



file: Krummich

State Community College
601 James Thompson Boulevard
East St. Louis, Illinois 62201-1129
618/583-2500

MEMORANDUM

OFFICE OF CURRICULAR AND INSTRUCTIONAL SERVICES

To: ALL ENVIRONMENTAL SCIENCE TECHNOLOGY
ADVISORY COUNCIL MEMBERS

From: JANET M. FINCH, ED.D., ACTING PRESIDENT/DEAN
CURRICULAR AND INSTRUCTIONAL SERVICES

Date: APRIL 10, 1995

Subject: INFORMATION FROM MEETING OF APRIL 4, 1995

Enclosed please find materials passed out at the last Environmental Science Technology Advisory Council meeting that was held on April 4, 1995 at State Community College.

We have incorporated all suggestions made by the Environmental Advisory Council during the last two meetings. Please review the attached curriculum and course outlines and give feedback for further improvement.

We would like to have final approval by the Advisory Council's next meeting, scheduled for April 18, 1995 at 2: p.m., in room 2085 at State Community College.

cc: All Committee Members

→ Diane Hendler
Mansanto was active in the
development of the "Environmental
Tech" Associate Degree program at
State Community College of East St. Louis
Call if you need more
information
Ken

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DSW 135419

STLCOPCB4035400

ENVIRONMENTAL SCIENCE TECHNOLOGY **ASSOCIATE OF SCIENCE DEGREE PROGRAM**

(Intended to transfer to a 4 year program)

SEMESTER 1

ENGL 111	English Comp. I	3
CHEM 111	General Chemistry I	4
BIOL 111	Intro To Biology I	3
ENVIR 1XX	Intro To Enviromental Science	3
		TOTAL 13

SEMESTER 2

MATH 121	College Algebra	4
ENGL 127	Technical Writing	3
CHEM 112	General Chemistry II	4
BIOL 224	Micro Biology	3
ENVIR 1XX	Environmental Lab Analytical Technique	3
		TOTAL 17

SUMMER

INTERNSHIP 191	TOTAL 3
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SEMESTER 3

ECON 110	Economic Issues & Policies	3
MATH 210	Calculus for Business/Soc. Science	4
PHIL 110	Intro to Philosophy	3
ENVIR 2XX	Environmental Monitoring, Sampling & Field Analysis	3
ENVIR 2XX	Pollution Control & Treatment Technologies	3
		TOTAL 16

SEMESTER 4

PHIL 131	Ethics	3
SOCL 224	Urban Sociology	3
ELECTIVE 2XX	HUMANITIES	3
SPCH 110	Oral Communications	3
ENVIR 291	Environmental Practicum	3
		TOTAL 15

TOTAL HOURS TO COMPLETE PROGRAM 64

ENVIR. I: INTRODUCTION TO ENVIRONMENTAL SCIENCE

CREDIT HOURS: 3 - Taken Semester I

ACTUAL HOURS: 3

PREREQUISITES: None

COURSE DESCRIPTION: The objective of this course is to introduce the student to environmental concepts, ecosystems, and the global nature of the environmental areas. The courses available will be discussed, as well as the legislative and regulatory background.

COURSE OUTLINE:

- I. OVERVIEW OF "ENVIRONMENT"
- II. CAREERS EXPLORATION
- III. BIOLOGICAL, SOCIAL, & PHYSICAL SCIENCES OF THE ENV.
- IV. ECOLOGICAL CONCEPTS, ENERGY & NATURAL RESOURCES
- V. INFLUENCE OF PLANT & ANIMAL LIFE
- VI. LEGISLATIVE OVERVIEW
 - a. Bills/Laws by Congress
 - b. Regulations - EPA
 - c. State Agency/Regulations
- VII. REGULATORY OVERVIEW
 - a. OSHA - Health & Safety
 - b. RCRA - Hazardous Waste
 - c. CERCLA - National Priorities List
 - d. TSCA - PCBs
 - e. CAA - Title V Permitting - air emissions
 - f. CWA - Water Discharge
 - g. DOT - Transportation

ENVIR. II: ENVIRONMENTAL LAB ANALYTICAL TECHNIQUE

CREDIT HOURS: 3 - Taken Semester II
ACTUAL HOURS: 1 hr. Classroom, 4 hrs. Lab Work

PREREQUISITES: Chemistry I & Biology

COURSE DESCRIPTION: The objective of this course is to provide the student with a general understanding of environmental lab techniques in analysis of samples taken from the medias of water, wastewater, groundwater, solid waste, sludge, soils, stack discharges and ambient air.

COURSE OUTLINE:

I. SAFETY AWARENESS

- a. Lab Safety Rules
- b. Personal Protective Equipment (gloves, safety glasses)
- c. Chemical Safety & Handling -
- d. Hazard Communication/MSDS
- e. Chemical Compatibility

II. INTRODUCTION TO A LAB

- a. Equipment
 - Glassware
 - Meters
 - Analytical Equipment
- b. Lab Data
 - Lab Math
 - Recordkeeping & Data Acquisition
 - Chain of Custody

III. ANALYTICAL TECHNIQUES

- a. Sample preservation
- b. Measuring & Weighing
- c. Titration
- d. Standards Preparation
- e. Sample Preparation
- f. Sample Verification & QA/QC Procedure

IV. WET CHEMISTRY

- a. Ph
- b. Conductivity
- c. Suspended Solids
- d. Total Solids
- e. Oil & Grease

V. METALS ANALYSIS

- a. Wet Chemistry
- b. Instruments (Atomic Absorption)

VI. ORGANICS ANALYSIS

- a. Sample Prep
- b. Instrumentation (gas chromatographs, mass spectroscopy)

VII. FIELD INSTRUMENT USE & TRAINING

- a. Mobile Equipment (Photovacs, OVA, Oxygen & LEL meters)
- b. Fingerprinting (Ph, Color, Odor, etc.)
- c. Personal Sampling Pumps (industrial hygiene)

VIII. LABORATORY COMPUTER SYSTEMS

COURSE REQUIREMENTS/GRADING STANDARDS

Students will be required to demonstrate their fulfillment of the objectives through:

- 1. Class Participation
- 2. Class Analysis
- 3. Test Performance

Students will be graded on the following scale:

Class Participation	20%
Tests	40%
Mid-Term	15%
Final	<u>25%</u>
	100%

There will be no make-up examinations except in RARE emergencies. Any student whose performance is 87% or better prior to the final examination, will NOT be required to take the final examination.

INSTRUCTIONAL METHODS

The Lecturer Method of instruction will be used with emphasis on case analysis.

ENVIR. III: ENVIRONMENTAL MONITORING, SAMPLING & FIELD ANALYSIS

CREDIT HOURS: 3 - Taken Semester III

ACTUAL HOURS: 2 hrs. Classroom & 2 hrs. Field Work

PREREQUISITES: Chem. I & II, Biology, Environmental Lab Analysis Technique

COURSE DESCRIPTION: The objective of this course is to provide the student with a general understanding of environmental monitoring and sampling techniques in the medias of water, wastewater, groundwater, solid waste sludge, soils, stack discharges and ambient air.

I. SAMPLING SAFETY & PROTECTION

- a. Safety
- b. Personal Protective Equipment
- c. Confined Space Entry (sewers)
- d. Stack Sampling Safety/Fall Protection

II. WATER & WASTEWATER MONITORING, SAMPLING & FIELD ANALYSIS

- a. Flow Measuring
 - Electrical & mechanical devices
 - Weirs & Flumes
- b. Sampling Objectives
 - Outfalls, surface water, sewer discharges
 - QA/QC Procedures
- c. Sampling Techniques
 - Types of Samples
 - 1. Microbiological
 - 2. Chemical
 - Sample Collection
 - 1. Composite
 - 2. Grab Sample
 - Preservation, Handling & Storage
 - Chain of Custodies
- d. Portable Field Analysis
 - Ph
 - Temperature
 - Physical/Chemical Field Analysis

III. GROUNDWATER SAMPLING

- a. Groundwater Characteristics
- b. Monitoring Wells
- c. Sampling Techniques & Protocols
- d. Sampling Objectives & QA/QC Procedures

IV. SOIL, SOLID WASTE & SLUDGE SAMPLING

- a. Types & Frequency of Samples
- b. Frequency of Sampling

V. HAZARDOUS WASTE SAMPLING

- a. Drums
- b. Liquids

- c. Screening
- d. Sample Techniques
- e. Remedial Investigation
- f. Sampling Objectives & QA/QC Procedures

VI. AIR QUALITY & STACK MONITORING, SAMPLING & FIELD ANALYSIS

- a. Ambient Air Quality Monitoring
- b. Overview of VOC's and Hazardous Air Pollutants (HAPs)
- c. Fundamental Meteorology
- d. Sampling Stations
- e. Stack Testing (US EPA Methods 1-10)
 - Air Flows in Stack
 - 1. Temperature
 - 2. Pressure
 - 3. Relative Humidity-
 - 4. Pitot
 - Sample Train
 - Sampling Parameters
 - Preparation, Preservation & Chain of Custodies
 - Data Collection
 - Continuous Sampling/Monitoring
- f. Sampling Objectives & QA/QC Procedures

VII. ON-LINE COMPUTER GOVERNMENTAL REFERENCES

COURSE REQUIREMENTS/GRADING STANDARDS

Students will be required to demonstrate their fulfillment of the objectives through:

- 1. Class Participation
- 2. Class Analysis
- 3. Test Performance

Students will be graded on the following scale:

Class Participation	20%
Tests	40%
Mid-term	15%
Final	<u>25%</u>
	100%

There will be no make-up examinations except in RARE emergencies. Any student whose performance is 87% or better prior to final examinations, will NOT be required to take the final examination.

INSTRUCTIONAL METHODS

The Lecturer Method of instruction will be used with emphasis on case analysis.

ENVIR IV: TREATMENT TECHNOLOGIES & POLLUTION CONTROL

CREDIT HOURS: 3

ACTUAL HOURS: 2 hours lecture, 2 hours lab work

COURSE DESCRIPTION: This course is not envisioned as a heavy engineering course. It is meant to provide the student with exposure to control and/or treat pollution in all media.

COURSE OUTLINE:

I. AIR POLLUTION CONTROL TECHNOLOGY

- a. Baghouses
- b. Scrubbers
- c. Electric Precipitators
- d. Stack Injection
- e. After Burners (thermal oxidizers)
- f. Carbon Adsorption

II. WATER TREATMENT

- a. Chemical Treatment Technology
- b. Biological Treatment Technologic
- c. Ground Water Treatment
 - Bioremediation
 - Air Stripping
 - Carbon Filtration
- d. Stormwater Best Management Practices

III. WASTE TREATMENT/DISPOSAL

- a. Thermal Treatment Technologies
- b. Chemical Stabilization
- c. Bioremediation/In-Situ Treatments
- d. Landfilling
- e. Reclamation/Reuse (solvent recovery, fuels blending)
- f. Underground Injection Control

IV. REMEDIATION

- a. Spill Control
- b. Release Modeling
- c. Decontamination
- d. Asbestos/Lead Abatement

COURSE REQUIREMENTS/GRADING STANDARDS

Students will be required to demonstrate their fulfillment of the objectives through:

1. Class Participation
2. Class Analysis
3. Test Performance

Students will be graded on the following scale:

Class Participation	20%
Tests	40%
Mid-term	15%
Final	<u>25%</u>
	100%

There will be no make-up examinations except in RARE emergencies. Any student whose performance is 87% or better prior to final examinations, will NOT be required to take the final examination.

INSTRUCTIONAL METHODS

The Lecturer Method of instruction will be used with emphasis on case analysis.

ENVIR. V: ENVIRONMENTAL PRACTICUM

CREDIT HOURS: 3 - Taken Semester IV
ACTUAL HOURS: 3 hrs. All Classroom with at least 1 Field Trip

PREREQUISITES: Chemistry I & II, Biology, Microbiology, Ecology

COURSE DESCRIPTION: The objective of this course is to use the knowledge obtained in previous environmental courses and apply them to a practicum. One possible applicable is preparation of an Environmental Impact Statement. The jobs involved will be discussed. Sampling and analysis which must be conducted and paperwork will be discussed. Other related issues, such as ethics, enforcement and environmental justice will be incorporated, as appropriate. In addition, safety considerations, such as PPE, chemical compatibility, etc. will be incorporated.

COURSE OUTLINE:

I. INTRODUCTION

II. CASE STUDIES

III. PRACTICUM: Env. Impact Statement Preparation

- a. Site Tours of local industry
- b. Paperwork (form R, etc.)
- c. Careers
- d. Considerations
 - Regulatory Requirements
 - Enforcement
 - Environmental Ethics
 - Environmental Justice
- e. Safety Considerations
 - PPE
 - Confined Space
 - Compatibility

gjjg/curricu

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DSW 135429

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* - Member of nucleus group

DSW 135430

STLCOPCB4035411

ENVIRONMENTAL SCIENCE TECHNOLOGY PROGRAM

ADVISORY COMMITTEE MEETING

AGENDA

APRIL 4, 1995

- I. Welcome/Introductions
- II. Review of March 13, 1995 Minutes
- III. Review Environmental Science Technology Program
- IV. Development of A.A.S. Environmental Science Technology Program
- V. Others

DSW 135431

STLCOPCB4035412

ENVIRONMENTAL SCIENCE TECHNOLOGY PROGRAM
ADVISORY COMMITTEE MINUTES
MARCH 13, 1995

MEMBERS PRESENT: Dr. Surinder Sabharwal, Dr. Don Wallace, Bill Wilkerson, Paul Davis, Patrick McCarthy, Dave Fulbright, Don Anderson, Everett Ayres, Arlene Lyons, Michael Schneider, Rufus Williams, Bill Brown, Joe Butler, Dr. Wilbur Campbell

1. Campbell welcomed the committee members to the College and distributed copies of the agenda.
2. Committee members expressed a need for clarification between an Associate of Science and an Associate of Applied Science degree. Many members thought the AS program was more skills directed. Dr. Campbell, Dr. Sabharwal, and Dr. Wallace discussed the major differences. Dr. Campbell made it clear that the proposed program was an AS program and that the college would be willing to develop an AAS program in the near future.
3. Committee members were unclear as to the process in securing new programs. Dr. Campbell and Dr. Sabharwal went through the ICCB approval process.
4. The committee discussed the need to review the five environmental courses that had been developed for the environmental science technology program. The committee agreed to review the 64 hour curriculum and offer recommendations to improve the proposed program.
5. Sabharwal reviewed the environmental science technology associate of science degree program. Committee members discussed the need for an associate in applied science program. The committee decided to complete work on the associate of science degree program before starting work on an associate of applied science program. Committee members discussed the need for employees with problem solving skills, critical thinking skills, and basic computer competencies that include the ability to navigate the information superhighway. Committee members recommended adding technical communications/technical writing to the curriculum.
6. The committee members discussed the need for program admission criteria. Members agreed that the new environmental science technology program should be a high quality, prestigious program and that students should have completed all prerequisites before admission to the program.
7. The committee members reviewed each of the five environmental courses and offered recommendations to improve the courses.

ENVIR I This course should include introduction to laws and regulations, critical thinking, problem solving, technical writing, and a research project. This course, and all of the

courses developed for the program, should include computer applications. The introduction to environmental laws should include CWA, CAA, RCRA, TSCA, CERCLA, DOT, the bills, legislation, and agency involvement.

ENVIR II This course should include safety considerations as well as field -- finger prints. Some members felt that the course seemed too much like applied chemistry.

ENVIR III This course should include safety, computer modeling, and on-line computer services. Members felt that composite and grab samples should be included in the sampling techniques, and that sample collecting, preservation, and handling could be handled as separate areas. Safety should be taught at the beginning of the course, and should include field testing and screening. The instructional methods of each course should include lecture, discussion, field work, and other methods in addition to the lecture method.

ENVIR IV This course should include s/b treatment technologies and pollution control, carbon absorption in air pollution, and underground injection control in disposal technologies.

ENVIR V This course should include emergency response and contingency planning, hazard communication, the health effects of hazardous materials, environmental compliance, ethics, and litigation. A case approach focusing on the application of regulations was recommended for this course.

8. The committee discussed the need for officers. The committee elected Bill Brown, Access America, as Chairman. The committee elected Arleane Lyons, Chemical Waste Management, Inc., as Vice Chairman.

9. The committee agreed to meet again on April 4, 1995 at 2:00 p.m. in Room 2085 at State Community College.

10. See attached for Pat McCarthy comments on curriculum.

Kat McCarthy ITH

ENVIRONMENTAL SCIENCE TECHNOLOGY **ASSOCIATE OF SCIENCE DEGREE PROGRAM**

SEMESTER 1

ENGL 111
CHEM 111
BIOL 111
ENVIR I

English Comp. I
Intro To Chemistry I
Intro To Biology I
Intro To Environmental Science

3
4
3
3
TOTAL 13

Suggest "Intro to Environmental R. (Quick Overview)"

SEMESTER 2

MATH 122
ENGL 112
CHEM 112
BIOL 124
ENVIR II

Trigonometry
English Comp. II
Intro to Chemistry II
Micro Biology
Environmental Lab Analytical Technique

4
3
4
3
3
TOTAL 17

SUMMER

INTERNSHIP

TOTAL 4

SEMESTER 3

ELECTIVE
MATH 113
ELECTIVE
ENVIR III

ENVIR IV

SOCIAL SCIENCE
Intro To Statistics
HUMANITIES
Environmental Monitoring, Sampling
& Field Analysis
Pollution Control & Treatment Technologies

3
3
3
3
3
3
TOTAL 15

SEMESTER 4

PHIL 131
ELECTIVE
ELECTIVE
SPCH 110
ENVIR V

Ethics
SOCIAL SCIENCE
HUMANITIES
Oral Communications
Overview of Current Major Environmental
Regulations

3
3
3
3
3
3
TOTAL 15

TOTAL HOURS TO COMPLETE PROGRAM 64

Because some courses included in this program require prerequisites; students are advised to consult a counselor.

5

ENVIR III

COURSE: ENVIRONMENTAL MONITORING, SAMPLING & FIELD ANALYSIS

CREDIT HOURS: 3 - Taken Semester III

ACTUAL HOURS: 2 hrs. Classroom & 2 hrs. Field Work

PREREQUISITES: Chem. I & II, Biology, Environmental Lab Analysis Technique

COURSE DESCRIPTION: The objective of this course is to provide the student with a general understanding of environmental monitoring and sampling techniques in the medias of water, wastewater, groundwater, solid waste, sludge, soils, stack discharges and ambient air.

TOPICS

II. Water & Wastewater Monitoring, Sampling & Field Analysis

--Flow Measuring

- a. Electrical & mechanical devices
- b. Weirs & Flumes

~~c. Surface Water~~ ← *delete here as it is covered here*

--Sampling Objectives

- a. Outfalls, surface, sewers
- b. QA/QC Procedures

--Sampling Techniques

a. Types of Samples

- ~~1. Automatic & Grab Samplers~~
- 2. Microbiological
- 3. Chemical

b. Sample collection
1) composite
2) grab samples

~~b. Sample Collecting, Preservation, Handling & Storage~~

d. Chain of Custodies

--Portable Field Analysis

- a. Ph
- b. Temperature
- c. Physical/Chemical Field Analysis

III. Groundwater Sampling

--Groundwater Characteristics

--Monitoring Wells

--Sampling Techniques & Protocols

--Sampling Objectives & QA/QC Procedures

IV. ~~III~~. Soil, Solid Waste & Sludge Sampling

--Types & Frequency of Samples

V. Hazardous Waste Sampling

-- Dams

Liquids

Screening

ENVIR III

- Sample Techniques
- Remedial Investigation
- Sampling Objectives & QA/QC Procedures

Dev. Air Quality & Stack Monitoring, Sampling & Field Analysis

- Ambient Air Quality Monitoring
- Fundamental Meteorology *← Overview of VOC's and Hazardous Air Pollu (HAP's)*
- Sampling Stations
- Stack Testing (USEPA Methods 1-10)

- a. Air Flows in Stack
 1. Temperature
 2. Pressure
 3. Relative Humidity
 4. Pitot

E. Continuous Sampling / Monitoring

- b. Sample Train
- c. Sampling Parameters
- d. Preparation, Preservation & Chain of Custodies
- e. Data Collection

- Sampling Objectives & QA/QC Procedures

I. Sampling Safety & Protection *← Make Safety # I.*

- Personal Protective Equipment
- Confined Space Entry (Sewers)
- Stack Sampling Safety

VII On-Line Computer Governmental References

COURSE REQUIREMENTS/GRADING STANDARDS

Students will be required to demonstrate their fulfillment of the objectives through:

1. Class Participation
2. Class Analysis
3. Test Performance

Students will be graded on the following scale:

Class Participation	20%
Tests	40%
Mid-term	15%
Final	25%

100%

There will be no make-up examinations except in RARE emergencies. Any student whose performance is 87% or better prior to final examinations, will NOT be required to take the final examination.

INSTRUCTIONAL METHODS

The Lecturer Method of instruction will be used with emphasis on case analysis.

ENVIR IV

COURSE TITLE:

POLLUTION CONTROL AND TREATMENT TECHNOLOGIES

COURSE DESCRIPTION:

This course is not envisioned as a heavy engineering course, it is meant to provide the student with exposure to control and/or treat pollution in all media.

COURSE OUTLINE

AIR POLLUTION CONTROL TECHNOLOGY

- 1) BAGHOUSES
- 2) SCRUBBERS
- 3) ELECTRIC PRECIPITATORS
- 4) STACK INJECTION
- 5) AFTER BURNERS

WATER TREATMENT

- 1) CHEMICAL TREATMENT TECHNOLOGY
- 2) BIOLOGICAL TREATMENT TECHNOLOGIC
- 3) GROUND WATER TREATMENT
 - a) Bioremediation
 - b) Air Stripping
 - c) Carbon Filtration
- 4) STORMWATER BEST MANAGEMENT PRACTICES (BMP 5)

WASTE TREATMENT

- 1) THERMAL TREATMENT TECHNOLOGIES
- 2) CHEMICAL STABILIZATION
- 3) BIOREMEDIATION/IN-SITU TREATMENTS
- 4) LANDFILLING

5) *Reclamation / Reuse (solvent recovery, fuel blending)*
COURSE REQUIREMENTS/GRADING STANDARDS

Students will be required to demonstrate their fulfillment of the objectives through:

1. Class Participation
2. Class Analysis
3. Test Performance

Students will be graded on the following scale:

Class Participation	20%
Tests	40%
Mid-term	15%
Final	25%

100%

There will be no make-up examinations except in RARE emergencies. Any student whose performance is 87% or better prior to final examinations, will NOT be required to take the final examination.

INSTRUCTIONAL METHODS

The Lecturer Method of instruction will be used with emphasis on case analysis.

ENVIR.V

COURSE: OVERVIEW OF CURRENT MAJOR ENVIRONMENTAL REGULATIONS**VI. Clean Water Act**

- Oil Pollution Prevention
- Determination of Reportable Quantities for Hazardous Substances
- EPA Administered Permit Programs: The National Pollution Discharge Elimination System
- Water Quality Standards
- National Primary Drinking Water Regulations
- National Secondary Drinking Water Regulations
- *Pretreatment*
- *Wetlands*

VII. Resource Conservation and Recovery Act

- Hazardous Waste Management System
- Identification and Listing of Hazardous Waste
- Standards Applicable to Generators of Hazardous Waste
- Standards Applicable to Transporters
- Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities
- *Land Disposal Restrictions (LDR)*

VIII. Comprehensive Environmental Response Compensation and Liability Act

- National Oil and Hazardous Substances Pollution Contingency Plan
- Designation, Reportable Quantities and Notification
- Hazardous Chemical Reporting: Community Right To Know
- Toxic Release Reporting: Community Right To Know

IX. Hazardous and Solid Waste Amendment Act

- Guidelines for the Thermal Processing of Solid Wastes
- Guidelines for the Land Disposal of Solid Wastes
- Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
- Standards for Tracking and Management of Medical Waste

X. Toxic Substances Control Act

- Polychlorinated Biphenyls
- Fully Halogenated Chlorofluoroalkanes
- Asbestos
- Dibenzo-para-dioxins/Dibenzofurans

XI. Other Regulations

- To Be Developed
- *Leaking Underground Storage Tanks (LUST)*
- *Used Tires*