wastes at contaiminated sites and from industrial waste streams. Chemical, thermal, biological and physical methods of remediaition are covered. The course deals with hazardous wastes in soils, groundwater, surface water, waste water ponds and tanks. The emphasis is on destruction, removal and containment methods using mathmatical models for contaminent fate and transport. Recent advances in emerging technologies are also discussed. Each student will complete an environmental remediation design project.

GEEN-655. Industrial Ecology Credit 3(3-0)
The concept of industrial ecology and its application through risk assessment methodologies are covered. Topics include how government policies impede or support the implementation of industrial ecology practices, the choice and use of materials in industrial applications and the implications of these choices on material stocks and flows in global systems. A process involving membrane separation steps will be designed and analyzed using industrial ecology practices.

DEPARTMENT OF Civil Engineering

CIEN-310 Environmental Engineering Credit 3(3-0) Introduction to environmental pollution. Topics Include: Physical chemical and biological water quality parameters water purification processes In natural systems air pollution and solid waste management and general design of waste control systems.
Prerequisite: Junior standing.

CIEN-311. Environmental Engineering Laboratory Credit 1(0-3)
Selected experiments on the measurement of environmental pollutants. Topics Include. Use of microscope Gram stain coliform analysis pH alkalinity hardness DO BOD and control microorganisms.
Corequisite: CIEN 310.

CIEN-460 Water Resources Engineering Credit 3(3-0) Application of hydrologic and hydraulic principles in the analysis and design of water resources systems. Topics include hydraulic structures systems economics water law irrigation hydroelectric power navigation flood control and water resources planning.
Prerequisite: CIEN 360.

CIEN-510. Environmental Engineering Design Credit 3(3-0)
The design of water and wastewater treatment systems. Topics include the functional design of physical chemical and biological treatment processes; the design of pump stations; and the design of sludge treatment processes.
Prerequisite: CIEN 310.

CIEN-610. Water And Waste Water Analysis Credit 3(2-3)
Laboratory and field methods for the measurement and analysis of water.
Prerequisite: CIEN 510.

CIEN-614. Stream Water Quality Modeling Credit 3(3-0) Mathematical modeling of water quality in receiving streams. Topics include: The generation of point and nonpoint sources of pollutants; the modeling and prediction of the reaction transport and fate of pollutants in the stream; and the formulation and solution of simulation models. Prerequisite: CIEN 310.

CIEN-616. Solid Waste Management Credit 3(3-0) The study of the collection storage transport and indisposal of solid wastes. Examination of various engineering alternatives and appropriate consideration for air and water pollution control and land reclamation. Prerequisite: Senior Standing.

CIEN-618. Air Pollution Control Credit 3(3-0)
Introduction to air pollution and its control. Topics include: sources types and characteristics of air quality standards; And engineering alternatives for achieving various degrees of air pollution control.
Prerequisite: Senior Standing.

CIEN-666. Design of Hydraulic Structures and Machinery Credit 3(3-0)
Analysis and design of water regulating structures including dams spillways outlet works transition structures conduit systems and gates. Application of basic principles of fluid mechanics and hydraulics to the design and selection of pumps turbines and other hydraulic machinery. Applications to multipurpose design Involving water supply irrigation flood control and navigation.
Prerequisites: MEEN 416 and CIEN 360.

CIEN-699. Special Project Credit 3(3-0)
Study arranged on a special civil engineering topic of interests of the student and faculty_ Topics may be analytical and/or experimental with independent study encouraged.
Prerequisite: Consent of Instructor

Computer Science

COMP-600. Special Topics in Computer Science Credit 3(3-0)
This is a seminar surveying fundamental concepts and current ideas in computer science. The course shall be administrated by a faculty team employing a cooperative teaching paradigm. Students shall select, research, and present topics of their interest.
Prerequisite: Senior or Graduate Standings.

DEPARTMENT OF Electrical Engineering

ELEN-436. Power Systems, Energy Conversion and Electric Machinery Laboratory Credit 1(0-3) A study of power circuits and a study of the behavior of motors and generators by laboratory experimentation. Prerequisites: E.E. 300, ELEN 306, ELEN 325, Corequisite: ELEN 430.

ELEN-660. Selected Topics in Engineering Credit Var. (1-3) Selected engineering topics of interest to students and faculty. The topics will be selected before the beginning of the course and will be pertinent to the programs of the students enrolled. Prerequisite: consent of instructor.

ELEN-666. Special Projects Credit Var. (1-3) Study arranged on a special engineering topic of interest to student and faculty member, who will act as advisor. Topics may be analytical and/or experimental and encourage independent study.
Prerequisite: consent of instructor.

ELEN-788. Master's Project Credit Variable (1-3) This course deals with advanced research in an area of interest to student and instructor.

ELEN-789. Special Topics Credit Variable (1-3) Study of advanced topics pertinent to student's program of study.

ELEN-799. Ph.D. Thesis

DEPARTMENT OF Industrial Engineering

INEN-360. Engineering Cost Management and Control
Credit 3(3-0)
This course covers the use of cost information by engineers for the planning, organizing, and control of industrial operations. Methods for engineering cost estimation, cost control, life cycle costing and performance measurement are studied. Case studies, design projects, and oral presentations are required. **Prerequisites: INEN 260.**

INEN-400. Introduciton to Stoastic Process and Stimulation
Credit 3(3-0)
This course covers the basic concepts of stochastic processes and stimulation, including Poisson Process, inventory, reliability and queuing models, discrete event simulation modeling, random number generation, model validation and result interpretation. Design projects on the use of simulation for alternative design of production systems are required. Prerequisite: MATH 224 and Junior Standing.

INEN-430-489. Industrial Engineering Seminars Credit 1(0-2) A series of seminars illustrating safety, health and welfare of the public in the performance of an engineer's professional duties are presented.

INEN-490. Design Projects in Industrial Engineering-I Credit 2(0-4)
This course introduces the students to real-life examples in the design of productive systems. The students learn, through open-ended case studies, the process of design as a problem solving and iterative decision making process. Fundamental elements of systems methodology, analysis design, and synthesis are discusses. The students work on group projects that test their design creativity. **Prerequisites: INEN 265, INEN 355. Corequisites: INEN 400, INEN 410.**

INEN-495. Design Projects in Industrial Engineering-II Credit 2(0-4)
The students work on a real-life design project from the industry. The project requires the students to analyze, design, and recommend, through economic justification, the best design alternative. The students write a final engineering report on their design concepts that includes problem statements, design specifications, and analytical models used. The students demonstrate the feasibility of their designs through formal presentations which include design performance measures such as safety, aesthetics, reliability cost, and social and ethical values. **Prerequisite: INEN 490.**

INEN-615. Industrial Simulation
Credit 3(3-0)
This course addresses simulation languages. One general purpose language is taught in depth. The use of simulation modeling in design and improvement of production and service is emphasized. Term papers and projects will be required. **Prerequisite: INEN 550 or equivalent.**

INEN-618. Total Quality Improvement (TQI) Credit 3(3-0)
This course provides a systematic engineering approach to understanding the philosophy and application of Total Quality Improvement (TQI). It also introduces students to Continuous Improvement (CI) techniques used by management as a means of improving engineering processes in order to become and remain competitive in the global market place. The CI techniques and concepts this course includes strategic planning, benchmarking, ISO 9000, teamwork, customer satisfaction, employee involvement, quality tools, and business process reengineering. Design projects are required. **Prerequisite: Senior/Graduating Standing.**

INEN-621. Engineering Cost Control and Analysis Credit 3(3-0)
This course is designed to emphasize the use of accounting data internally by engineers as a key participant in all functions of management. It focuses upon the systems design concepts in job order costing, process costing and Just-in-Time inventory in manufacturing organizations. Projects are required. **Prerequisites: INEN 260 or equivalent.**

INEN-625. Industrial Information Systems
Credit 3(3-0)
This course introduces the planning, design, implementation, and evaluation of industrial information systems. Analysis and design techniques, organization of data, current software tools, and current database technologies are presented. The role of information systems in global manufacturing, distribution, and services is addressed. Design projects are required. **Prerequisites: INEN 355 or equivalent.**

INEN 632. Robotic Systems and Applications
Credit 3 (2-2)
This course addresses design, analysis, implementation and operation of robotics in production systems. End effectors, vision systems, sensors, stability and control, off-line programming and simulation of robotic work areas is emphasized. Design projects are required. **Prerequisite: INEN 410 or equivalent.**

INEN-648. Industrial Biomechanics
Credit 3(3-0)
This course explains and analyzes the mechanical behavior of the musculoskeletal system and component tissue during industrial work situations. Topics include: biomedical and musculoskeletal models, mechanical work capacity, bioinstrumentation. Applications to Human-Machine systems design and analysis are emphasized. **Prerequisites: Senior/Graduatie Standing.**

INEN-650. Probabilistic Models in Operations Research Credit 3(3-0).
Stochastic models in Operations Research and solution techniques are introduced in this course. Specific topics include random number generation, Monte Carlo simulation, Poisson process, Markov chains, queuing models, decision analysis, stochastic inventory systems and system reliability. Projects and term papers are required. **Prerequisite: INEN275 or equivalent.**

INEN-662. Reliability
Credit 3(3-0)
This course reviews the statistical concepts and methods underlying procedures used in reliability engineering. Topics include the nature of reliability and maintenance, life failure and repair distributions, life test strategies, and complex system reliability including: series/parallel/standby components with preventive maintenance philosophy. **Prerequisite: INEN 200.**

INEN-664. Human Performance, Risk Analysis & Systems Safety
Credit 3(3-0)
This course addresses the relationship between system safety, risk and human performance at work. Quantitative and qualitative methods of investigating and analyzing accidents, system environment are discussed. Design projects that incorporate Occupational Safety and Health Act are emphasized. **Prerequisites: INEN 275, 420 or equivalent.**

INEN-666. Special Projects Credit
Variable (1-3) Study arranged on a special engineering topic of interest to student and faculty member, who will act as advisor. Topics may be anlytical and/or experimental and encourage independent study. Prerequisite: consent of the instructor.

DEPARTMENT OF Mechanical Engineering

MEEN-444. Undergraduate Projects Credit
Variable (1-3) Study arranged on engineering topics of interest to student. A faculty member will serve as project advisor. Topics may include analytical and/or experimental work and encourages independent study. **Prerequisite: Permission of Department and consent of aculty member as advisor.**

MEEN-474. Engineering Design
Credit 3(2-2) This course provides an introduction to mechanical design. Lectures cover the following topics; codes and standards; ethics; project planning; technical writing; design of machine elements for static and fatigue strength. Individual and group design projects are assigned. **Prerequisites: MEEN 210, MEEN 226, MEEN 300, MEEN 336.**

MEEN-544. Special Topics Credit Variable (1-3) A senior level course on topics not covered in other mechanical engineering courses. There is to be a title specificied for the course, which indicates the contents. The students records will carry both course number and name. This course will satisfy the requirements for a Technical Elective, and approval of the syllabus and other course details must be secured from the department curriculum committee.

MEEN-660. Selected Topics in Mechanical Engineering Credit 3(3-0)
This course consists of selected mechanical engineering topics of interest to students and faculty. The topics will be selected before the beginning of the course and will be pertinent to the programs of the students enrolled. **Prerequisite: Consent of instructor.**

MEEN-766. Graduate Projects Variable (1-3) Independent Project Work on an advanced special topic of interest to the student and faculty member acting as advisor. Three credit hours of this course are required for the MSME project option. Topics may be analytical or experimental in nature and must be agreed upon by the advisor before students register for this course. **Prerequisite: consent of instructor.**

MEEN-777. Thesis Variable (1-3)
Thesis work. **Prerequisite: Consent of the advisor.**

MEEN-788. Research Variable (1-3)
Advanced research in an area of interest to student and instructor. Prerequisite: consent of instructor.

MEEN-789. Special Topics Variable (1-3)
A course designed to allow the introduction of potential new courses on a trial basis or offering of special course topics on a once only basic. The course may be offered to individuals or groups of students. A definite topic and title must be agreed upon by the advisor before students register for the course. **Prerequisite: consent of instructor.**

DEPARTMENT OF Construction Management And Safety

CM-593. Safety Management Credit 3(3-0) This course focuses on the industrial manager's role in preventing accidents, protecting workers health, and maintaining safety awareness in the workplace.

CM-599. Independent Study Credit 3(0-6)
The student selects a technical problem in his major area for special research and study in consultation with a faculty member in his area of interest. He will spend a minimum of 6 hours per week in library research or laboratory experimentation. A technical report in standard format will be required for completion and must be approved by two department faculty members.
Prerequisite: Junior or Senior standing.

CM-690. Special Problems in Construction Management Credit 3(0-6)
Intensive study in the field of Construction Management under the direction of a faculty advisor.

OSH-311. Industrial Accident Prevention Credit 3(3-0) To develop a basic understanding of the principles involved in identifying and eliminating hazards in the workplace to protect the life and safety of employees, including physical, mechanical, electrical, and chemical hazards.

OSH-312. Accident Investigation Analysis and Records Credit 3(3-0)
To develop an understanding of the necessity, scope, and requirements of investigation, record/report analysis of accidents to meet federal, state, and local laws and standards.
Prerequisite: OSH 311.

OSH-414. Principles of Fire Prevention and Protection Credit 3(3-0)
An introduction to the basic principles of fire theory, classes of fire, fire prevention, and the necessary measurements to minimize the loss of property and the loss of property and the loss of human resources.
Prerequisite: OSH majors and Consent of Instructor.

OSH-415. Standards and Regulations in Occupational Safety and Health
Credit 3(3-0) Develop basic knowledge and understanding of OSH related standards and regulations, be it local, state or federal. Special emphasis on OSH, EPA, SARA, CRCLA and WC Standards as they apply to the workplace. **Prerequisites: OSH 311, 312.**

OSH-416. Industrial Hygiene II
Credit 3(3-0) Industrial Hygiene and Toxicology. Application of engineering principles to the control of environmental hazards. Topics include the principles of ventilation and design ventilation, shielding design for radiation protection, methods of noise controls, control of industrial emissions, and disposal of industrial waste. Interrelationship with safety engineering, fire protection engineering, system safety and occupational medicine.

OSH-413. Industrial Hygiene I
Credit 3(3-0) An introduction to the principles of industrial hygiene and toxicology. Topics include elements of toxicology and occupational disease, airborne contaminants, ionizing and nonionizing radiation, noise and vibration, and heat stress. Emphasis on understanding biological response to the measurement of environmental hazards. Application of non-engineering controls. Laboratory work with industrial hygiene instrumentation. **Prerequisites: Chemistry, Physics, and Biology.**

OSH-513. Human Factors
Credit 3(3-0) To develop an understanding of the systems so that human tasks and the working environment are compatible with the capabilities and limitations of people. Attention is given to the systems approach in accident prevention and methods of engineering problems for optimum integration of man and machine components.

OSH-514. Industrial Relations
Credit 3(2-0) A study of state and federal Workman's Compensation laws; their history, administration and jurisdiction; and their relationship to injury, accidents, and occupational disease.

OSH-515. Evaluation for Occupational Safety and Health Credit 3(2-2)
The development of formal technical reports by groups of students functioning as a team to evaluate specific operations, methods, environments, equipments, etc. and to determine significantly important exposures, develop controls, and justify the controls. The course includes performance based field experience.
Prerequisite: OSH 413, 416.

OSH-516. Occupational Safety and Management Credit 3(3-0)
Management techniques applied to Occupational Safety and Health direction of programs, selection, supervision, evaluation of technical personnel, establishing objectives and priorities, introcompany relations, security, and quality performance. Technical reports required.
Prerequisite: OSH 311, 312.

OSH-517. Material Handling for the Safety Professional Credit 3(3-0)
Lectures with emphasis on the recognition, evaluation, and control of material handling exposures. Design of material handling systems, operational analyses, the man-machine-environment relationship in a material handling system and ergonomics are stressed. Case histories are provided and the student is required to write technical reports specifying applicable control methods for assigned case histories.

School of Nursing

NURS-320. Health Assessment
Credit 2(2-0) This course focuses on the broad scope of health assessment including health promotion and health maintenance, interviewing techniques, data collection and physical assessment. Opportunity will be provided for students to practice history taking and physical assessment skills.

NURS-504. Nursing Research
Credit 2(2-0) This course is an introduction to the research process. Emphasis is placed on utilization and application of the research process to problems in nursing.

NURS-510. Community Health Nursing Credit 3(3-0) This course focuses on the care of clients experiencing health problems as individuals, families, groups and communities. Emphasis is on the utilization of the nursing process in promoting, maintaining, and restoring health. The epidemiological approach is introduced as a methodology for the study of populations and high risk groups in various settings.

NURS-516. Independent Study Credit 3(3-0) An independent study on a specific topic or area in nursing to gain increased knowledge and/or skills enables the student to do research and/or practice in an area of interest in nursing under the guidance of the instructor.

DEPARTMENT OF Electronics and Computer Technology

ECT-599. Independent Study Credit 3(0-6) The student selects a technical problem in electronics or computer technology for special research and study in consultation with a faculty member in area of interest. The student will spend a minimum of six (6) hours per week in libary research or laboratory experimentation. A technical report in standard format is required for completion and approved by faculty. **Prerequisite: Junior or senior standing with Department Chair approval.**

ECT-690. Special Problems in Technology Credit 3(0-6) Intensive study in the field of Electronics and Computer Technology under the drection of a faculty advisor.

DEPARTMENT OF Manufacturing Systems

MFG-300. Technology Seminar Credit 1(1-0) This course is designed to review and acquaint students with the necessary skills to present themselves and their credentials to various groups. Video/oral presentation as well as written and computer generated graphic presentations will be made.

MFG-470. Industrial Materials and Processes Credit 3(1-3) Nature, origin and the conversion into manufactured goods of metals, plastics, woods, ceramics, composites and synthetic materials.

MFG-599. Independent Study Credit 3(3-0) The student selects a technical problem in his major area for special research and study in consultation with a faculty member in his area of interest. He will spend a minimum of 6 hours per week in library research or laboratory experimentation. A technical report in standard format will be required for completion and must be approved by two department faculty members.

MFG-651. Principles of Robotics Credit 3(1-3) Study of robotics principles and logic control manipulators towards the total integration into a flexible manufacturing system.

MFG-690. Special Problems in Manufacturing Systems Credit 3(0-4) Intensive study in the field of Industrial Technology under the direction of a faculty advisor.

DEPARTMENT OF Graphic Communications

TECH-211. Seminar in Technology Education Credit 1(1-0) Provides actual classroom observations of the public school environment. Students will meet in a seminar to discuss their observations relative to current research and trends in technology education in the public schools.

TECH-218. Introduction to Technology Credit 3(2-2)
Use of the anthropological approach in studying the evolution of technology and its impact on tool development and technological processes. Student will develop problem-solving and manipulative skills through "hands-on" activities in a multiple activity laboratory. The activities will be developed/ designed around the technological systems of communication, manufacturing, transportation, and construction. Student will also develop leadership skills through his/her involvement in the Technology Education Collegiate Association activities.

GCS-433. Industrial Design I Credit 3(3-0)
The history of industrial design, contemporary design applications, the design process, and materials are covered. Production techniques are explored as well as the processes of cutting, forming, fastening, and finishing.

TECH-510. Research and Development in Technological Systems Credit 4(2-4)
Research and development in Technological Systems is the capstone technology education course. This course is a synthesis course where the student researches problems relative to any of the four identified technological systems (i.e., Communication, Transportation, Construction, Manufacturing) and develop solution(s) to the identified problems. The student also will explore the interrelationship among the four technological systems.

TECH-668. Independent Studies in Industrial Education Credit 3(3-0)
Intensive study in the field of Industrial Education under the direction of a faculty advisor. Prerequisite: Approval of graduate coordinator.

TECH-668. Independent Studies in Industrial Education Credit 3(3-0)
Intensive study in the field of Industrial Education under the direction of a faculty advisor. Prerequisite: Approval of graduate coordinator.

TECH-669. Safety in the Instructional Environment of Technology Education Credit 3(3-0)
Principles and techniques of organizing and supervising safety in a Technology Education setting. Emphasis is placed on instructional strategies, state and national laws, special hazards, color coding, and accident analysis. The course is required for T&I certification by the State of North Carolina.

Waste Management Institute Advisory Committee

Dr. Shoou-Yuh Chang, Civil Engineering
Dr. Robert Pyle, Construction Management & Safety
Dr. Godfrey Gayle, Natural Resources
Dr. Harold Martin, Academic Affairs
Dr. George Johnson, Animal Science
Dr. Mel Johnson, Business Administration
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Dr. Earnestine Psalmonds, Division of Research
Dr. Godfrey Uzochukwu, Waste Management Institute
Dr. Joseph Whittaker, Biology
Dr. Alex Williamson, Chemistry

For detailed information about
The WMI at
North Carolina A&T State University,
contact:

Dr. Godfrey A. Uzochukwu, Director
Waste Management Institute
NCA&T State University
Greensboro, NC 27411
(910) 334-7030
FAX (910) 334-7399
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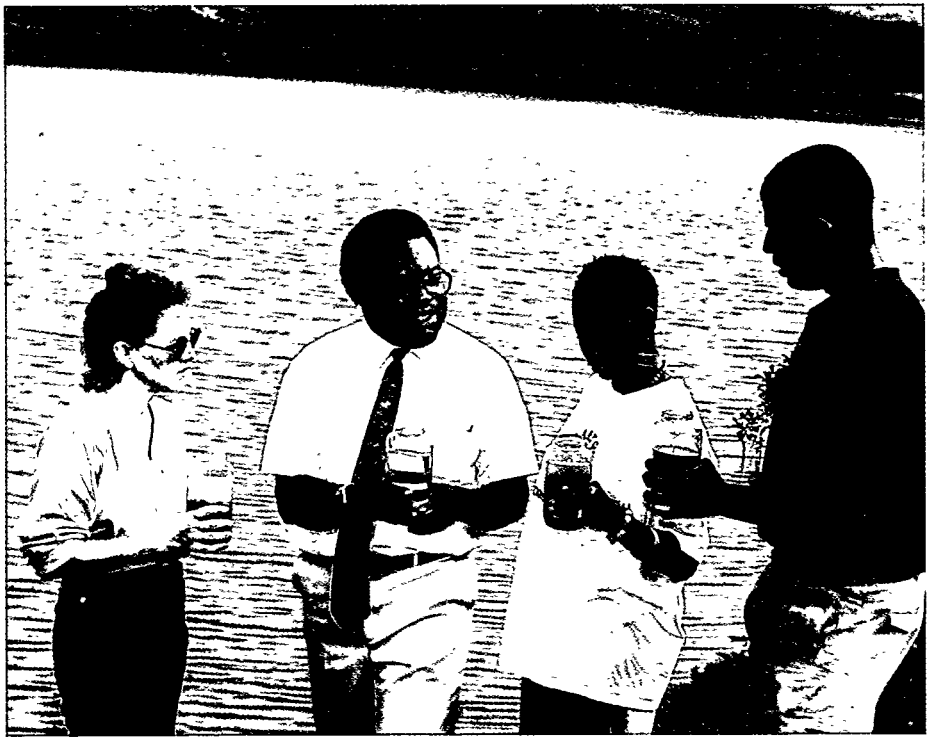

NORTH CAROLINA
AGRICULTURAL AND TECHNICAL STATE UNIVERSITY
GREENSBORO, NORTH CAROLINA

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North Carolina Agricultural and Technical State University

Waste Management Institute

awards

Waste Management Certificate

to

John Doe

In recognition of the satisfactory fulfillment of the prescribed course work in waste management

Given at Greensboro, North Carolina, this seventh day of May, 1995.

Godfrey A. Uzochukwu

Director of the Institute

Harold L. Martin

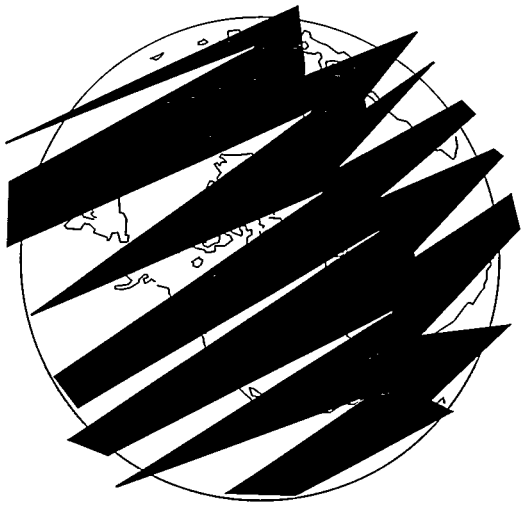
Vice Chancellor for Academic Affairs

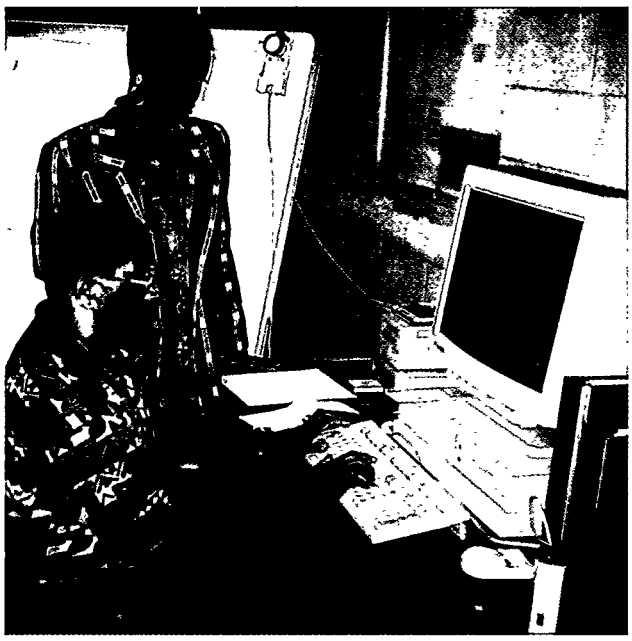
Edward B. Fort

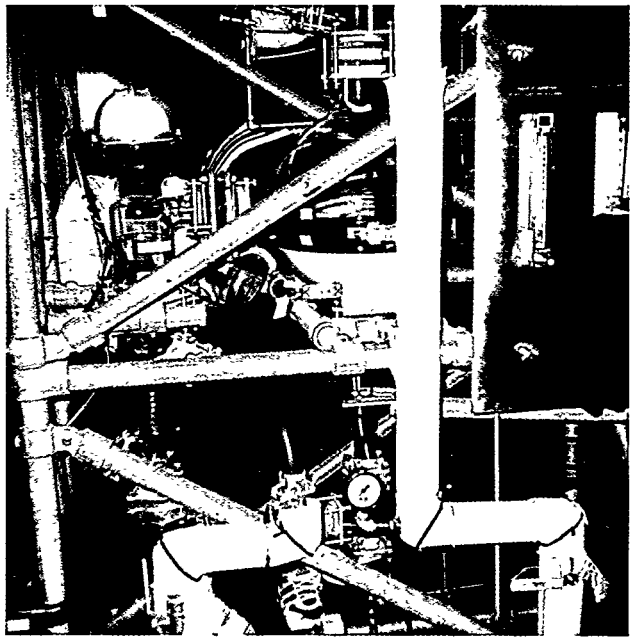
Chancellor of the University

Waste Management Institute

North Carolina A&T State University







CAPABILITIES IN WASTE MANAGEMENT

WM-NCA&TSU

Capabilities In Waste Management (Faculty)

DEPARTMENT OF ANIMAL SCIENCE

Diseases of Animals:
G.A. Johnson, M.S., D.V.M.

Environmental Biotechnology:
J. Allen, B.S., M.S., Ph.D.

Animal Diseases:
T. L. Hanner, B.S., D.V.M.

Radioactive Tracers/Physiology:
R. McKinnie B.S., M.S., Ph.D.

Pathology/Animal Diseases:
D. Norford, B.S., DVM, M.S., Ph.D.

Environmental Toxicology:
L. Ogden, DVM, B.S., M.S., Ph.D.

Poultry Diseases:
W. Willis, B.S., M.S., Ph.D.

DEPARTMENT OF NATURAL RESOURCES

Land Appl. Of Agricultural Waste, and Waste Water Management:
G. A. Gayle, B.S., M.S., Ph.D.

Agri. Waste Utilization/Composting:
C. W. Raczkowski, B.S., M.S., Ph.D.

Xenobiotic Chemicals Biodegradation; Site Assessment; and Bioremediation:
G. B. Reddy, B.S., M.S., Ph.D.

Land Applcation of Wastes; Waste Water Treatment, and Heavy Metals:
M.R. Reddy, B.S., M.S., Ph.D.

Bioprocessing/Alternate Energy:
A. Shahbazi, B.S., M.S., Ph.D.

Waste Site Selection and Characterization:
G. A. Uzochukwu, B.S., M.S.,Ph.D.

DEPARTMENT OF BIOLOGY

Aquatic Ecology and Toxicology:
D. W. Aldridge, B.S., M.S., Ph.D.

Altered Envir. and Insect Development:
J. Bennett, B.S. M.S., Ph.D.

Envir. Impacts and Plant Populations:
R. Coomans, B.S., Ph.D.

Viral Diseases of Aquatic Animals and Environmental Estrogens:
D. B. Foushee, B.S., M.S., Ph.D.

Organic Solvents and Microbial Ecosystems:
T. L. Jordan, B.A., M.S., Ph.D.

Molecular Biology and Epidemiology of Bacterial Pathogens:
B. McKnight, B.S., M.A., Ph.D.

Envir. Effects and Arthropod/Mammalian Populations:
J. White, B.S., M.A., Ph.D.

Envir. Regulation and Microbial Protein Synthesis:
J. J. Whittaker, A.B., Ph.D.

DEPARTMENT OF CHEMISTRY

Environmental Contaminants:
W. K. Adeniyi, B.S., M.S., Ph.D.

Precollege Outreach Programs:
V. Guthrie, B.S., M.S., Ed.D.,

Water Pollution:
J. V. Kumar, B.S., Ph.D.

Radioisotopes:
L. M. Jordan, B.S. M.A., Ph.D.

Radioactive Waste/Tracers; Heavy Metal Interactions:
A.K. Mohammed, B.S., Ph.D.

Trace Metals:
A. N. Williamson, B.S., Ph.D.

DEPARTMENT OF HISTORY

Waste Geography:
D. S. Mason, A.B., M.A., Ph.D.

Environmental History:
P. V. Meyers, B.A., M.A., Ph.D.

DEPARTMENT OF PHYSICS

Theoretical Analyses:
S. K. Mtingwa, B.S., M.S., Ph.D.

Experimental Physics:
E.S. Williams, B.S. M.S. Ph.D.

DEPARTMENT OF SOCIOLOGY/SOCIAL WORK

Sociological Theory of Toxic Waste Dumps:
R. Davis, B.S., M.A., Ph.D.

The Impact of the Environment on the Family:
S. Kirk, B.A., M.S.W., M.S., Ph.D.

DEPARTMENT OF BUSINESS ADMINISTRATION

Environmental Policy:
C. A. Archibong, B.S., M.B.A., Ph.D.

Resource Management and Environmental Economics:
M. N. Johnson, B.S., M.A., M.B.A., D.B.A.

Marketing Issues in Waste Management
J. Nkonge, B.A., M.B.A., Ph.D.

Hazardous Working Environment:
D. H. Pogue, B.A., M.A., Ph.D.

Environmental Policy:
I. O. Ugboro, B.S., M.B.A., Ph.D.

DEPARTMENT OF CONSTRUCTION MGT. & SAFETY

Safety Management:
H. Carter, Sr., B.A. M.S. Ph.D.

Applications of Ozone Technology for Air and Water Pollution:
R. Pyle, B.A., M.A.

Safety Management:
D. T. Shah, B.E., M.S. Ph.D.

Safety Management:
M. Taggert, B.S., M.S., M.P.H., Ph.D.

DEPARTMENT OF ARCHITECTURAL ENGINEERING

Energy and the Environment:
P. Rojeski, Jr., P.E., B.S., M.S., Ph.D.

DEPARTMENT OF CHEMICAL ENGINEERING

Bioremediation; Water and Waste Water Treatment:
S. Ilias, B.S., M.S., Ph.D.

Solar detoxification; Mineral Processing:
V. N. Kabadi, B.ChE., M.S., Ph.D.

Nuclear Waste Disposal Site Characterization:
F. G. King, B.S., M.S., M.Ed, D.Sc.

Bioremediation of Waste Sites:
K. Schimmel, B.S., M.S., Ph.D.

Sludge Suspension:
G. B. Tatterson, B.S., M.S., Ph.D.

Supercritical Water Oxidation; Physical Separations:
G. L. White, B.S., M.S., Ph.D.

Hazardous Waste Destruction and Management; Solid Waste Management:
Y. G. Adewuyi, B.S. M.S. Ph.D.

DEPARTMENT OF CIVIL ENGINEERING

Waste Materials for Structural Applications:
K. H. Murray, B.S., M.S., Ph.D., P.E.

Waste Water Treatment/Solid and Hazardous Waste Disposal:
S. Y. Chang, B.S., M.S., M.S., Ph.D., P.E.

Debris Disposal; Recycling and Design for Waste Reduction:
R. E. Norris, B.S., M.S., D. Eng., P.E.

Hazardous Waste Transportation/Routing; Waste Facilities Location:
E. U. Nzewi, B.S., Ph.D., P.E.

Underground Storage Design for Low and High Level Nuclear Wastes:
M. R. Salami, B.S., M.E., Ph.D., P.E.

Hazardous Waste Transportation/Routing; Waste Facilities Location:
G. S. Spring, B.S. M.S., Ph.D., P.E.

DEPARTMENT OF ECONOMICS

Agricultural Resource Management:
A. Khan, B.A., M.A., M.A., Ph.D.

Resource Pricing and Optimization:
G. Price, B.S., M.A., Ph.D.

Resource Management:
M. Simmons, B.S., M.A., Ph.D.

DEPARTMENT OF AGRICULTURAL EDUCATION AND ECONOMICS

Environmental Education:
D. M. Lyons, B.S., M.S. Ed.D.

Career Exploration and Environmental Education:
F. O. Walson, B.S., Ed.D.

Environmental Resource Management and Policy:
G. Ejimakor, B.S., M.S., Ph.D.

Sustainable Agriculture:
J. O'Sullivan, B.A., M.S., Ph.D.

Perception of Waste Management Issues/Survey Research of Waste Management Issues:
A. Thompson, B.S., M.S., Ph.D.

DEPARTMENT OF HUMAN ENVIRONMENT AND FAMILY SCIENCE

Waste Water Treatment by Agricultural Byproducts (Peanut Shells and Corncobs):
C. W. Seo, B.S., M.S., Ph.D.

DEPARTMENT OF INDUSTRIAL ENGINEERING

Automated Materials Handling:
B. Ram, B.S., M.S., Ph.D.

Tracking Hazardous Materials by AutoID; Mathematical Modeling for Storage and Transportation of Hazardous Materials, and Quality Control and Compliance to IS 9000:
S. Sarin, B.S., M.S., Ph.D.

Plastic and Rubber Waste Remedial Measures and Recycling:
S. J. Udoka, B.S., M.S., Ph.D.

SCHOOL OF NURSING

Medical Terminology, Bio Disease/Care:
D. Burns, A.D.N., R.N., M.S.N., B.S.N.

Medical Terminology Bio Disease/Care:
E. W. Cooper, B.S.N., M.P.H., MS.Ed., Ed.D.

Medical Terminology, Bio Disease/Care:
C. Henry, B.S.N., M.S.N.

Medical Terminology, Bio Disease/Control and Prevention
M.C. Warren, B.S.N., M.S.

DEPARTMENT OF ELECTRICAL ENGINEERING

Statistical Modeling of Waste Contaminants:
A. Homaifar, B.S., M.S., Ph.D.

Waste Data Acquistion:
P. Lala, M.S., M.S.E., Ph.D.

Expert Systems in Waste Management:
G. Lebby, B.S., M.S., Ph.D.

Expert Systems in Waste Management:
E. E. Sherrod, B.S., M.S.

Analytical Models and Pollution Reduction:
F. S. Vainstein, B.S., M.S., Ph.D.

DEPARTMENT OF MECHANICAL ENGINEERING

Nuclear Energy:
W. J. Craft, B.S., M.S., Ph.D.

Use of Robotics in Waste Management:
S. L. Wang, B.S., M.S., Ph.D., P.E.

SCHOOL OF EDUCATION

Waste Management Education and Outreach:
P. I. Hunter, B.A., M.Ed., Ph.D.

Waste Management Education and Outreach:
K. D. Guy, B.S., M.Ed., Ed.D.

Waste Management Education:
L. Powers, B.S., M.Ed., Ph.D.

DEPARTMENT OF GRAPHIC COMMUNICATIONS SYSTEMS AND TECHNOLOGICAL STUDIES

Waste Minimization/Pollution Prevention:
J. Smink, B.S., M.S., Ed.D.

Waste Minimization/Pollution Prevention:
E. Lord, B.A., M.Ed., Ph.D.

Capabilities In Waste Management (Equipment)

- Gidding Soil Probe
- High Performance Liquid Chromatography (HPLC)
- GBC Atomic Absorption Spectrophotometer with Graphite Furnace
- Surface Area Analyzer
- Dohrman Total Organic Carbon Analyzer
- Varian E109B Electron Spin Resonance Spectrophotometer
- Guilford Response UV Visible Spectophotometer
- Perkin Elmer Diode Array Spectrophotometer (Complete with P.E. Data Station)
- EG&G PARR Electrochemistry System
- Pine Instruments Four Electrode Bi-Potentiostat with RDE & RRDE
- Hewlett Packard 5780 Gas Chromatograph with Mass Spectrophotometer
- Matson Instruments Cygnus 100 FT-IR Spectrophotometer
- Hewlett Packard 5880 Gas Chromatograph
- Carlo Erba Elemental Analyzer
- Matson Galaxy 20/20 FTIR
- Perkin Elmer Atomic Absorption Spectrophotometer
- pH Meter
- Micro-Oxymax Respirometer
- Conductivity Meter
- Biological Oxygen Demand Meter
- Auto Analyzer II
- Nuclear Magnetic Resonance Spectrometer (NMR)
- Gas Chromatograph-Mass Spectrometer
- X-ray Diffraction Unit
- Seismic Station
- Electron Microscopes
- Optical Microscopes
- GIS/RS Computer Workstations

WM-NCA&TSU

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For detailed information about
The WMI at North Carolina A&T State University, contact:
Dr. Godfrey A. Uzochukwu, Director
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- Environmental Safety & Health Training
- Environmental Safety & Risk Assessment
- Underground Storage Facility Management
- Environmental Monitoring — Air/Land/Water
- Storm Water Management & Permitting — NPDES
- Remedial Investigations & Feasibility Studies (RI/TS)
- Hazardous, Radioactive & Mixed Waste Management
- Environmental Equity Investigations & Support Services
- RCRA Facility Investigations/Corrective Measures Studies (RFI/CMS)

Support Services

- Underground Storage Tank Assessments
- Air Permitting
- Waste Minimization Studies
- Mixed Waste Characterization
- Hazardous Waste Site Management
- Storm Water Run-Off Permitting
- Visible Emissions Evaluations
- NPDES Permitting
- RCRA Compliance & Permitting
- CERCLA/SARA Compliance & Assessments
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- Remedial Investigations
- Risk Assessments
- Emergency Planning, Training, & Exercises
- Safety and Transportation Regulatory Compliance & Assessment
- Radiological and Hazardous Materials Response Training
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OBSERVING SYSTEM

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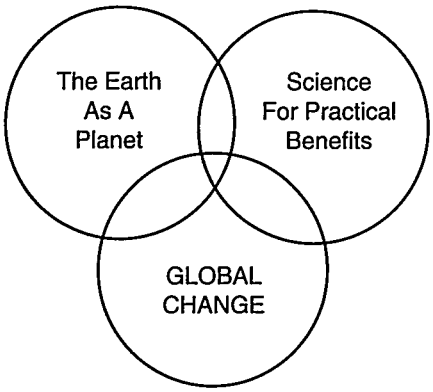

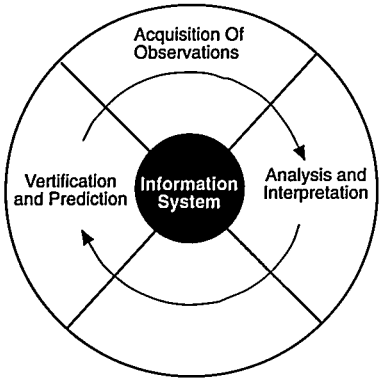

- Geographic Information System (GIS) and Remote Sensing (RS) Technologies for management of natural resources and environmental protection.
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- Communications of GIS and RS data to users in a meaningful form.
- Earth System Science Instruction and Community Outreach.

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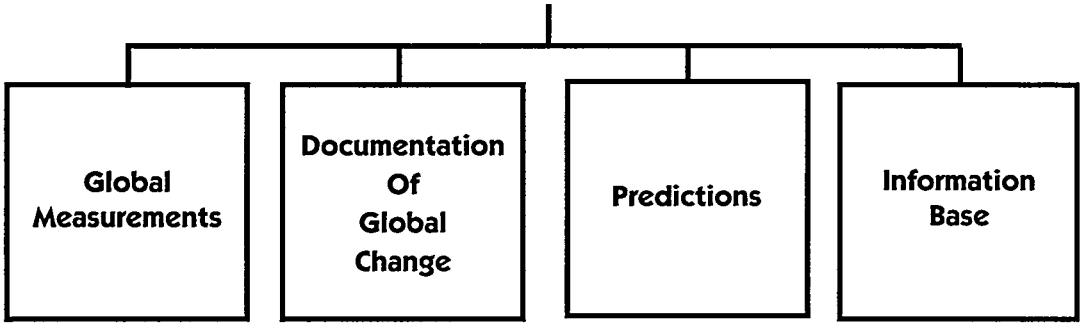

For More Information Curriculum And Financial Aid

EASC Curriculum
Department of Natural Resources and Environmental of Design
NC A&T State University
Greensboro, N.C. 27411
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Water Resources Engineering
Department of Civil Engineering
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NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY
OFFICE OF THE REGISTRAR

APPLICATION FOR A WASTE MANAGEMENT CERTIFICATE
WASTE MANAGEMENT INSTITUTE

Degree	Completed	Expected
Bachelor of Arts	_____	_____
Bachelor of Fine Arts	_____	_____
Bachelor of Science	_____	_____
Bachelor of Social Work	_____	_____
Master of Arts	_____	_____
Master of Science	_____	_____
Doctor of Philosophy	_____	_____

I wish to complete the requirements for a waste management certificate:
____ Fall ____ Spring ____ First Summer ____ Second Summer 19 ____

I understand that to earn a certificate in waste management for the semester/summer indicated above, I must have completed a minimum of 18 credit hours of approved waste management/ related courses, and have a minimum GPA of 2.0.

List of waste management courses completed:_____
_____
_____

Total Credit Hours: _____ GPA: _____

List of waste management courses in progress this semester: _____
_____

Total Credit Hours: _____

Name: _____
Print full given name which will appear on your certificate

School/College: _____
Agric., Arts & Sci., Educ., Bus. & Econ., Engr., Nurs., Technology

Major: _____

Local Address: _____ Local Phone Number: _____
City and State/Zip Code

Home Address: _____ Zip Code: _____
City and State

Home Phone Number: _____

Have you applied for graduation? ___ *Yes* ___ *No*

Students will receive the certificate upon the conferring of the degree.

Signed: _____ Date: _____

FALL 1997 APPLICATION DEADLINE: OCTOBER 24, 1997

WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES, FALL 1997

AGEC-300-01***	PRIN RURAL SOCIOLOGY
AGEC-638-01***	SPEC PROB AGRI ECON
AGED-300-01***	INTRO/INTERNATIONAL AG
AGEN-213-01***	GEOG INFO SYS/ENG&NARS
AGEN-304-01**	STRUCTURE ENVIRONMENT
AGEN-401-01**	SURVEY/PRACTICES/PRIN
AGEN-410-01**	GENERAL HYDROLOGY
AGEN-520-01***	SENIOR SEMINAR
AGEN-600-01**	CONS/DRAINAGE/IRRIGAT
AGEN-602-01***	SPECIAL PROB IN AG ENG
ANSC-637-01**	ENVIRONMENTAL TOXICOL
ANSC-665-01***	BIOTECHNOLOGY
AREN-442-01**	FUND ILLUMINATING ENG
AREN-462-01**	HVAC SYSTEMS CONCEPTS
AREN-581-01***	SENIOR SEMINAR
AREN-672-01**	ENERGY CONSERV BLDG
BIOL-221-01**	GENERAL MICROBIOLOGY
BIOL-310-01**	ECOLOGY
BIOL-468-01**	BIOL TECH & ETHICS I
BIOL-620-01**	FOOD MICROBIOLOGY
BAUD-537-01***	INTERNATIONAL MKT
BAUD-538-01***	MARKETING RESEARCH
CHEM-221-01**	ORGANIC CHEMISTRY I
CHEM-222-01**	ORGANIC CHEMISTRY II
CHEM-223-01**	ORGANIC CHEM I LAB
CHEM-224-01**	ORGANIC CHEM II LAB
CHEM-503-01***	CHEMICAL RESEARCH
CHEN-430-01**	PROCESS DESIGN I
CHEN-450-01**	SENIOR SEMINAR
CHEN-510-01***	INDEP STUDY CHEM ENG
CHEN-625-01**	BASIC FOOD PROC ENGIN
CIEN-310-01**	ENVIORON ENGINEERING
CIEN-311-11**	ENVIRON ENGIN LAB
CIEN-321-11**	GEOTECH ENG LAB
CIEN-330-01**	CONSTRUCTION MATERIALS
CIEN-520-01**	GEOTECH ENGINEERING II
CIEN-560-01***	WATER RES ENGR DSGN
CIEN-616-01**	SOLID WASTE MANAGEMENT
CIEN-699-02***	SPECIAL PROJECTS
CM-320-01**	CONSTRUCTION SAFETY
CM-690-01***	SPECIAL PROBLEMS IN CM
EASC-201-01**	EARTH-MAN'S ENVIRNMT
EASC-616-01**	ENV PLAN/NAT RES MANAG
EASC-622-01**	ENV PLANNING/WASTE MAN
EASC-627-01**	STRATEGIES OF CONSERVA
EASC-666-01**	EARTH SYSTEM SCIENCE
ECT-599-01***	INDEPENDENT STUDY
ECT-690-01***	SPEC PROBLEMS IN TECH
ELEN-430-01**	POW SY EN CON EL MA
ELEN-636-01**	BAL POW SYST/STEADY ST
GCS-668-01***	INDEPENDENT STD IN INED
GEEN-666-01***	SPECIAL PROJECTS
GEOG-200-01***	PRINCIPL OF GEOGRAPHY
HIST-633-01***	INDEPENDENT STUDY HIST
HORT-608-01***	SPECIAL PROB IN HORTICUL
INEN-240-01**	INDUS PROD PROCES DSGN
INEN-255-01**	METHODS ENGINEERING

WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES, FALL 1997

INEN-260-01***	ENGR ECON ANALYSIS
INEN-270-01***	ENGIN STATISTICS I
INEN-325-01**	QUALITY CONTROL
INEN-330-01**	DETER MODEL OPER RESR
INEN-360-01***	ENGR COST MGT CONTROL
INEN-618-01**	TOTAL QUALITY IMPROVE
INEN-621-01***	ENGIN COST CONT & ANAL
INEN-645-01***	ADV FACILITIES DESIGN
INEN-664-01**	HUMAN PERF RISK/SYS SAF
LASC-261-01**	MEDICAL TERMINOLOGY
LASC-365-01**	BIOL DIS & CARE LASC
LASC-462-01**	PRIN OF MEDICAL SCIENCE
LDAR-240-01**	BASIC LDSCP DESIGN I
LDAR-500-01***	SPC PROB LANDSC ARCH
MEEN-444-01***	UNDERGRADUATE PROJECT
MEEN-567-01**	ENVIORNMENTAL CONTROL
MFG-599-01***	INDEPENDENT STUDY
MFG-610-01***	PROBSOLVING IN MFG TECH
NARS-520-01***	SEMINAR PLANT SCI TECH
NURS-320-01***	HEALTH ASSESSMENT
NURS-510-01***	COMMUNITY HEALTH NURS
NURS-516-01***	INDEPENDENT STUDY
OSH-201-01**	INTRO TO OSH
OSH-311-01**	INDUS ACCIDENT PREVENT
OSH-312-01**	ACC PREV ANALY& RECORD
OSH-393-01**	SAFETY MANAGEMENT
OSH-411-01**	HAZ MAT FOR SAF PROF
OSH-413-01**	INDUSTRIAL HYGIENE I
OSH-416-01**	INDUSTRIAL HYGIENE II
PHYS-406-01***	INTRO MODERN PHYSICS
PHYS-500-01***	SPECIAL TOPICS IN PHYS
PHYS-550-01***	UNDERGRAD RESEARCH
PSYC-445-01***	INDUSTRIAL PSYCH
PSYC-644-01***	APP HEALTH PSYCHOLOGY
SLSC-338-01**	FUND OF SOIL SCIENCE
SLSC-633-01**	SOIL GENESIS & LAND USE
SOSW-670-01***	LAW AND SOCIETY
TRAN-650-01***	TRANSPORTATION LAW
TRAN-670-01***	MATERIALS MANAGEMENT

* Graduate Students Only

** Waste Management Certificate Courses

*** Possible Waste Management Topics/Projects

STUDENTS: PLEASE SEE YOUR ADVISOR!

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Director of Waste Management Institute
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uzo@garfield.ncat.edu

WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES
FALL 1996

WMI - NCA&TSU

AGEC-599-01***	INDEPENDENT STUDY I
AGEC-638-01***	SPEC PROB AGRI ECON
AGEC-732-01*	AGRIC POLICY
AGED-664-01***	OCCUP EXPL MID GRDS
AGEN-304-01**	STRUCTURES ENVIRNMNT
AGEN-410-01**	GENERAL HYDROLOGY
AGEN-600-01**	CONS/DRAIN/IRRIGATION
ANSC-637-01**	ENVIRONMNT TOXICOLOGY
ANSC-665-01**	BIOTECHNOLOGY
ANSC-708-01*	SP PROB ANIMAL HEALTH
AREN-521-01***	SENIOR SEMINAR
AREN-585-01***	SENR PROJ:DESIGN DEV.
AREN-611-01**	ENERGY CONSRVATIN BLDG
AREN-666-01***	SP PROJ:ELECT SYS II
AREN-666-02***	SPECIAL PROJECTS
AREN-789--01***	SPECIAL TOPICS
BIOL-310-01**	ECOLOGY
BIOL-468-01**	BIOL.TECH & ETHICS I
BIOL-701-01*	SEMINAR BIOLOGY
BUAD-461-01***	LEGAL ENVIR OF BUS
BUAD-462-01***	BUSINESS LAW
BAUD-538-01***	MARKETING RESEARCH
CHEM-503-01***	CHEMICAL RESEARCH
CHEM-661-01***	CHEMICAL INSTRUCTION
CHEN-430-01***	PROCESS DESIGN 1
CHEN-450-01***	SENIOR SEMINAR
CHEN-500-01***	CHEM ENGIN SEMINAR
CHEN-505-01**	MIXING & SCALE-UP
CHEN-510-01***	INDEP STUDY CHEM ENG
CHEN-620-01***	ADV CHEN ANALYSIS
CIEN-310-01**	ENVIRONMENT ENGINEER
CIEN-311-11**	ENVIRONMENT ENGIN LAB
CIEN-401-01***	SENIOR SEMINAR
CIEN-520-01**	GEOTECH ENGINEERIN II
CIEN-560-01**	WATER RES ENG DESGN
CIEN-616-01**	SOLID WASTE MNGT
CIEN-699-02***	SPECIAL PROJECTS
CM-320-01**	CONSTRUCTION SAFETY
CM-599-01**	INDEPENDENT STUDY
CM-690-01**	SPEC PROBLEMS IN CM
CUIN-415-01***	CURR. DESGN & INST. PLN
CUIN-513-01***	STRAT TCH SC ELEM SCH
EASC-201-01**	EARTH-MAN'S ENVIRNMT
EASC-616-01**	ENV PLAN/NAT/RES MAN
EASC-622-01**	ENV PLANN/WASTE MAN
EASC-622-11**	LABORATORY
EASC-627-01**	STRATEGIES OF CONSER.
EASC-666-01**	EARTH SYSTEM CONSERVATI
ECT-599-01***	INDEPENDENT STUDY
ECT-690-01***	SPECIAL PROBLEMS TECH
ELEN-666-01***	SPECIAL PROJECTS
GCS-668-01***	INDEPENDENT STD INE
GEEN-660-03***	SPECIAL PROJECTS
GEEN 666-01***	SPECIAL PROJECTS
GEEN-789-05*	GEOGRAPHY INFO SYS
GEOG-200-01***	PRIN. OF GEOGRAPHY
HEFS-612-01***	SENIOR SEMINAR
HEFS-637-01***	SPEC. PROB. FD. NUT F. SC
HIST-633-01***	INDEPENDENT STUDY HST
INEN-489-01***	INDUST ENGR SEMINAR
INEN-660-01***	SPEC TOPICS/SEMINAR
INEN-664-01**	INDUSTRIAL SAFETY
LASC-261-01**	MEDICAL TERMINOLOGY
LASC-365-01**	BIOL.DISASES&CRE LASC
LASC-462-01**	PRIN. MEDICAL SCIENCE
LASC-569-01***	SEMINAR IN LASC
MEEN-226-01***	MANUFACTURING PROCESS
MEEN-444-01***	UNDERGRADUATE PROJECT
MEEN-562-01***	HEAT TRANSFER
MEEN-660-02***	SPECIAL TOPICS IN ENG
MEEN-733-01*	RADIATION
MEEN-766-01*	ADVANCE PROJECTS
MEEN-789-02*	SPECIAL TOPIC
MFG-191-01***	INTRO MFG PROCESSES
MFG-293-01***	POWER TECHNOLOGY
MFG-300-01***	TECHNOLOGY SEMINAR
MFG-610-01***	PROB SOLVING MFG TECH
MFG-690-01***	SPEC PROBLEMS MFG SYS
NARS-520-01***	SEM PLANT SCI TECH
NURS-320-01***	HEALTH ASSESSMENT
OSH-212-01**	INTRO OCCUP SAFE HLTH
OSH-311-01**	INDUST. ACCIDENT PREVENT
OSH-312-01**	ACCD.PREV.ANAL&RECORD
OSH-312-11**	LABORATORY
OSH-393-01**	SAFETY MANAGEMENT
OSH-411-01**	HAZ MAT FOR SAF PROF
OSH-411-11**	LABORATORY
OSH-413-01**	INDUSTRIAL HYGIENE I
OSH-413-11**	LABORATORY
OSH-513-01**	HUMAN FACTORS
OSH-514-01***	INDUSTRIAL RELATIONS
PHYS-468-01**	NUCLEAR PHYS/ELEM PRT
PHYS-500-01***	SPECIAL TOPICS PHYS
PHYS-510-01***	PHYSICS SEMINAR
PHYS-550-01***	UNDERGRADUATE RESEARCH
POLI-643-01***	URBAN POL GOVERNMENT
PSYC-420-01***	SOCIAL PSYCHOLOGY
PSYC-440-02***	INTRO PSYC RESEARCH
PSYC-445-01***	INDUSTRIAL PSYCH
PSYC-500-01***	INDEPENDENT STUDY
PSY-542-01***	SEMINAR PSYCHOLOGY
PSYC-500-01	INDEPENDENT STUDY
SLSC-717-11*	METHODOLOGY SOIL&PLANT
SOCI-408-01***	INDEPENDENT STUDY I
SOCI-525-01***	INDEPENDENT STUDY
TRAN-670-01***	MATERIALS MANAGEMENT

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WASTE MANAGEMENT INSTITUTE
SPRING 1997 INTERDISCIPLINARY COURSES

AGEC-440-01	RESOURCE ECONOMICS**
AGEC-632-01	INTERNATIONAL AGRICULT***
AGEC-730-01	RURAL DEVELOPMENT*
AGED-607-01	ENVIRONMENTAL EDUC**
AGED-665-01	OCCUP EXPL M-G AG OC***
AGEN-303-01	POWER AND MACHINERY**
AGEN-523-01	ALTER ENE SYS/BIOL PRO**
AGEN-602-01	SPECIAL PROB IN AG ENG***
AGEN-624-01	WATER RESOURCES ENGIN***
ANSC-413-01	SANIT&DIS FARM ANIMALS**
ANSC-641-01	DISEASE MGM'T LIVESTCK**
ANSC-665-01	BIOTECHNOLOGY***
ANSC-701-01	TOPICS-ANIMAL HEALTH*
ANSC-708-01	SP PROB ANIMAL HEALTH*
AREN-221-01	BLD SANIT/FIR PROC**
AREN-361-01	HVAC PRINCIPLES**
AREN-430-01	STURCT ENG DESIGN I***
AREN-445-01	ELEC SYS BUILDING I***
AREN-586-01	SR PROJ:CONTRACT DOCMN***
AREN-633--01	FOUNDATIONS & SOILS***
AREN-675-01	ENERGY MNGNT BUILDN**
AREN-739-01	DSGN BLD WIND & EARTHQK*
AREN-778-01	ENERGY MAINT MGMT*
AREN-788-01	MASTER'S PROJECT*
BIOL-221-01	GENERAL MICROBIOLOGY***
BIOL-621-01	SOIL MICROBIOLOGY***
BIOL-642-01	SPEC PROB IN BIOLOGY***
BIOL-700-01	ENVIRONMENTAL BIO*
BUAD-430-02	MARKETING CONCEPTS***
BUAD-461-01	LEGAL ENVIR OF BUS***
BUAD-520-04	STRATEGIC MANAGEMENT***
BAUD-537-01	INTERNATIONAL MKT***
BAUD-538-01	MARKETING RESEARCH***
CHEM-221-01	ORGANIC CHEMISTRY I***
CHEM-222-01	ORGANIC CHEMISTRY II***
CHEM-223-01	ORGANIC CHEM I LAB***
CHEM-224-01	ORGANIC CHEM II LAB***
CHEM-503-01	CHEMICAL RESEARCH***
CHEM-504-01	INDEPENDENT STUDY***
CHEM-702-01	CHEMICAL RESEARCH***
CHEN-450-01	SENIOR SEMINAR***
CHEN-500-01	CHEM ENGIN SEMINAR***
CHEN-510-01	INDEP STUDY CHEM EN***
CHEN-645-01	ENVIRONMENTAL REMED**
CIEN-320-01	GEOTECHNICAL ENG I***
CIEN-360-01	HYDROLOGY***
CIEN-510-01	ENVIRONM ENGR DESIGN**
CIEN-614-01	STR WAT QUAL MODEL**
CIEN-670-01	CONST ENGR & MGMT***
CM-599-01	INDEPENDENT STUDY***
CM-690-01	SPECIAL PROBLEMS CM***
CUIN-415-01	CURR DESIGN & INS PLAN***
CUIN-562-01	SEMINAR IN ELEM EDUC***
EASC-201-01	EARTH-MAN'S ENVIRNMT**
EASC-309-01	ELEMENTS PHY GEOLOGY***
EASC-627-01	STRAT OF CONSERVAT**
EASC-699-01	ENVIRON PROBLEMS**
ECON-525-01	ECONOMICS SEMINAR***
ECT-599-01	INDEPENDENT STUDY***
ECT-690-01	SPECIAL PROBLEMS TECH***
ELEN-436-11	POWER SYS ENE CONV**
ELEN-666-01	SPECIAL PROJECTS***
GCS-668-01	INDEPENDENT STD INED***

WMI - NCA&TSU

GEEN-655-01	INDUSTRIAL ECOLOGY**
GEEN-666-01	SPECIAL TOPICS***
GEEN-660-03	SP TOP: EROSION/WATER***
GEEN-666-03	SPECIAL PROJECTS***
GEOG-641-01	TOPICS IN WORLD GEOG***
HEFS-643-01	FOOD PRESERVATION***
HEFS-730-01	NUTRITION AND DISEASE*
HIST-220-01	HIST SCIENCE & TECH***
HIST-633-01	INDEPENDENT STUDY HIST***
INEN-489-01	INDUST ENGR SEMINAR***
INEN-632-01	ROBOT SYS & APPLICA***
INEN-635-01	MAT HANDLING SYS DESIGN***
LASC-261-01	MEDICAL TERMINOLOGY**
LASC-636-01	PRIN TOXICOLOGY**
LDAR-102-01	ENVIRON DSGN ETHIC**
LDAR-230-01	ENVIRONMENTAL ECOLOGY**
LDAR-441-01	ADV LDSCP ARC DES II***
MEEN-444-01	UNDERGRADUATE PROJECT***
MEEN-474-01	ENGINEERING DESIGN***
MEEN-544-01	SPECIAL TOPICS***
MEEN-660-01	SPECIAL TOPICS IN ENG***
MFG-300-02	TECHNOLOGY SEMINAR***
MFG-470-01	INDUST MATERIALS/PROCS***
MFG-599-01	INDEPENDENT STUDY***
MFG-651-01	PRIN OF ROBOTICS**
MFG-690-01	SPEC PROBLEMS MFG SYS***
NARS-520-01	SEMINAR***
NURS-320-03	HEALTH ASSESSMENT***
NURS-504-01	NURSING RESEARCH***
NURS-510-02	COMMUNITY HEALTH NURS***
NURS-516-01	INDEPENDENT STUDY***
OSH-312-01	ACCD PREV ANAL&RECORD**
OSH-393-01	SAFETY MANAGEMENT**
OSH-411-01	HAZ MAT FOR SAF PROF**
OSH-413-01	INDUSTRIAL HYGIENE I**
OSH-414-01	PRIN FIRE PREV PROTEC**
OSH-415-01	STANDARDS & REG IN OSH**
OSH-516-01	OSH MANAGEMENT**
OSH-517-01	MATERIALS HANDLING**
PHYS-406-01	INTRO MODERN PHYSICS***
PHYS-550-01	UNDERGRAD RESEARCH***
POLI-504-01	INDEDEPENDENT STUDY***
POLI-653-01	URBAN PROBLEMS***
PSYC-500-01	INDEPENDENT STUDY***
PSYC-542-01	SEMINAR PSYCHOLOGY***
SLSC-621-01	SOIL MICROBIOLOGY***
SLSC-632-01	SOIL PHYSICS***
SLSC-633-01	SOIL GENESIS & LAND***
SLSC-634-01	SOIL ENVIRONMENT CHEM**
SOCI-408-01	INDEPENDENT STUDY I***
SOCI-525-01	INDEPENDENT STUDY***
TECH-510-01	RESEARCH/DEV TECH SYS***
TRAN-660-01	NATION TRANS POLICY***

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WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES
FALL 1995

WMI - NCA&TSU

AGED-599-0***	INDEPENDENT STUDY
AGEC-638-01***	SPEC PROB AGRI ECON
AGEC-732-01*	AGRIC POLICY
AGED-502-01***	STUDENT TEACHING
AGED-664-01***	OCCUP EXPL MID GRDS
AGED-700-01*	SEMINAR
AGED-750-01*	COMMUNITY PROBLEMS
AGEN-410-01	GENERAL HYDROLOGY
AGEN-701-01*	SOIL & WATER CONS ENG
ANSC-637-01**	ENVIRN. TOXICOLOGY
AREN-331-01***	ARCHITECTURAL DESGN I
AREN-331-02***	ARCHITECTURAL DESIN I
AREN-431-01***	ARCH DESIGN III
AREN-521-01***	SENIOR SEMINAR
AREN-611-01**	ENERGY CONSRVATIN BLD
AREN-666-01***	SPECIAL PROJECTS
AREN-731-01*	GRADUATE SEMINAR
AREN-776-01*	GRADUATE PROJECT
AREN-789--01*	SPECIAL TOPICS
BIOL-468-01**	BIOL. TECH & ETHICS
BIOL-701-01*	SEMINAR BIOLOGY
BUAD-462-01***	BUSINESS LAW
BUAD-520-01***	BUSINESS POLICY
BAUD-538-01***	MARKETING RESEARCH
CHEM-503-01***	CHEMICAL RESEARCH
CHEM-661-01***	CHEMICAL INSTRUCTION
CHEM--701-01*	SEMINAR
CHEM-702-01*	CHEMICAL RESEARCH
CHEN-430-01***	PROCESS DESIGN I
CHEN-500-01***	CHEM ENGIN SEMINAR
CHEN-510-01***	INDEP STUDY CHEM ENG
CHEN-520-01***	FUEL & PETROCHEMICALS
CIEN-310-01**	ENVIRONMENT ENGINEER
CIEN-311-11**	ENVIRONMENT ENGIN LAB
CIEN-401-01***	SENIOR SEMINAR
CIEN-550-01***	TRANSPORTATION DESGN
CIEN-560-01***	WATER RES ENG DESGN
CIEN-616-01**	SOLID WASTE MNGT
CIEN-620-01***	FOUNDATIONS DSGN I
CIEN-699-02***	SPECIAL PROJECTS
CM-593-01**	SAFETY MANAGEMENT
CM-599-01***	INDEPENDENT STUDY
CM-690-01***	SPEC PROBLEMS IN CM
COMP-600-01***	SPEC. TOPICS COMP SC
COMP-691-01***	INDEPENDENT STUDY
COMP-790-01*	SPEC TOPICS
CUIN-415-01***	CURR. DESGN & INST. PLN
CUIN-720-01*	CURR DEVELOPMENT
CUIN-790-01*	SEMINAR EDUC PROB
EASC-201-01**	EARTH-MAN'S ENVIRNMT
EASC-616-01**	ENV PLAN/NAT/RES MAN
EASC-622-01**	ENV PLANN/WASTE MAN
EASC-627-01**	STRATEGIES OF CONSER.
ECON-300-01***	MICROECONOMICS
ECT 599***	INDEPENDENT STUDY
ECT 690***	SPECIAL PROBLEMS TECH
ELEN-436-11***	POWER SYS ENE CONV
ELEN-788--01*	MASTERS PROJECT
GCS-668-01***	INDEPENDENT STD INED
GEEN-660-03***	SPECIAL PROJECTS
GEEN 666-01***	SPECIAL PROJECTS
GEEN-788-01*	RESEARCH
GEEN-789-03*	SPEC. TOPICS IN CHEN
HDSV-707-01*	RESEARCH SEMINAR
HEFS-612-01***	SENIOR SEIMINAR
HEFS-618-01***	FOOD TECHNL SEMINAR
HEFS-637-01***	SPC. PROB., FD. NUT. FD. SC
HEFS-730-01*	NUTRITION AND DISEASE
HIST-210-01***	WORLD REGIONAL GEOG
HIST-633-01***	INDEPENDENT STDY HIST
HORT-608-01***	SPECIAL PROB HORTICU
INEN-245-01***	IND PRO PROC DSGN LAB
INEN-489-01***	INDUSTR ENGR SEMINAR
INEN-490-01***	DESIGN PROJECT INEN I
INEN-495-01***	DSGN PRJECT IN IE - II
INEN-789-01*	SPEC TOPCIS SEMINAR
LASC-261-01**	MEDICAL TERMINOLOGY
LASC-462-01**	PRIN, MEDICAL SCIENCE
LASC-569-01***	SEMINAR IN LASC
LDAR-240-01***	BASIC LDSCP DESIGN I
LDAR-440-01***	ADV LNDSCP DESIGN I
LDAR-500-01***	SP PRO LANDSCAPE ARCH
MEEN-444-01***	UNDERGRADUATE PROJECT
MEEN-474-01***	ENGINEERING DESIGN
MEEN-544-01***	SPECIAL TOPICS
MEEN-562-01***	HEAT TRANSFER
MEEN-565-01***	DSGN MACHINE ELEMENTS
MEEN-566-01***	DESIGN THERMAL SYSTEM
MEEN-572-01***	MECHANCIAL ENG SEMINR
MEEN-619-01***	COMP-AIDED GRAPH DES
MEEN-660-01***	SPECIAL TOPICS IN ENG
MEEN-789-03*	SPECIAL TOPIC
MFG-599-01***	INDEPENDENT STUDY
MFG-690-01***	SPEC PROBLEMS MFG SYS
MFG-790-01*	MASTER'S PROJECT
NARS-520-01***	SEM PLANT SCI TECH
NARS-720-01***	GRADUATE SEMINAR
NURS-504-01***	NURSING RESEARCH
OSH-311-01**	INDUST. ACCIDENT PREV
OSH-411-01**	HAZ MAT FOR SAF PROF
OSH-413-01**	INDUSTRIAL HYGIENE I
PHYS-500-01***	SPECIAL TOPICS PHYS
PHYS-510-01***	PHYSICS SEMINAR
PHYS-550-01***	UNDERGRADUATE RESCH
POLI-643-01***	URBAN POL GOVERNMENT
PSYC-445-01***	INDUSTRIAL PSYCH
PSY-542-01***	SEMINAR PSYCHOLOGY
SLSC-640-01**	WETLAND MANAGEMENT
SOCI-310-01**	MEDICAL SOCIOLOGY
SOCI-408-01***	INDEPENDENT STUDY I
SOCI-525-01***	INDEPENDENT STUDY
SOCI-671-01***	RESEARCH

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WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES
Spring 1995

WMI-NCA&TSU

AGEC-632-01	INTERNAT AGRIC
AGEC-730-01	RURAL DEVELOP
AGED-607-01**	ENVIRON EDUC
AGED-665-01	OCC EXP M-G AG
AGEN-303-01	POWER & MACHIN
AGEN 602-01***	SPECIAL PROBLEMS
AGEN 714-01*	APPLIED HYDROLOGY
ANSC-413-01***	SEMINAR ANI.SCI
ANSC-641-01	DISEA MGM'T LVES
ANSC-701-01*	TOPICS-ANIM HLTH
ANSC-702-01*	SEMI ANIM HLTH
ANSC-708-01*	SP PROB ANIM HLT
AREN-221-01**	BLD SANIT/FIR PRO
AREN-561-01	FOUND & SOIL
AREN-610-01**	ENERGY & ENVIRO
AREN-666-01***	SPECIAL PROJECTS
AREN-734-01*	ENERGY/MNT MGT.
BIOL-621-01	SOIL MICROBIO
BIOL-700-01*	ENVIRO BIOLOGY
BUAD-461-01	LEGAL ENVIR/BUS
BUAD-462-01	BUSINESS LAW
BUAD-520-01	BUSINESS POLICY
CHEM-503-01***	CHEMICAL RESEA
CHEM-702-01*	CHEMICAL RESEA
CHEN-410-01	CHEM ENG LAB II
CHEN-450-01***	SENIOR SEMINAR
CHEN-500-01***	CHEM ENGIN SEM
CHEN-505-02***	SELECT TOPIC/CHE
CHEN-510-01***	IND STDY CHEM E
CIEN360-01	HYDROLOGY
CIEN-510-01**	ENVIR ENGR DESG
CIEN-614-01**	STR WAT QUAL MO
CIEN-620-01	FOUNDAT DESGN I
CIEN-664-01	OPEN CHANN FLO
CM -599-01***	INDEPT STUDY
CM -690-01***	SPEC PROBLS/CM
CUIN-202-01	FILD EXP ORIEN
CUIN-513-01	STRAT TCH/SC ELE
CUIN-562-01	SEMR/ELEM EDUCA
CUIN-720-01*	CURR DEVELOPME
EASC-201-01**	EARTH MAN ENVIR
EASC-309-01	ELE PHY GEOLOGY
EASC-444-01**	EARTH/ENVIR SEM
EASC-625-01	EARTH RESOURCES
EASC-699-01**	ENVIRON PROB
ECON-300-01	MICROECONOMICS
ECON-301-01	MACROECONOMICS
ECON-525-01	ECONOMICS SEMIN
ECT -599-01	INDEPEN STUDY
ECT -690-01***	SPEC PROB TECH
EDLP-651-01	INTRO ADULT ED
ELEN-436-11	POWER SYS EN CO
ELEN-660-01***	SPECIAL PROJECTS
ELEN-666-01***	SPECIAL PROJECTS
ELEN-789-01*	SPECIAL TOPICS
GEEN-666-03***	SPECIAL PROJECTS
GEEN-789-01*	AIR POLLUT CONT
GEEN-789-02*	ENV REMEDIATION
HEFS-604-01	SEMI/HOEC ED
HEFS-631-01	FOOD CHEMISTRY
HEFS-643-01	FOOD PRESERVAT
HEFS-679-01	NUTRITION EDUC
HEFS-730-01*	NUTRI & DISEASE
HEFS-744-01*	SEM/FOOD & NUTR
HIST-200-01	PRIN GEOGRAPHY
HIST-322-01	ECONOMIC GEOG
HIST-633-01***	INDEP STDY HIST
INEN-325-01	QUALITY CONTROL
INEN-489-01	INDUST/ENGR SEM
INEN-490-01***	DESIGN PROJ INEN
LASC-261-01**	MEDICAL TERMINO
LASC-636-01**	GEN TOXICOLOGY
LDAR-102-01	ENVIRON DSGN ET
LDAR-230-01	ENVIRON ECOLOGY
MEEN-260-01	MATERIALS SCIENC
MEEN-444-01	UNDERGRAD PROJ
MEEN-474-01	ENGINEERING DES
MEEN-562-01	HEAT TRANSFER
MEEN-645-11	ALUM PRO DSGN M
MEEN-660-01***	SPECIAL TOPS/ENG
MEEN-733-01*	RADIATION
MEEN-789-02*	SPECIAL TOPIC
MFG -191-01	INTRO MFG PROCE
MFG -300-01	TECH SEMINAR
MFG -470-01	INDUST MATER/PR
MFG -599-01***	INDEPENDENT STU
MFG -651-01***	PRIN/ROBOTICS
MFG -690-01***	SPEC/P/MFG SYS
NARS-720-01*	GRADUATE SEMIN
NURS-320-01	HEALTH ASSESSM
NURS-510-01	COMMU HLTH NUR
NURS-514-01	MNGT/L/HLTH ORG
OSH-311-01**	IND ACCI PREVENT
OSH-312-01**	ACCD/PREV/ANAL
OSH -414-01**	PRIN/FIRE P/PROT
OSH -416-01**	INDUST. HYGIE II
OSH -515-01	EVAL FOR OSH
OSH -516-01**	OSH MANAGEMENT
OSH -517-01**	MATER HANDLG SP
PHYS-406-01	INTRO MODERN PHYS
PHYS-407-01**	NUCLEAR PHYS
POLI-504-01***	INDEPEND STUDY
POLI-653-01	URBAN PROBLEMS
PSYC-320-01	GEN'L PSYC
PSYC-440-01***	INTRO PSYC RESEA
PSYC-500-04***	INDEPENDE STDY
SLSC-632-01	SOIL PHYSICS
SLSC-721-01*	ADV SOIL MICROBI
SLSC-727-01*	SOIL FERT/PL NUT
SOCI-408-01***	INDEPENDT STDY I
SOCI-525-01***	INDEPEND STUDY
SOCI-670-01	LAW & SOCIETY
TECH-211-01	SEM/TECH EDUCA
TECH-510-01***	RESRCH/DEV T SYS
TRAN-360-01	INTRO TRANSPORT
TRAN-660-01	NATION TRANS POL

*Graduate Students Only
**Waste Management Certificate Courses
***Possible Waste Management Topics/Projects
STUDENTS: PLEASE SEE YOUR ADVISOR!

Dr. Godfrey A. Uzochukwu, Professor
Director of Waste Management Institute
Carver Hall Annex
334-7030

WASTE MANAGEMENT INSTITUTE
INTERDISCIPLINARY COURSES
FALL SEMESTER 1994

Course I.D.	Title
AGEC-300	Principles of Rural Sociology
AGED-664	Occup Expl MID Grds
AGED-664	Laboratory
AGEN-304	Structional Environment
ANSC-637	Environmental Toxicology
AREN-611	Energy Conservation
BIOL-221	General Microbiology
BIOL-468	Biol. Tech & Ethics
BUAD-220	Business Environment
BUAD-341	Intro. Mgmt Info System
BUAD-461	Legal Envir. of Business
BUAD-462	Business Law
BUAD-520	Business Policy
CHEM-221	Organic Chemistry
CHEM-222	Organic Chemistry II
CHEM-223	Organic Chem I Lab
CHEM-224	Organic Chem II Lab
CHEM-503	Chemical Research
CHEM-420	Chem Reaction Engineering
CHEM-430	Process Design I
CHEM-605	Biochemical Engineering
CIEN-310	Environment Engineering
CIEN-311	Environment Engineering Lab
CIEN-320	Geotechnical Engineering I
CIEN-612	Environment Engineering Desi
CIEN-662	Water Resource Engineering
CIEN-668	Subsurface Hydrology
CM-190	Mat/Process of Construction
CM-593	Safety Management
EASC-201	Earth-Man's Environment
EASC-616	En Plan/Nat Res Mgmt
EASC-622	Env. Plan/Waste Mgmt
EASC-627	Strategies Conservation
EASC-666	Earth System Science
ECON-300	Microeconomics
ECON-301	Macroeconomics
HEFS-643	Food Preservation
HIST-200	Principles of Geography
HIST-210	World Regional Geography
LASC-261	Medical Terminology
LASC-365	Biol. Disease/Care
LASC-462	Principle of Medical Science
OSH-311	Indust. Accident Prev.
OSH-411	Haz Mat. for Saf Prof
OSH-413	Industrial Hygiene
PSYC-320	General Psychology
PSYC-445	Industrial Psychology
SLSC-338	Fund. of Soil Science
SOCI-310	Medical Sociology
SOCI-670	Law and Society

STUDENTS: PLEASE SEE YOUR ADVISOR!

Dr. Godfrey A. Uzochukwu, Director and Professor
Carver Hall Annex - 334-7030

North Carolina A&T State University

Waste Management Institute

Selected Employment Opportunities in Environmental Sciences and Technologies for majors in Environmental Science, Agricultural and Biosystems Engineering, Earth Science, Chemistry, Chemical Engineering, Biology, Physics, Civil Engineering, Animal Science, Mathematics, Food Sciences and Technology.

- Aerosol, gas, and meteorological measurements
- Velocity and turbulence of air motion
- Monitoring methods for pollutants
- Development of emission standards for mobile sources
- Measurement of particulate matter emissions from fugitive sources
- Measurement of sediment contamination in water systems
- Contribution of pollutants to the water systems
- Evaluation of risks associated with on-site incineration of PCB and metal contaminated soils at hazardous waste sites
- Measurement of the effects of climate change and elevated CO_2 on ecosystems
- Evaluation of sinkhole contribution to groundwater contamination
- Determination of instrument variability in PCB and pesticide analysis
- Validation studies using robot
- Review of hazardous waste disposal procedures and waste reduction efforts
- Determination of nonpoint source water quality issues and concerns
- Strategies for reducing nonpoint source water quality degradation
- Purification of waste solvent by distillation for reuse
- Review of environmental impacts from specific activities
- Assessment of water quality data using statistical analysis
- Development of environmental indicators (biological, ecological, health, etc.) and analysis by Geographic Information System (GIS)
- Review of projects for wetland impacts
- Effects of pesticide exposure on human health
- Measurement of atmospheric deposition of pollutants
- Advanced identification program for protection of aquatic vegetation
- Risk assessment of important environmental chemicals
- Study of environmental processes and effects on aquatic life
- Assessment of effects of pollutants on the environment
- Measurement of sediment-associated reactions of atrazine
- Measurement of relationships between carbondioxide enrichment, ecological responses, and global climate change
- Employment opportunities in computer science and engineering
- Manage your own environmental business

Prepared by the Waste Management Institute: Dr. Godfrey A. Uzochukwu, Director
Carver Hall Annex
(910) 334-7030 • Fax (910) 334-7399 • Email uzo@garfield.ncat.edu

North Carolina A&T State University

Waste Management Institute

Selected Employment Opportunities in Environmental Management and Administration for Major in Business Administration, Business Management, Marketing, Business Education, Economics, Agricultural Economics, Accounting and Business Policy

- Promotion of public health, welfare, and environmental quality
- Assessment of economic damages to ecosystems
- Evaluation of air stationary source compliance training program
- Development of environmental protection programs at State, Tribal, Regional and Local levels of government
- Environmental policy analysis and regulatory development
- Environmental program analysis
- Conduct environmental audits
- Evaluation of environmental performance issues
- Determination of cost-effective measures for controlling pollution
- Preparation of pollution prevention accomplishment reports
- Review and analysis of environmental trade agreements
- Development of technical policies, regulations, and guidelines for pollution control
- Estimation of ecological resources in environmental monitoring and assessment program
- Compilation of toxins release inventory database
- Development of market recyclables using Geographic Information System Technology
- Review of environmental impact statements
- Development of public outreach document for environmental management
- Development of survey instruments for environmental monitoring
- Provide administrative support to environmental programs
- Manage your own environmental consulting business

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North Carolina A&T State University

Waste Management Institute

Selected Employment Opportunities in Environmental Engineering and Computer Science for Majors in Computer Science, Civil Engineering, Chemical Engineering, Industrial Engineering, Architectural Engineering, Electrical Engineering, Mechanical Engineering and Agricultural and Biosystems Engineering:

- Computerization of emission levels of vehicles
- Development of electronic environmental information
- Determination of source loadings, ambient concentrations and partition coefficients for heavy metals in water systems
- Computer programming for public user interface to access large environmental database of information
- Application of data bases to environmental and risk assessments
- Application of remotely sensed data to environmental management
- Development and testing of hypertext system approach for science information, integration, and synthesis
- Employment opportunities in environmental sciences and communications
- Manage your own environmental business

Prepared by the Waste Management Institute: Dr. Godfrey A. Uzochukwu, Director
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North Carolina A&T State University

Waste Management Institute

Selected Employment Opportunities in Environmental Policy, Regulation, and Law for Majors in Business Policy, Business Law, Occupational Safety and Health, and Construction Management and Safety:

- Development of protocol for determine compliance with environmental policies and regulations
- Compilation of survey of environmental regulation
- Interpretation of environmental policies and regulations
- Review and analysis environmental policies and regulations
- Review of environmental policies and regulations designed to protect communities
- Introduction of environmental objectives into early stages of business activities
- Preparation of reports summarizing environmental policies and regulations relevant to environmental protection
- Own and manage your own environmental business

Prepared by the Waste Management Institute: Dr. Godfrey A. Uzochukwu, Director
Carver Hall Annex
(910) 334-7030 • Fax (910) 334-7399 • Email uzo@garfield.ncat.edu

Environmental Stewardship Award

for

EDUCATION

FIRST PLACE

Presented to

NC A&T STATE UNIVERSITY

by the

Greensboro Area Chamber of Commerce

November 21, 1996

Ralph Shelton, Chairman of the Board
Greensboro Area Chamber of Commerce

Peter Reichard, President
Greensboro Area Chamber of Commerce

Henry Gutman, Co-chair
Environmental Affairs Council

Ramona O'Bryant, Co-chair
Environmental Affairs Council

WEDNESDAY'S NEWS TO USE

NEWS & RECORD

Triad B

Wednesday,
Sept. 14, 1994

WILL RECRUIT MINORITIES

A&T gets $1.4 million to study waste handling

● N.C. A&T State University wins a grant to promote waste-handling research.

BY TAFT WIREBACK
Staff Writer

N.C. A&T State University accepted the first part of a $1.4 million grant Tuesday to improve America's waste-handling abilities and to expand the role of minority scientists in that effort.

Thomas Heenan of the U.S. Department of Energy gave the school $262,000 as part of a three-year grant to the university's new Waste Management Institute. The grant also is aimed at bolstering ties to historically black colleges and universities and at interesting more minority students in waste-management careers, he said.

"It's always hard to predict the future, but we look forward to a long-term partnership that will provide us with trained people," said Heenan, assistant manager of environmental restoration and solid waste at the department's Savannah River operations office in Aiken, S.C.

The new institute seeks to improve disposal techniques and to train students in the management of all types of materials, from household garbage and hazardous chemicals to nuclear waste.

Chancellor Edward Fort said the university will use teachers and researchers from various disciplines at the institute, started earlier this year. Fort said the institute is working on waste-management issues that touch a variety of schools within the university, ranging from chemical engineering to soil conservation and business.

Fort said that much of the waste-management effort will take place in a planned, $23 million center for interdisciplinary research — projects involving researchers from more than one area of learning.

Waste-management studies and research already are under way at the university, said Godfrey Uzochukwu, the institute's director and a professor of environmental science. "This grant will help us to enhance the capabilities of our labs," Uzochukwu said.

News & Record, Sunday, October 27, 1996

Program teaches ways to protect environment

Uzochukwu

Dr. Godfrey A. Uzochukwu, director of the Waste Management Institute at N.C. A&T, is overwhelmed at the accomplishments of the students and faculty in the Waste Management Institute Program.

"Many of the students involved in the Waste Management Program have received jobs due to the fact that they are environmentally aware of problems and situations that surround us," Uzochukwu said.

The program was implemented in 1994 under the direction of Uzochukwu and is the only program in North Carolina that awards a certificate of completion.

This certifies that the student has passed the required courses related to the Waste Management Institute. The mission of the Institute is to enhance awareness and understanding of waste management problems in our society and to enhance instruction, research and outreach needed to improve the quality of life and protect the environment.

The students research ways to reduce, reuse, and recycle aluminum and other items such as: steel cans, corrugated cardboard, glass, magazines, newspapers plastic, paper, chipboard, laundry detergent boxes, cereal boxes, batteries, motor oil, tires, and telephone books. The institute also seeks to improve disposal techniques and to train students in the management of all types of materials, from household garbage and hazardous chemicals to nuclear waste.

To receive a certificate, students are required to complete 19-20 credit hours from the institute's core courses. The certificate program complements the student's academic major.

The Institute has received a $1.4 million grant from the General Administration of North Carolina and is entering its third year of supporting and providing scholarships.

News & Record, Sunday, December 8, 1996

Chamber cites program

The Greensboro Area Chamber of Commerce recently awarded N.C. A&T's Waste Management Program first place in the category of Environmental Education of the Environmental Stewardship Award.

The awards are given each year to recognize companies and institutions that have made a commitment to preserving the environment of Guilford County through innovative waste reduction, management practices and preventive strategies.

Since the awards program was started in 1992, more than 47 companies have received awards, some having been recognized more than once.

According to Mona O'Bryant, co-chair of the chamber's environmental affairs council, the awards play an important role in educating the community about the efforts that local institutions and companies are making to protect the environment.

The Waste Management Institute seeks to enhance waste management instruction, research, and community outreach in a variety of settings and organizations.

In the last year, Waste Management has held programs for high school and college students. The program is chaired by Dr. Godfrey Uzochukwu, instructor in the College of Arts and Sciences.

News & Record, Sunday, April 9, 1995

A&T will host symposium on environmental awareness

The N.C. Waste Management Institute at N.C. A&T will host a symposium on "Environmental Issues and Awareness" on Thursday. The symposium will be held from 8:30 a.m. to 4 p.m. in the McNair Hall Auditorium on campus.

Clark

The keynote speaker for the symposium is Dr. Dorothie T. Clark, Diversity Manager, Bechtel Savannah River Inc.

Students and teachers from public schools in the Piedmont Triad area, college / university administrators, students, scientists, government official and industry managers will attend the event. The goal of the symposium is to enhance awareness and understanding of waste management issues.

It will serve as a vehicle for universities, public schools, federal agencies, and industries working in concert, to address a wide range of environmental issues.

The symposium topics include Solid Waste Problems in N.C.; Waste Recycling In Outer Space; Business Perspectives of Waste Management; and Public Perception of Environmental Restoration; and Bioremediation of Wastes.

Clark is listed in Outstanding Young Women in America and was inducted into Pi Lambda Theta Honor Society for women in education at the University of Chicago. She has been a member and officer of several boards, including the Governor's (Colorado) Commission on Public Broadcasting, the Colorado Republican Leadership Board of Directors, and the Urban League or Colorado.

Clark received her B. Ed. degree from Chicago State University, a master's of science degree from the University of Chicago, and her terminal degree from the University of Northern Colorado (Greeley).

The institute provides training in waste management to students, industry managers and employees, public school teachers and community groups.

The institute's programs are designed to increase this state's economic productivity. The savings on health care costs related to pollution will drastically increase.

The on-site registration fee for the symposium is $25. For more information, call 334-7030.

News & Record, Sunday, April 7, 1996

Environmental Exposition at A&T on Thursday

The Waste Management Institute of N.C. A&T will host an Environmental Exposition 8 a.m.-5 p.m. Thursday at Greensboro Hilton.

The exposition will highlight environmental career opportunities, challenges, and professional development.

The exposition is free of charge and open to the public. Registration is required. To register, or for additional information, call Dr. Godfrey Uzochukwu, 334-7030.

High school and college students will participate in the environmental poster contest, which awards winners cash prizes of up to $200. These posters will be displayed from 8 a.m. to 11 a.m. and again from 2 p.m. to 4 p.m.

"This is an excellent networking opportunity for environmental professionals, government agencies, high school teachers, students and other scientists," says Dr. Godfrey A. Uzochukwu, director of the Waste Management Institute at A&T.

Cynthia Anderson, director of Environmental Restoration Division for the Department of Energy's Savannah River Operations Office of Aiken, S.C., will be keynote speaker for the luncheon 11 a.m.-1:30 p.m.

Anderson

Anderson is responsible for the remediation of inactive waste sites and the decommissioning surplus facilities. A native of Charleston, S.C., Anderson is a graduate of Claflin College. Other guest speakers scheduled include Renee M. Wesley, director of Small Business Office for Environmental and Base Closure and the Human Systems Center at Brooks AFB, Texas; and Horace L. Morancie, recycling and waste management coordinator for the U.S. General Service Administration.

Wesley graduated from St. Joseph's Academy in Lancaster, Pa., and earned a bachelor's degree from the University of Maryland. She also has a master of science degree in human relations from the University of Oklahoma.

Morancie is a graduate of Polytechnic University. He has a master's degree from Cornell University and has attended Brooklyn Law School, Kennedy School of Government and Harvard University.

Uzochukwu named to national advisory group

Dr. Godfrey Uzochukwu, director of N.C. A&T's Waste Management Institute, has been invited to serve as part of a new advisory group for the Soil Survey Division of the U.S. Department of Agriculture.

Uzochukwu

Uzochukwu is among professors and state and federal agency officials around the country asked to be a part of the National Cooperative Soil Survey Advisory Group to the Soil Survey Division. Horace Smith, the division's director, assembled the group to serve as a sounding board for the division and to provide advice on strategic issues and emerging topics. The group's first meeting is scheduled for Aug. 20-22 in Raleigh.

The Soil Survey Division is responsible for developing national soil information and maps for general and specific land use planning purposes such as building site development, woodland management, farmland management and wildlife habitat protection.

A professor of soil, earth and environmental sciences at A&T since 1985, Uzochukwu has bachelor's and master's degrees from Oklahoma State University and a doctorate from the University of Nebraska. He completed post-doctoral studies at Texas A&M University.

Uzochukwu also conducts research into environmental implications of soil and mineral properties for better land use.

ON CAMPUS

Faculty / staff

Cassill and Gibson participate in private label conference

Dr. Nancy L. Cassill and **Fay Y. Gibson**, faculty members in the Department of Textile Products Design and Marketing at UNCG, recently gave presentations at the second annual Private Label Conference and Sourcing Network in Rye Brook, N.Y.

Cassill, an associate professor, presented results of a survey of the size and composition of the private label apparel marketplace. Gibson, a lecturer, delivered a keynote address on mega-trends in the apparel industry.

Cassill

Gibson

The international conference was held at the Rye Town Hilton July 22-24.

A UNCG faculty member since 1987, Cassill is president-elect of the International Textile and Apparel Association. She is a specialist in textile products marketing and consumer behavior, and has published numerous articles on the subjects. She also is a member of the American Collegiate Retail Association.

Gibson has been a UNCG faculty member since 1986 and serves as director of the Department of Textile Products Design and Marketing's internship program. She has published numerous manuals on textile marketing and retailing, and has presented papers at several conferences and professional meetings.

UNCG's Caldwell edits book by economist Frederich Hayek

"Socialism and War: Essays, Documents Reviews," a new volume of work by the economist Frederich A. Hayek, has been edited by economist **Dr. Bruce Caldwell** of UNCG and has been released by the University of Chicago Press.

The 270-page book contains essays and other writings by the Austrian economist, who was a lifelong advocate of free markets and was an opponent of socialism and planned economies. The essays, reviews and letters comprise volume 10 in the multi-volume series, The Collected Works of F.A. Hayek series, which is being released by the University of Chicago Press.

Caldwell

Caldwell will edit two additional volumes in the series, to be published under the heading, "The Demons of Science."

Caldwell has been studying and writing about the works of Hayek for a decade. Caldwell also edited "Contra Keynes and Cambridge: Essays and Correspondence," the ninth volume in the Hayek series. The earlier book, published in 1995, contains essays and correspondence by Hayek that emerged during his 15-year debate over economic and monetary theory with British economist John Maynard Keynes.

In his work, Hayek favored free markets and believed that government intervention could cause more problems than good. His work earned him the Nobel Memorial Prize in Economics in 1974. Hayek's views, said Caldwell, would be very popular today.

"Hayek lived from 1899 to 1992, so his productive life spanned most of this century," said Caldwell. "His thinking and writing on the topic of free markets was among the most far-reaching in the history of economic thought."

In his introduction to the book, Caldwell says that Hayek fought an often lonely battle against socialism. Hayek's most famous book, "The Road to Serfdom," was written during World War II and dedicated "To the socialists of all parties," in an effort to stop the growing interest in state planning that was emerging in Great Britain at that time.

The papers collected in "Socialism and War" cover three areas of Hayek's writings in the 1930s and 1940s, Caldwell said. The first works include his debates with market socialists, which were carried on chiefly in British academic journals in the 1930s. Next are his responses to the onset of World War II, most of which appeared in short articles in weeklies and book reviews. The third section contains a series of his papers examining the relationship between economic planning and freedom.

Caldwell has received a $48,516 grant from the National Science Foundation to examine the economic methodology of Hayek.

He is author of the book, "Beyond Positivism: Economic Methodology in the Twentieth Century." He is editor of six other books.

A&T ROTC leader Dantzler retires with 31 years service

Major Solomon D. Dantzler Jr., the U.S. Air Force ROTC Unit Admission Officer and an assistant professor of aerospace studies at N.C. A&T, has retired from his post after 31 years of military service.

Dantzler

Dantzler, a native of Macon, Miss., went to A&T in 1995 after serving at posts in places ranging from Texas and Michigan to South Korea and Greenland. Colleagues and students said goodbye to him at a campus retirement ceremony June 27.

With a bachelor's degree in business management and a master's in human relations and management, Dantzler's Air Force positions have included air traffic controller, air traffic controller instructor, administrative officer, personnel chief and chief of social actions, a position in which he administered drug and alcohol prevention and human relations education programs for more than 20,000 military and civilian personnel. He will remain in the Greensboro area to direct a junior ROTC program and teach math.

...e State Department of Insurance is not ...ressing enforcement of ventilation codes ...r existing buildings. He has been meeting ...ith local building inspections departments ...r discuss practical strategies for enforcing ...entilation requirements for new buildings.

"The response from the local inspections ...departments has been very positive, but the ...Department of Insurance has to take a stron...ger position on ventilation enforcement," he ...says.

Rojeski says the role of the health depart...ment is also critical because ventilation is a ...health issue. However, the state health de...partment has not adopted the ventilation ...requirements from the building code so local ...enforcement doesn't occur. This is true not ...only for restaurants and bars, but also for ...offices, nursing homes and day care centers.

He urges citizens concerned about the ...issue to contact their legislators. Second-hand ...smoke in restaurants and bars is a comfort ...issue and an economic concern, Rojeski says.

...GTECH will research expertise in the area ...of computer software development.

"GTECH has remained the leader in the ...competitive market for lottery technology by ...allying our industry knowledge and business ...strengths with the creativity and research ...talents of the academic world," said William ...Y. O'Connor, president and COO.

"Our partnership with A&T will assist ...GTECH in meeting future technology re...quirements while furthering the education of ...students and faculty."

The alliance will begin this summer with ...an internship program. Dr. Dechang Gu, asso...ciate professor of Computer Science at A&T, ...has been selected as the first to participate in ...this unique program. Gu has a Ph.D. in ...Computer Science, and 10 years of experi...ence in education and research. His areas of ...expertise include JAVA and software design ...reliability.

During the summer internship, Gu will ...work with the Software Embedded Systems ...

...dale, has donated $40,000 to fund scholar...ships for students in the College of ...Engineering at N.C. A&T.

Company representatives including David ...A. Guiodin, vice-president of engineering, ...presented the check June 2 to Dr. Charles ...Williams, A&T's associate vice chancellor for ...academic affairs, and Dr. Lonnie Sharpe, asso...ciate dean for undergraduate programs in ...the College of Engineering.

The money — which includes $20,000 for ...the Department of Electrical Engineering ...and $20,000 for the Department of Mechani...cal Engineering — is intended to help the ...company identify and attract high caliber ...electrical and mechanical engineering stu...dents to work for Square D after gradua...tion. To qualify for the scholarships, students ...must be full time students majoring in elec...trical or mechanical engineering; maintain a ...3.0 GPA in their major; exhibit future leader...ship potential through involvement in extra-

...facturability, serviceability, appearan... ergonomics.

The main event is the four-hour end... race, which is worth 25 percent of t... points for the competition. Held this ... an off-road testing area used by Ho... America to test sport-utility and all-... vehicles, the event went forward ... flash flooding caused by three days of ... rain.

The two-mile endurance course wa... of mud by race day. The A&T Ba... driven by Kellam, started on the p... cause it won first place in the acce... trials. The vehicle performed flawles... the entire four hours and finished in th... a mere 10 seconds ahead of the secon... team from the University of West V...

The victory boosted A&T to fourt... overall out of 79 entrants from engi... schools around the United States an... ada.

Waste management workshop set for N.C. A&T open to public

ON CAMPUS
Events

Uzochukwu

The Waste Management Institute of N.C. A&T and the Historically Black Colleges and Universities and Minority Institutions Environmental Technology and Waste Management Consortium will present its seventh pre-college Environmental Technology and Waste Management Workshop.

The event, which is open to the public, will be held 1:30 p.m. to 4 p.m. Wednesday in Webb Auditorium.

Over 100 high school and college students are expected to attend the workshop which is designed to increase the number of professionals who will work in waste management fields.

Workshop presenters will include Dr. Godfrey Uzochukwu, director and professor of the Waste Management Institute; Dr. Jothi Kumar, professor, Department of Chemistry; Dr. Kenneth Roberts, assistant professor, Department of Chemical Engineering; Bob Patterson, environmental safety officer, A&T Occupational Safety and Health Administration (OSHA); and Doris Maxwell, U.S. Environmental Protection Agency, Research Triangle Park.

Facilitators for the event will be A&T environmental science students Michael Regan and Laura Stout.

Topics to be discussed include waste management issues, "Ozone: Double Trouble," and chemical engineering and waste management.

The Waste Management Institute Program was implemented in 1994 and is the only program in North Carolina that awards a certificate of completion.

Teachers, administrators honored for excellence

SCHOOL SCENE
Teacher / staff

Fourteen teachers and two administrators were honored for excellence in teaching and distinguished service at the 1996-97 Guilford County Schools Business Advisory Board for Science and Mathematics Awards Dinner held June 5 at the Greensboro-High Point Marriott.

The business advisory board is composed of school system personnel and 10 local corporations that support the implementation of the schools' science and mathematics programs.

Participating businesses include Lucent Technologies, Novartis, Cone Mills, Dow Corning, Duke Power, Lorillard, Morflex, Moses Cone Health System, Piedmont Natural Gas and Wesley Long Community Hospital.

Gary Taft, chairman of the board at Morflex, was keynote speaker.

Awards were presented in the following individuals in the area of science: Beverly Cea, Grimsley High School, Mack Baker/Mary Kearns Distinguished Service to Science Education; Kyle J. Malmin, Guilford Primary School, Excellence in Science Teaching-Elementary School; Karen F. Kelly, Lincoln Middle School, Excellence in Science Teaching-Middle School; Debra L. Ball, Southern High School, Excellence in Science Teaching-High School; Sandra B. Rayne, Oak Ridge Elementary School, Science Rookie of the Year-Elementary School; Jennifer A. Gaddis, Grimsley High School, Science Rookie of the Year-Secondary School; and Leon H. Surdivant, Guilford Middle School, Science Administrator of the Year.

Receiving awards in mathematics:

Emette S. Ballard, Guilfo... mary School, Distinguished S... to Mathematics Education; N... Armstrong, Laughlin Scho... cellence in Mathematics Tea... Elementary School; Joan L... day, Guilford Middle, Exc... in Mathematics Teaching-... School; Kathy G. Cline, Hig... Central High School, Excell... Mathematics - Teaching... School; Natalie S. Stewart, S... Elementary School, Mathe... Rookie of the Year-Elem... School; Candida Fernande... dale Middle School, Mathe... Rookie of the Year-Seco... School; and Patricia B. ... Kiser Middle School, Mathe... Administrator of the Year.

A total of 85 teachers and ... administrators were nomina... science and math awards.

Each nominee was prese... certificate and each winne... category received a plaque.

In addition to a plaque, w... of the Rookie of the Year, Pr... of the Year and Excelle... Teaching categories receive... Winners of the Distinguishe... vice category received a ... and $300.

Environmental Expo Committee

Dr. Horlin Carter
Dr. Shoou - Yuh Chang
Dr. Doretha Foushee
Mr. B. Eric Funderburk
Dr. Vallie Guthrie
Dr. Melvin Johnson
Ms. Staci Kyle
Ms. Avys Massey
Dr. Emmanuel Nzewi
Mr. Bob Patterson
Dr. G. B. Reddy, Chairperson
Ms. Carolyn Davis-Ruff
Dr. Keith Schimmel
Dr. Dilip Shah
Dr. Godfrey Uzochukwu

300 copies of this document were printed on recycled paper at a total cost of $300.00

Environmental Expo and Luncheon

Thursday
April 11, 1996
8:00 a.m. - 4:00 p.m.
Greensboro Hilton

Sponsored by

Waste Management Institute

North Carolina Agricultural and Technical State University

Funded by the United States Department of Energy (DOE) Savannah River Office

Symposium Committee

Dr. Horlin Carter
Dr. Shoou - Yuh Chang
Dr. Doretha Fousnee
Mr. Broadus Funderburk
Dr. Vallie Guthrie
Dr. Melvin Johnson
Dr. Emmanuel Nzewi
Dr. Lanell Ogden
Mr. Bob Patterson
Dr. G. B. Reddy, Chairperson
Ms. Caroiyn Davis-Ruff
Dr. Keith Schimmel
Dr. Godfrey Uzochukwu

The University

North Carolina Agricultural and Technical State University (NCA&TSU) is a comprehensive State University. The University has more than 90 academic programs (B.A., B.S., M.A. and M.S.) offered through the Schools of Agriculture, Business and Economics, Education, Nursing, Technology, College of Engineering, and the College of Arts and Sciences. The University offers the Ph.D. degrees in Electrical and Mechanical Engineering and also has a Waste Management Certificate program. North Carolina Agricultural and Technical State University enrolls 8,000 students.

Goals of the Symposium

- To enhance awareness and understanding of waste management issues
- To provide "hands-on" waste management experience for pre-college students/teachers

North Carolina A&T State University is committed to equality of educational opportunity and does not discriminate against anyone, students, or employees based on race, color, national origin, religion, sex, age or handicap. Moreover, North Carolina A&T State University is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a large number of white students.

400 copies of this document were printed at a total cost of $295.00

ENVIRONMENTAL ISSUES AND AWARENESS SYMPOSIUM

Thursday
April 13, 1995
8:30 a.m. - 4:00 p.m.
McNair Hall Auditorium

Sponsored by

Waste Management Institute

North Carolina Agricultural and Technical State University

Funded by the United States Department of Energy (DOE) Savannah River Office

Evaluation

Summary of Environmental Expo, April 1996

Participants: Industry Manager (4%), Government Officials (10%), High School Students (18%), College Professors (67%), Administrators (4%) and Other (17%)

- Overall rating of quality of exhibits

  Excellent - 26% of participants

  Very Good - 54% of participants

  Good - 20% of participants

- Rating of Speakers

  Excellent - 94% of participants

- Rating of highlighted environmental issues

  Excellent - 96% of participants

Evaluation

Summary of Faculty Evaluation/Survey of Environmental and Waste Management Activities

The results are as follows:

- 71% of faculty taught at least 2 environmental courses
- 86% of faculty advised environmental students
- 64% of faculty worked with students who are interested in the Waste Management Certificate
- 79% of faculty helped students to meet the requirements for the Waste Management Certificate
- 79% of faculty have attended at least 2 environmental workshops/symposium
- 71% of faculty responded "yes" their students have participated in internships

93% of faculty responded "yes" that the Environmental and Waste Management program enhanced awareness of environmental issues

Summary of Student Evaluation/Survey of Environmental and Waste Management Activities

The results are as follows:

- 40% of students indicated that they have taken at least 2 environmental courses
- 63% of students indicated that they would receive the Waste Management Certificate
- 65% of students indicated that they were aware of the Waste Management Certificate requirements
- 86% of students have attended at least 2 environmental conferences
- 73% of students responded "yes" that the environmental and waste management program enhanced awareness of environmental issues
- Rating of environmental courses:

  Excellent - 28% of students
  Very Good - 39% of students
  Good - 25% of students

- Rating of environmental instructors:

  Excellent - 22% of students
  Very Good - 41% of students
  Good - 30% of students

- Rating of environmental facilities:

  Excellent - 12% of students
  Very Good - 40% of students
  Good - 38% of students

Summary of Environmental Symposium Evaluation, April 1995

Participants (high school students (63%), college students (2%), high school teachers (14%), colleges, professors (2%), administrators (2%), and others (15%)

Were speakers appropriate?

Yes - 98% of participants

Was workshop beneficial?

Yes - 91% of participants

Did workshop enhance awareness of environmental issues?

Yes - 100% of participants

Summary of Precollege Environmental Technology and Waste Management Workshop, June 1995

Participants (high school students (74%), college students (19%), and others (5%)

- Rating of topics and facilities

  Excellent - 21% of participants
  Very Good - 32% of participants
  Good - 29% of participants

- Were speakers appropriate?

  Yes - 94% of participants

- Was workshop beneficial?

  Yes - 94% of participants

- Did workshop enhancement awareness of environmental issues?

  Yes - 98% of participants

10.5 Summary of Environmental Science Institute for Teachers, June 1995

- Were speakers appropriate?

  Yes - 100% of participants

- Was workshop beneficial?

  Yes - 100% of participants

- Did workshop enhance awareness of environmental issues?

  Yes - 100% of participants

THE WASTE MANAGEMENT INSTITUTE
NORTH CAROLINA AGRICULTURAL & TECHNICAL
STATE UNIVERSITY

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

PRESENT

THE 7TH PRE-COLLEGE

ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT WORKSHOP

NORTH CAROLINA A&T STATE UNIVERSITY
B. C. WEBB HALL AUDITORIUM
WEDNESDAY, JUNE 25, 1997
1:30 pm - 4:00 pm

OPEN TO THE PUBLIC

FUNDED BY THE U. S. DEPARTMENT OF ENERGY -
SAVANNAH RIVER OFFICE

and

THE HBCU/MI AND ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

THE WASTE MANAGEMENT INSTITUTE
NORTH CAROLINA AGRICULTURAL & TECHNICAL
STATE UNIVERSITY

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

PRESENT

THE SIXTH PRE-COLLEGE

ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT WORKSHOP

NORTH CAROLINA A&T STATE UNIVERSITY
B. C. WEBB HALL AUDITORIUM
WEDNESDAY, JUNE 26, 1996
8:30 A.M. - 11:30 A.M.

OPEN TO THE PUBLIC

FUNDED BY THE U. S. DEPARTMENT OF ENERGY
SAVANNAH RIVER OFFICE

and

THE HBCU/MI AND ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

THE WASTE MANAGEMENT INSTITUTE
NORTH CAROLINA AGRICULTURAL & TECHNICAL
STATE UNIVERSITY

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

PRESENT

THE FIFTH PRE-COLLEGE

ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT WORKSHOP

NORTH CAROLINA A&T STATE UNIVERSITY
B. C: WEBB HALL AUDITORIUM
WEDNESDAY, JUNE 28, 1995
8:00 A.M. - 12:00 P.M.

OPEN TO THE PUBLIC

FUNDED BY THE U. S. DEPARTMENT OF ENERGY -
SAVANNAH RIVER OFFICE

and

THE HBCU/MI AND ENVIRONMENTAL TECHNOLOGY
AND WASTE MANAGEMENT CONSORTIUM

THE GREENSBORO AREA MATHEMATICS AND SCIENCE EDUCATION CENTER (GAMSEC)

AND

THE WASTE MANAGEMENT INSTITUTE (WMI)
NORTH CAROLINA AGRICULTURAL & TECHNICAL STATE UNIVERSITY

PRESENT

THE 1ST EARTH AND ENVIRONMENTAL SCIENCE SUMMER INSTITUTE FOR TEACHERS (K-12)

NORTH CAROLINA A&T STATE UNIVERSITY

CARVER HALL 165

June 26 - 30 and July 10 - 14, 1995
8:30 A.M. - 1:30 P.M.

FUNDED BY THE U. S. DEPARTMENT OF ENERGY - SAVANNAH RIVER OFFICE

and

US ENVIRONMENTAL PROTECTION AGENCY

THE WASTE MANAGEMENT INSTITUTE

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT CONSORTIUM

THE CONSORTIUM

Seventeen Historically Black Colleges and Universities (HBCU's) and Minority Institutions (MI) formed the Environmental Technology and Waste Management Consortium. This consortium was in response to the U.S. Department of Energy's 5-year plan for Research, Development, Demonstration, Testing, and Evaluation in Environmental Technology and Waste Management.

PURPOSE

To increase the number of minority professionals (scientists, engineers, and others) who will work in environmental and waste management fields.

PARTICIPATING INSTITUTIONS

Alabama A&M University

Clark-Atlanta University

Florida A&M University

Hampton University

Howard University

Jackson State University

New Mexico Highlands University

North Carolina A&T State University

Prairie View A&M University

Southern University

Texas A&I University

Texas Southern University

Tuskegee University

University of Texas at El Paso

Xavier University of Louisiana

THE WASTE MANAGEMENT INSTITUTE

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT CONSORTIUM

WASTE MANAGEMENT

LOW LEVEL NUCLEAR WASTE

HAZARDOUS WASTE

CHEMICAL WASTE • WASTE WATER

INDUSTRIAL CHEMICAL WASTE

TOXIC WASTES • PCB DISPOSAL

WASTE TECHNOLOGY

WASTE MINIMIZATION • ASBESTOS

WASTE RECYCLING

ENVIRONMENTAL RESTORATION

ENVIRONMENTAL MANAGEMENT

THE WASTE MANAGEMENT INSTITUTE

Interdisciplinary Academic Units

Animal Science • Agricultural Education • Agricultural Economics • Architectural Engineering • Biology • Business Administration • Chemical Engineering • Chemistry • Civil Engineering • Computer Science • Construction Mgmt. and Safety • Economics • Education • Electrical Engineering • History • Human Environment and Family Science • Industrial Engineering • Mechanical Engineering • Nursing • Natural Resources • Physics • Political Science • Psychology • Sociology and Social Work.

The Waste Management Institute has a certificate program for students who have completed the required course work in waste management.

THE WASTE MANAGEMENT INSTITUTE

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT CONSORTIUM

WEDNESDAY, JUNE 25, 1997

B. C. Webb Hall Auditorium

1:30 - 2:00 PM — Registration

2:00 - 2:15 pm — Waste Management Issues
Dr. Godfrey Uzochukwu
Director and Professor
Waste Management Institute
NCA&TSU

2:15 - 2:30 — Participant Introductions

FACILITATORS
Michael Regan
Laura Stout

2:30 - 2:45 — Ozone: Double Trouble
Dr. Jothi Kumar
Professor
Department of Chemistry
NCA&TSU

2:45 - 3:00 — Chemical Engineering and Waste Management
Dr. Kenneth Roberts
Assistant Professor
Department of Chemical Engineering
NCA&TSU

3:00 - 3:15 — Break

3:15 - 3:30 pm Mr. Bob Patterson Safety and Health NCA&TSU	Environmental Safety
3:15 - 4:00 pm Ms. Doris Maxwell USEPA Research Triangle Park	USEPA's internship programs
4:00	Adjourn

THE WASTE MANAGEMENT INSTITUTE

AND

THE HBCU/MI ENVIRONMENTAL TECHNOLOGY AND WASTE MANAGEMENT CONSORTIUM

WORKSHOP COMMITTEE

Dr. Shoou-Yuh Chang

Ms. Carolyn Ruff

Mrs. Azell Reeves

Dr. Godfrey A. Uzochukwu

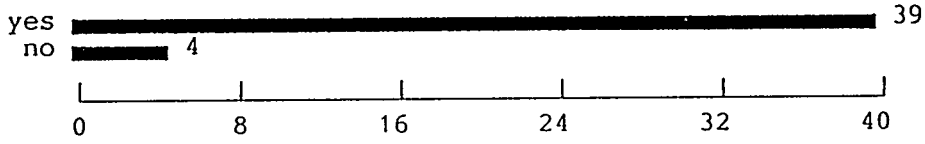
Mr. Michael Regan

Mrs. Laura Stout

SUMMARY RESULTS OF EVALUATIONS FOR WMI SYMPOSIUM
HELD APRIL 13, 1995.

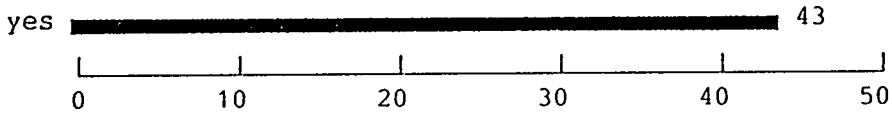
Q3 Was workshop beneficial

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	39	90.7	90.7	90.7
no	2.00	4	9.3	9.3	100.0
	Total	43	100.0	100.0	



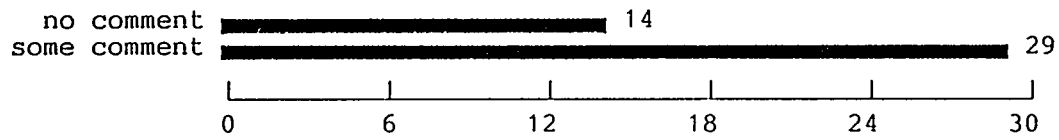
Q4 Did workshop enhance awareness of enviro

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	43	100.0	100.0	100.0
	Total	43	100.0	100.0	



Q5 Comments

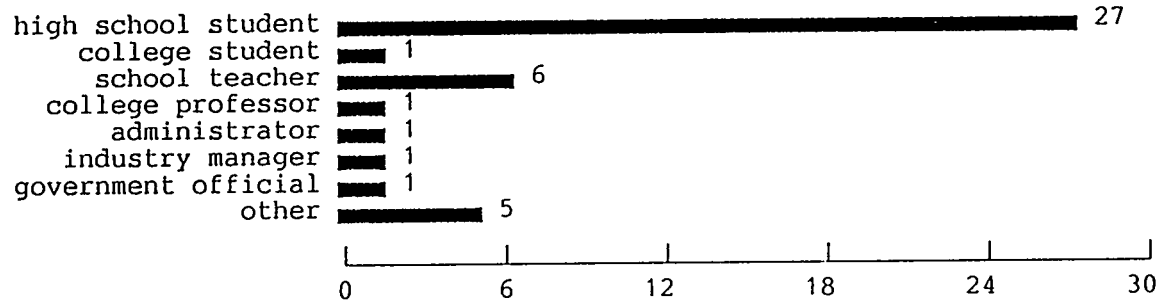
Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
no comment	.00	14	32.6	32.6	32.6
some comment	1.00	29	67.4	67.4	100.0
	Total	43	100.0	100.0	



Q6 What is your affiliation

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
high school student	1.00	27	62.8	62.8	62.8
college student	2.00	1	2.3	2.3	65.1
school teacher	3.00	6	14.0	14.0	79.1
college professor	4.00	1	2.3	2.3	81.4
administrator	5.00	1	2.3	2.3	83.7
industry manager	7.00	1	2.3	2.3	86.0
government official	8.00	1	2.3	2.3	88.4
other	9.00	5	11.6	11.6	100.0
	Total	43	100.0	100.0	

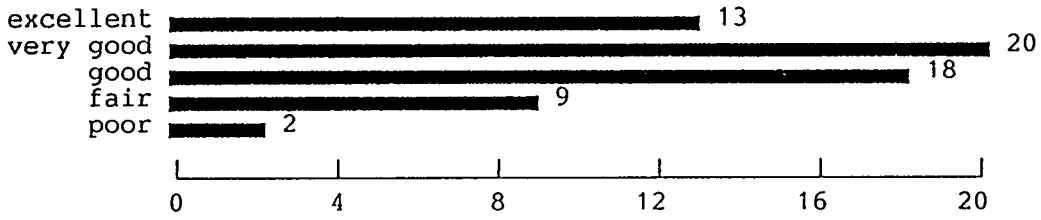
Q6 What is your affiliation



Valid cases 43 Missing cases 0

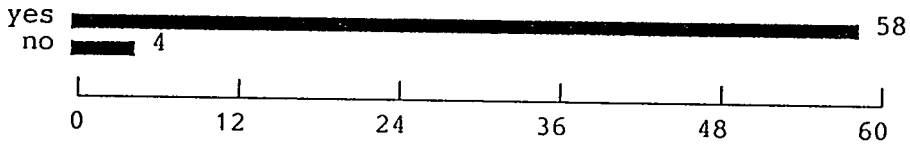
Q1 Quality of topics and facilities

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
excellent	1.00	13	21.0	21.0	21.0
very good	2.00	20	32.3	32.3	53.2
good	3.00	18	29.0	29.0	82.3
fair	4.00	9	14.5	14.5	96.8
poor	5.00	2	3.2	3.2	100.0
	Total	62	100.0	100.0	



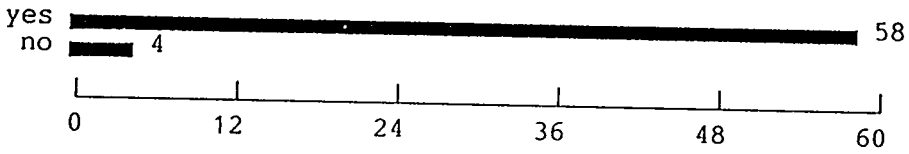
Q2 Were speakers appropriate?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	58	93.5	93.5	93.5
no	2.00	4	6.5	6.5	100.0
	Total	62	100.0	100.0	



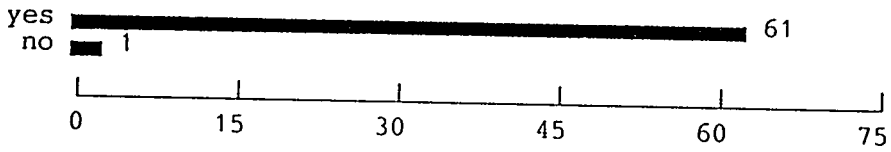
Q3 Was workshop beneficial

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	58	93.5	93.5	93.5
no	2.00	4	6.5	6.5	100.0
	Total	62	100.0	100.0	



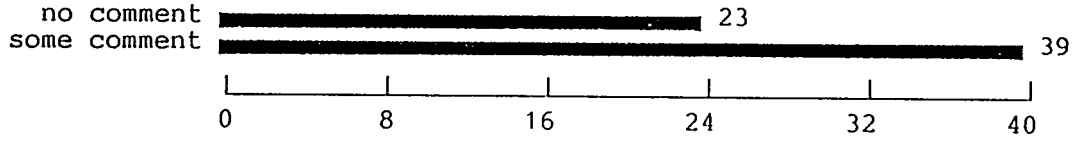
Q4 Did workshop enhance awareness of enviro

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	61	98.4	98.4	98.4
no	2.00	1	1.6	1.6	100.0
	Total	62	100.0	100.0	



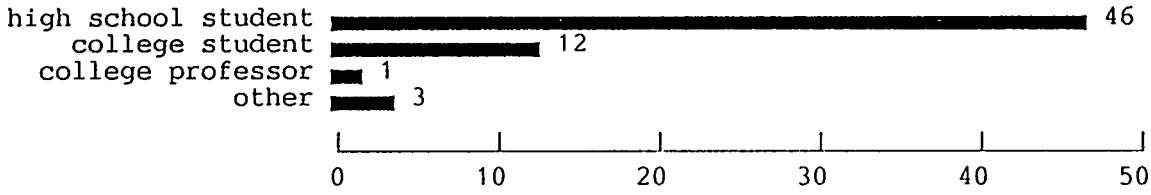
Q5 Comments

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
no comment	.00	23	37.1	37.1	37.1
some comment	1.00	39	62.9	62.9	100.0
	Total	62	100.0	100.0	



Q6 What is your affiliation

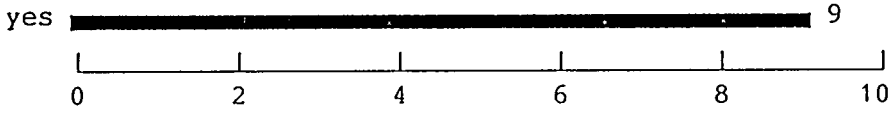
Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
high school student	1.00	46	74.2	74.2	74.2
college student	2.00	12	19.4	19.4	93.5
college professor	4.00	1	1.6	1.6	95.2
other	9.00	3	4.8	4.8	100.0
	Total	62	100.0	100.0	



SUMMARY RESULTS OF EVALUATIONS FOR WMI SYMPOSIUM
HELD JUNE 26 - 30, 1995
TEACHERS (6TH - 8TH GRADES).

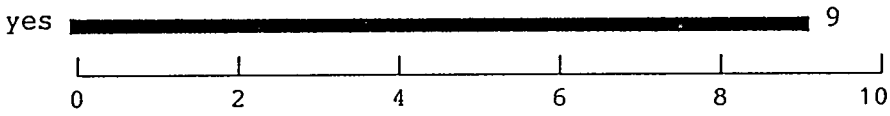
Q2 Were speakers appropriate?

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	9	100.0	100.0	100.0
	Total	9	100.0	100.0	



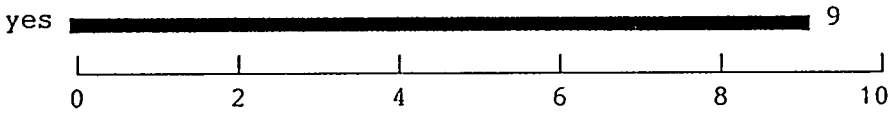
Q3 Was workshop beneficial

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	9	100.0	100.0	100.0
	Total	9	100.0	100.0	



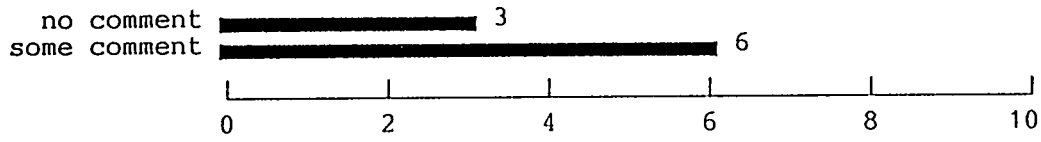
Q4 Did workshop enhance awareness of enviro

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
yes	1.00	9	100.0	100.0	100.0
	Total	9	100.0	100.0	



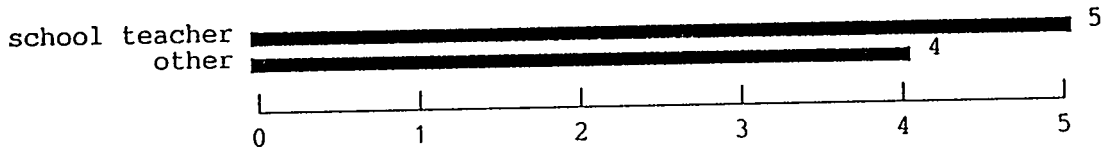
Q5 Comments

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
no comment	.00	3	33.3	33.3	33.3
some comment	1.00	6	66.7	66.7	100.0
	Total	9	100.0	100.0	



Q6 What is your affiliation

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
school teacher	3.00	5	55.6	55.6	55.6
other	9.00	4	44.4	44.4	100.0
	Total	9	100.0	100.0	



VITA DATA
DR. G. A. UZOCHUKWU, PROFESSOR AND DIRECTOR
N.C. A&T State University

Natural Resources and Environmental Design

Waste Management Institute

CITIZENSHIP:
United States of America

EDUCATION:
B.S. (1979) Oklahoma State University
M.S. (1980) Oklahoma State University
Ph.D. (1983) University of Nebraska
Post-Doc (1984) Texas A&M University

ACADEMIC FIELD:
Soil, Earth, and Environmental Sciences

EXPERIENCE:

- **July 1993 - Present (Professor)**
- **July 1989 - June 1993 (Associate Professor)**
- **January 1985 - June 1989 (Assistant Professor)**

  North Carolina A&T State University, Greensboro, NC.
  Has responsibility for providing instruction in the disciplines of earth science, geology, mineralogy, soils, landuse and environmental sciences at both undergraduate and graduate levels. Research responsibility includes investigation of environmental implications of soil and mineral properties for better land use. Involved in interdisciplinary and multidisciplinary research with other scientists in soil environmental processes and ecology

- **January 1984 - December 1984 (Research Associate)**

  Texas A&M University, College Station, Texas. Developed a procedure for identification and study of soil manganese minerals by x-ray diffraction.

ADMINISTRATION:

- 1993 - Present: Director of NC A&T's Interdisciplinary Waste Management Institute
- 1992 - Present: Director of NC A&T's Earth System Science (NASA) Project
- 1993 : Chair. of the Waste Management Institute's Planning Committee
- 1992 - Present: Director of NC A&T's Seismic Station

- 1985 - Present: Developed the earth and environmental science program at NCA&TSU and serves as the program coordinator.

CONSULTING SERVICES:

Media
Chatham Co. (1990 Low level Radioactive Waste Site Selection)
Public School Science Projects
University Science Projects
Community Projects
Local small business

PROFESSIONAL SOCIETIES:

American Society of Agronomy
Carolina Geological Society
Mineralogical Society of America
North Carolina Academy of Science
Soil Science Society of North Carolina
Soil Science Society of America
Clay Mineral Society of America

LICENCE FOR PROFESSIONAL PRACTICE:

Licenced Soils Specialist (LSS) - North Carolina

BOARD/COMMITTEE MEMBERSHIPS:

Member of the Technical Review Board of the UNC System Water Resources Research Institute (1991 - 1994)
Member of the Brightwood Elementary School Advisory Council (1993 - 1996; Chair 1995/96).
Member of the Student Manuscript Contest Committee (American Society of Agronomy, 1994-1996)
Undergraduate Committee Member - Advancement of Minority in Environmental Professions.
Member of Minority Concerns Committee - American Society of Agronomy

FUNDED PROGRAMS:

DOE (Co-PI) $250,000 - 1991 to 1995
Academic Partnership Program in Environmental Technology and Waste Management
USDA (PI) $152,166 - 1991 to 1994
Instructional Resources and Outreach Program
NASA (PI) $353,457 - 1992 to 1996
Development of Predictive Models for Natural Resource Management
NSF/UNC-CH (PI) $114,148 - 1993 to 1997
Career Access Program for Under-represented Minority Groups
USDOE-SR (PI) $722,000) - 1994 to 1996
Infrastructure Support for the Waste Management Institute at NCA&TSU

HONORS/AWARDS

1991 Amoco Foundation Teaching Excellence Award (**Teacher of the Year**)
Cited in the 1992 WHO'S WHO Environmental Registry for Achievement in Environmental Industry
Cited in the 1994 WHO's WHO Among America's Teachers

DEPARTMENT OF MECHANICAL ENGINEERING

Nuclear Energy:
W. J. Craft, B.S., M.S., Ph.D.

Use of Robotics in Waste Management:
S. L. Wang, B.S., M.S., Ph.D., P.E.

SCHOOL OF EDUCATION

Waste Management Education and Outreach:
P. I. Hunter, B.A., M.Ed., Ph.D.

Waste Management Education and Outreach:
K. D. Guy, B.S., M.Ed., Ed.D.

Waste Management Education:
L. Powers, B.S., M.Ed., Ph.D.

DEPARTMENT OF GRAPHIC COMMUNICATIONS SYSTEMS AND TECHNOLOGICAL STUDIES

Waste Minimization/Pollution Prevention:
J. Smink, B.S., M.S., Ed.D.

Waste Minimization/Pollution Prevention:
E. Lord, B.A., M.Ed., Ph.D.

Capabilities In Waste Management (Equipment)

- Gidding Soil Probe
- High Performance Liquid Chromatography (HPLC)
- GBC Atomic Absorption Spectrophotometer with Graphite Furnace
- Surface Area Analyzer
- Dohrman Total Organic Carbon Analyzer
- Varian E109B Electron Spin Resonance Spectrophotometer
- Guilford Response UV Visible Spectophotometer
- Perkin Elmer Diode Array Spectrophotometer (Complete with P.E. Data Station)
- EG&G PARR Electrochemistry System
- Pine Instruments Four Electrode Bi-Potentiostat with RDE & RRDE
- Hewlett Packard 5780 Gas Chromatograph with Mass Spectrophotometer
- Matson Instruments *Cygnus* 100 FT-IR Spectrophotometer
- Hewlett Packard 5880 Gas Chromatograph
- Carlo Erba Elemental Analyzer
- Matson Galaxy 20/20 FTIR
- Perkin Elmer Atomic Absorption Spectrophotometer
- pH Meter
- Micro-Oxymax Respirometer
- Conductivity Meter
- Biological Oxygen Demand Meter
- Auto Analyzer II
- Nuclear Magnetic Resonance Spectrometer (NMR)
- Gas Chromatograph-Mass Spectrometer
- X-ray Diffraction Unit
- Seismic Station
- Electron Microscopes
- Optical Microscopes
- GIS/RS Computer Workstations

Funded by USDOE-SR

WM-NCA&TSU

For detailed information about
The WMI at North Carolina A&T State University, contact:
Dr. Godfrey A. Uzochukwu, Director
Waste Management Institute
NCA&T State University
Greensboro, NC 27411
(910) 334-7030 • FAX (910) 334-7399 • E-mail: uzo@ earth. ncat. edu.

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