# 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 |

**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

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**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

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.



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**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)



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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 | 25% |
| | 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.



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**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
c. Sampling Techniques & Protocols
d. Sampling Objectives & QA/QC Procedures

V. HAZARDOUS WASTE SAMPLING

a. Drums
b. Liquids



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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 7 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 | 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.



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**ENVIR IV: TREATMENT TECHNOLOGIES & POLLUTION CONTROL**

CREDIT HOURS: 3
ACTUAL HOURS: 3 hours lecture

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



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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.



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