Department of Environmental Health

Applied Environmental Science Program

Program Information

Instructional Level	Bachelor or Science
Instructional Area	Environment
Original Developer(s)	Dr. Areena Murad, Dr. Bader Al-Kha;af
Last Revision Date	12/29/2004
Revision History	By Dr. Bader Al-Khalaf and Dr. Areena Murad

Target Population

This program is designed for individuals seeking jobs in the area of Environmental Field and Laboratory Sampling and Analysis and Environmental Research.

Description

The Applied Environmental Science Program prepares graduates to work in the government and private sectors in the area of Applied Environment. Graduates receive a BSc Degree in Science and gain knowledge in assessing environmental problems, application of environmental pollution criteria and standards to environmental quality control, and environmental risks analysis and management.

Career/Job Titles

1. Environmental Science Educator/Promoter
2. Environmental Lab Technician
3. Environmental Analyst Assistant

Related DACUM Studies DACUM A

DACUM Title	EHS DACUM
Date	03/03/04
Organization	PAAET, CDC
Facilitator	Dr. Areena Murad; Dr. Bader Al-Khalaf
Method	DACUM

Entry Requirements

1. High School Graduate with Science Inclination
2. High School GPA of minimum 70%
3. Satisfactory result on the personal interview administered by the Department
4. Placement tests: English (minimum 65%), Mathematics (minimum 65%), Chemistry (minimum 65%) or 60% minimum score on placement tests and successful completion of the preparatory semester with minimum score of 65%

Program Outcomes

1. MONITOR STATUS OF THE ENVIRONMENT

Criteria

A. Apply emergency planning procedures

B. Use portable labs for environmental monitoring

C. Calibrate portable equipment

D. Collect environmental data

E. Conduct evaluation of the status of the environment

F. Write report on environmental status
G. Demonstrate understanding of principles of environmental monitoring
H. Communicate monitoring information

2. APPLY GIS TECHNOLOGY TO ENVIRONMENTAL MONITORING PRACTICE

Criteria

A. Demonstrate understanding of principles of GIS
B. Read maps
C. Use GPS for positioning in space
D. Create contour maps

3. APPLY MATHEMATICAL MODELS (DISPERSION MODEL) TO ENVIRONMENTAL MONITORING PRACTICE

Criteria

A. Apply knowledge of principles of modeling to dispersion model analysis
B. Apply basic oceanography principles to model analysis
C. Apply basic meteorological principles to model analysis
D. Identify source of emission (type, etc.)
E. Identify type of model
F. Complete data entry (use mathematical formulas)
G. Calculate ambient conversions
H. Apply KUEPA regulations (comparison of ambient emissions)
I. Use USEPA regulations (comparison of ambient emissions)

4. APPLY ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS) TO OCCUPATIONAL ANALYSIS

Criteria

A. Develop sample EMS
B. Maintain EMS model
C. Use models for EMS for occupational analysis
D. Develop policy procedures
E. Conduct baseline study for EMS
F. Demonstrate understanding of principles of EMS

5. APPLY SH&E IMPACT ASSESSMENT PROCEDURES TO OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT PRACTICE

Criteria

A. Conduct HAZOP
B. Demonstrate understanding of principles of EIA
C. Write HSEIA plan
D. Demonstrate understanding of principles of exposure assessment (dose-response)
E. Apply PHA

6. APPLY WASTE MANAGEMENT PROCEDURES TO SOLID AND HAZARDOUS WASTE MANAGEMENT PRACTICE

Criteria

A. Demonstrate understanding of economics of treatment system
B. Communicate hazard information

C. Determine optimum treatment
D. Identify waste type
E. Practice waste management rules and regulations
F. Specify collection system
G. Specify treatment system and disposal
H. Maintain data QC/QA standards
I. Demonstrate understanding of principles of waste management
J. Monitor the disposal sites
K. Sample waste
L. Analyze samples

7. PARTICIPATE IN RISK ASSESSMENT AND RISK COMMUNICATION (HSE)

Criteria

A. Conduct hazard identification
B. Recommend measures for hazard mitigation
C. Measure hazard levels
D. Identify risk matrix
E. Prioritize risk
F. Locate hazardous spots ("hot spots")
G. Carry out exposure assessment
H. Communicate hazard information (community, media, stakeholders, etc.)
I. Calculate hazard levels

8. MAINTAIN LABORATORY AND FIELD EQUIPMENT

Criteria

A. Maintain and calibrate air sampling equipment
B. Maintain and calibrate radiation measuring equipment
C. Maintain and calibrate water sampling equipment
D. Maintain and calibrate sludge sampling equipment
E. Maintain and calibrate chemical waste sampling equipment
F. Maintain and calibrate soil sampling equipment
G. Maintain and calibrate medical waste sampling equipment
H. Maintain and calibrate biological sampling equipment

9. COLLECT AND PRESERVE ENVIRONMENTAL SAMPLES

Criteria

A. Identify sample location (geographical)
B. Transport the sample
C. Transfer sample custody to the lab
D. Report sampling information
E. Record sample custody information
F. Assess sampling results
G. Identify sample size
H. Identify sample matrix
I. Identify sample type

J. Identify sampling equipment to use
K. Prepare sampling equipment
L. Preserve the sample
M. Identify sampling strategy
N. Collect needed samples

10. ANALYZE ENVIRONMENTAL SAMPLES

Criteria

A. Perform biological analysis of water
B. Perform air analysis
C. Perform physical oceanography analysis
D. Perform chemical oceanography analysis
E. Perform chemical analysis of sediments
F. Perform biological analysis of sediments
G. Perform terrestrial biological analysis

11. ANALYZE ENVIRONMENTAL SAMPLES USING PROTOCOLS

Criteria

A. Use Stockholm Agreement Protocol for analysis of environmental samples
B. Use OSHA Protocol for analysis of environmental samples
C. Use EPA Protocol for analysis of environmental samples
D. Use WHO Protocol for analysis of environmental samples
E. Use MSDS Protocol for analysis of environmental samples
F. Use ROPME Protocol for analysis of environmental samples
G. Use Shuaiba Industrial Area Protocol for analysis of environmental samples

12. APPLY STATISTICAL ANALYSIS TO ENVIRONMENTAL DATA

Criteria

A. Assess environmental data
B. Enter data into computer
C. Sort data
D. Do data transformation and coding
E. Run statistical package (SPSS)
F. Retrieve results of analysis

13. INTERPRET STATISTICAL OUTPUTS

Criteria

A. Demonstrate understanding of principles of design of environmental experiment
B. Use scientific method in experimental design
C. Interpret results of data central tendency and dispersion
D. Interpret results of linear correlation
E. Interpret results of ANOVA analysis
F. Interpret results of linear regression
G. Interpret results of significance test

14. WRITE SCIENTIFIC/TECHNICAL REPORT

Criteria

A. Collect references

B. Conduct baseline analysis
C. Prepare and conduct presentation
D. Define scope of work
E. Interpret data (results)
F. Draft recommendations
G. Draw conclusions
H. Organize the report order

15. APPLY PRINCIPLES OF CONSERVATION BIOLOGY TO ENVIRONMENTAL MANAGEMENT PRACTICE

Criteria

A. Demonstrate understanding of principles of biodiversity
B. Demonstrate understanding of principles of biodiversity conservation strategies
C. Practice biodiversity legislation and regulations
D. Demonstrate understanding of biodiversity conventions results and recommendations
E. Apply principles of biodiversity monitoring to conservation practice
F. Demonstrate understanding of principles of establishing of protected areas

16. APPLY ECOLOGICAL APPROACH TO THE ENVIRONMENTAL CONSERVATION PRACTICE

Criteria

A. Demonstrate understanding of principles of marine ecology
B. Demonstrate understanding of principles of terrestrial ecology
C. Demonstrate understanding of principles of ecotoxicology
D. Demonstrate understanding of principles of population dynamics
E. Demonstrate understanding of principles of ecosystem conservation

17. DEMONSTRATE UNDERSTANDING OF NATIONAL ENVIRONMENTAL AND HEALTH REGULATIONS AND LEGAL ISSUES

Criteria

A. Work with other organizations
B. Practice available regulations (national, local)
C. Acquire and organize data on laws and regulations
D. Write recommendations
E. Communicate recommendations

18. DEMONSTRATE UNDERSTANDING OF BASIC ENGINEERING DESIGNS

Criteria

A. Demonstrate understanding of basic principles of design
B. Demonstrate understanding of basic terminology of design
C. Read blueprints (electrical, mechanical, logos)
D. Demonstrate understanding of principles of ergonomics

19. ASSIST IN ENVIRONMENTAL HEALTH EDUCATION AND PROMOTION

Criteria

A. Assess intervention effectiveness
B. Provide community services
C. Assess community health education status

D. Assess community health problems

General Education Outcomes

1. Apply scientific concepts and terminology.
2. Develop familiarity with the scientific method.
3. Explain the cell concept in the organization of living things.
4. Discuss the energy intake, storage, and use in living systems.
5. Describe the concept of atoms and molecules and their relationship to all matter.
6. Describe the symbols for the importance of the major atoms found in living things: C, H, O, N, Na, and K.
7. Explain the concept in the organization of living things.
8. Understand the basics of sound, light, and electromagnetic waves
9. Report Writing
10. Biology
11. General Chemistry
12. Apply mathematical symbols and concepts to area of study.
13. Use word processing software to employ the writing process to create effective paragraphs, expository writings, and business correspondence utilizing appropriate methods.
14. Create documents following appropriate layout and design.
15. Solve simple equations.
16. Use given formula(s) to solve problems.
17. Demonstrate the concept of balanced chemical reactions.
18. Technical Reporting (Associate Degree)
19. General Education Chemistry and Physics - General Education Chemistry and Physics at FVTC provides students with a physical science foundation so that they may recognize and apply scientific concepts in their programs, careers, and lives. Student will have acquired the tools to develop logical, problem solving skills. Problem solving includes data collection and analysis. The acquisition of data required participation as a member of a team, as well as utilization of computers and laboratory equipment. The analysis of data requires decision making, interpretation, and communication of results. Critical thinking in the physical sciences demands a basic understanding of the relationships between matter and energy. In Physics, the emphasis is on concepts of energy such as mechanics, heat, fluids, light, electricity, and magnetism. In Chemistry the emphasis is on the structure (atoms, compounds, and mixtures) and changes (chemical reactions) of matter.
20. Determine laboratory procedures needed for correct diagnoses.
21. Integrate the fundamental chemistry conc. of measurement, calc., observation, and occupational applications.
22. Use the writing process to prepare and present written documents.
23. Apply scientific concepts and methods
24. Use a scientific calculator to perform mathematical calculations.
25. Perform mathematical calculations.
26. Use research effectively and correctly to create oral and written presentations.
27. Read and understand written passages.
28. Student will demonstrate knowledge of introductory computer concepts with hands-on application. .
29. Apply economics to the environmental research and experimental design
30. Use various communication strategies to share meaning orally.
31. Recognize appropriate sources for current information.
32. Written Communication (Associate Degree)
33. Biology - The student who successfully completes Biology demonstrates a knowledge of the unity and diversity of life and the dynamic interactions among all organisms. Students differentiate among organisms, their role in the biosphere and their relationship to each other. Students will apply this knowledge to responsible utilization of earth's resources and appropriate preservation of the

environment. Students work safely and carefully in a laboratory setting and apply this skill to acquiring and interpreting data in their occupational field.

34. Interpret basic statistical data.
35. Use percent formula(s) in solving applications.
36. Use both United States Customary System and the Metric System of measurement, and convert between the two systems.
37. Interpret current trends impacting the workplace.
38. Understand governmental participation at the grass-roots level.
39. Upon completion of the Economics course, individuals will be able to:
40. Oral/Interpersonal Communication (Associate Degree)
41. Introduction to Computer Literacy (2 and 3 credits) - The computer novice who successfully completes Introduction to Computer Literacy (2 credits) will demonstrate knowledge of introductory computer concepts through exploration and hands-on application. The concepts explored include basic computer systems, operating systems, Internet and email, word processing, spreadsheets, databases, presentation graphics and social issues of computer use. The student who successfully completes Introductory to Computer Literacy (3 credits) will have additional keyboarding experience.
42. Algebra - The student who successfully completes Algebra will apply basic algebraic concepts (integers, equations, factoring, graphing, formula rearrangement, and systems of equations) and problem-solving skills to meet specific Computer Information Systems program requirements.
43. Anatomy and Physiology 1 and 2 - A student who successfully completed Anatomy and Physiology 1 and 2 will have the knowledge of the complex structural and physiological interrelationships within the human body. This will be accomplished by a study of the cellular basic of life and a comprehensive study of all the major body organ systems, fluid, electrolyte, and acid base balance through study of current scientific knowledge and investigation during applicable laboratory activities. The student will be able to integrate and apply this information in their program courses, clinical and community setting, and continued professional advancement.
44. Microbiology - The student who successfully completes Microbiology demonstrates a knowledge of the dynamic relationship between microorganisms and the human body in health and disease. The student can apply this knowledge to their program courses, community and clinical health care needs, and continued professional advancement. Students differentiate among the variety of microorganisms (bacteria, viruses, fungi, protozoa, and helminthes), their natural habitat, structural features, and method of transmission. Students will begin the process of applying this knowledge to basic principles of treatment and prevention of disease in their occupation field. Students use critical thinking skills and strategies for solving problems: interpretation of microbiology laboratory data, demonstrating understanding of isolation procedures in a hospital setting, predicting why and how public health strategies prevent community outbreaks of infectious diseases. Students work safely with microorganisms in the laboratory and apply this skill to prevention of disease in the health care setting and for their own safety. Students work successfully in laboratory teams and, utilizing computers, complete laboratory data analysis.
45. General Chemistry (Associate Degree) - Students enrolled in the Associate Degree Nursing, Dental Hygiene, Natural Resources, Agriculture Science and Technology, and Fire Protection Technology programs will have gained experience with inorganic chemical structures, e.g. writing and balancing chemical equations. They will also have studied organic chemical structure, properties, and names, and to a lesser extent, reactions in organic chemistry.
46. Economics - Upon successful completion of this course, the student will be able to:
47. Introduction to Psychology - Upon successful completion of this course, the student will be able to:

Core Abilities

1. Information Literacy and Research
   Indicators

A. learner identifies, locates and uses informational tools for research purposes

2. Global Perspective
   Indicators
   A. learner demonstrates understanding of the value of a global perspective on society with respect to past, present and future events
3. Apply academics
   Indicators
   A. learner transfers academic knowledge and principles to life and work situations
4. Work effectively in teams
   Indicators
   A. learner demonstrates awareness of and respect for individual team member's differences.
   B. learner completes own share of tasks necessary to complete project/activity.
   C. learner encourages team members by listening and responding appropriately to their contributions.
   D. learner gives and accepts constructive criticism.
5. Develop self-awareness
   Indicators
   A. learner recognizes his/her individual self-worth, strengths, weaknesses and potential for growth
   B. learner recognizes his/her individual biases and values
   C. learner demonstrates the ability to give and receive constructive feedback
   D. learner develops time and stress management skills
   E. learner sets goals and devises strategies for educational, personal, and professional development in a changing world, consistent with his/her abilities and circumstances
6. Communicate effectively utilizing reading, writing, speaking and listening skills
7. Scientific, Mathematical & Technological
   Indicators
   A. learner collects, organizes, computes and interprets quantitative and qualitative data and/or information
   B. learner applies mathematics, science and technology to make decisions
8. Use technology
   Indicators
   A. learner recognizes the impact of technology
   B. learner selects and uses appropriate technology related to the course
9. Behave ethically
   Indicators
   A. learner accepts responsibility for his/her actions
   B. learner demonstrates respect for the rights, views, and work of others
   C. learner exhibits personal, professional, and academic honesty
   D. learner recognizes his/her responsibility to personal, social, professional, and educational environments and makes informed decisions based on that responsibility
   E. learner displays behavior consistent with the ethical standards within a discipline or profession
10. Use mathematics
    Indicators

A. learner performs computations using appropriate methods
B. learner demonstrates knowledge and application of measurement
C. learner reads, interprets, and generates graphical information
D. learner demonstrates knowledge and application of formulas
E. learner uses critical thinking skills in a mathematical context

11. Think critically and creatively
    Indicators
    A. learner applies the principles and strategies of organized thinking
    B. learner practices analytical, explorative, and innovative thinking
    C. learner applies problem-solving steps
    D. learner makes decisions based on analysis
    E. learner evaluates information, ideas, and problems
    F. learner accepts all ideas during brainstorming sessions
    G. learner collects data through probing questions and research
    H. learner respects the contributions of others
    I. learner uses techniques such as brainstorming to acquire alternative solutions
    J. learner makes inferences and connections
    K. learner demonstrates open-mindedness
    L. learner demonstrates comparison skills
    M. learner persists in the search for truth
    N. learner presents ideas for critical evaluation
12. Critical Thinking and Problem Solving
    Indicators
    A. learner thinks critically
    B. learner solves problems using basic research, analysis and interpretation
13. Communicate effectively
    Indicators
    A. learner applies appropriate reading, writing, speaking, and listening skills to express information, ideas, and opinions
    B. learner interprets non-verbal communication
14. Use appropriate technology
    Indicators
    A. learner selects procedures, equipment, tools and resources to produce desired results.
    B. learner analyzes technology resources to meet needs.
    C. learner demonstrates knowledge of technology on the job and in personal life.
15. Communicate in written for effectively (in English)
    Indicators
    A. learner communicates effectively in written forms
    B. learner uses appropriate technology that supports or facilitates communication
16. Apply scientific and mathematical knowledge
    Indicators
    A. learner collects, organizes, computes and interprets quantitative and qualitative data and/or information

B. learner applies mathematics, science and technology to make decisions

17. Think critically in the problem solving process
    Indicators
    A. learner thinks critically
    B. learner solves problems using basic research, analysis and interpretation
18. Have global perspect of the local problems
    Indicators
    A. learner demonstrates understanding of the value of a global perspective on society with respect to past, present and future events
19. Use computer technology
    Indicators
    A. learner recognizes the impact of technology
    B. learner selects and uses appropriate technology
20. Develop job-seeking skills
    Indicators
    A. learner identifies job possibilities
    B. learner writes a resume
    C. learner completes an application for a job
    D. learner participates in an effective interview
    E. learner accepts or rejects a job offer
    F. learner develops a record keeping system for job search
    G. learner researches job clusters to determine possible careers
    H. learner determines career choices and alternative using personal information and career research
    I. learner sets long-range and short-range goals
    J. learner develops a plan of action to achieve goals
    K. learner networks with peer groups and people in their career field
21. Social and Civic Responsibility
    Indicators
    A. learner demonstrates ethical and cultural awareness
    B. learner demonstrates an understanding of cultural diversity
    C. learner demonstrates effective and appropriate modes of social interaction
22. Act responsibly
23. Work cooperatively
    Indicators
    A. learner works with others to complete tasks, solve problems, resolve conflicts, share information, and offer support with a global and cultural awareness
24. Demonstrate civic, global, environmental and cultural responsibility
25. Use language, both oral and written, while working with others to learn problems
    Indicators
    A. learner initiates and participates in conversations to understand a task or problem
    B. learner develops a plan within a group for allocating time and effort to seek multiple resources (utilizing technology whenever possible) and to share information
    C. learner records, organizes, and evaluates information relevant to solving problems

D. learner demonstrate in-depth analysis and possible solutions as a group through presentations, artifacts, and/or written reports

26. Cultivate global awareness
    Indicators
    A. learner expresses an understanding of the interconnections and interactions among people and systems
    B. learner accumulates knowledge of, and experience with, people in his/her own and other cultures, and how they live, think, communicate, and view the world
    C. learner describes the impact of the global economy on life, work, and opportunities
    D. learner recognizes the commonality of human experiences across cultures
    E. learner recognizes the influence of diverse cultural perspectives on human thought and behavior
27. Learn effectively
    Indicators
    A. learner takes responsibility for self as a learner
    B. learner applies the learning process: assessing, planning, implementing, and evaluating
    C. learner identifies, assimilates, and integrates information and ideas
    D. learner organizes and uses learning activities in a lifelong process
28. Solve problems
    Indicators
    A. learner identifies problems to be solved, tasks to be performed, or decisions to be made.
    B. learner formulates alternative solutions, processes, or decisions and identifies potential consequences.
    C. learner selects appropriate solutions, processes or decisions.
    D. learner evaluates problems, monitors the feedback and revises plans indicated by the findings.
29. Use science and technology
    Indicators
    A. learner demonstrates knowledge of scientific terminology and principles
    B. learner uses scientific principles appropriately in problem-solving and decision-making
    C. learner applies the scientific method by organizing, analyzing, and interpreting data
    D. learner uses appropriate scientific equipment, methods, and safety precautions
    E. learner describes the changing nature of the interaction among science, technology, and society
    F. learner uses critical thinking skills to approach and use new technology
30. Demonstrate social interaction
    Indicators
    A. learner behaves appropriately in a variety of situations, circumstances, and roles
    B. learner works effectively in pairs, as well as small and large groups
    C. learner demonstrates awareness of, and respect for, personal differences
    D. learner recognizes conflicts and uses conflict resolution skills when appropriate
31. Take responsibility for her or his own actions.
    Indicators
    A. learner acknowledges one's actions
    B. learner acknowledges one's role in group activities

C. learner reviews the results of one's actions
D. learner identifies the successes resulting from one's actions
E. learner identifies any problems resulting from one's actions and makes adaptations
F. learner evaluates and acts upon feedback

32. Apply effective problem solving strategies

Program Course Detail

Course 1. -- Values and Loyalties

Course Number	SS 112
Course Title	Values and Loyalties
Semester/Year	1/1
Credits	3
Contact Hours	45
Category	General Education Requirement
Required	Yes

Course 2. -- Islamic Education

Course Number	IE 101
Course Title	Islamic Education
Semester/Year	1/1
Credits	2
Contact Hours	30
Category	General Education Requirement
Required	Yes

Course 3. -- English 1(ESP)

Course Number	ENG 115
Course Title	English 1(ESP)
Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Language Requirement
Required	Yes
Course Description	This course is a critical reading for special purposes and expository writing offers training in the writing process, the development and organization of expository prose, and research techniques. The course emphasizes quality in logic and direction.

Course 4. -- Mathematics for Environmental Sciences

Course Number	NSC 111
Course Title	Mathematics for Environmental Sciences
Semester/Year	1/1
Credits	3
Contact Hours	60

Category	Major Requirement
Required	Yes
Course Description	The course is designed to introduce basic analytic and geometric properties of the algebraic functions with heavy emphasis on the trigonometry. Topics included are: algebraic and trigonometric techniques, coordinate geometry, functions and relations and their graphic representation, and common logarithms.

Course 5. -- General Physics

Course Number	NSC 112
Course Title	General Physics
Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Major Requirement
Required	Yes
Course Description	Study of principles and applications of concepts in mechanics, energy and heat, wave motion, sound, light and waves , electricity and principles of nuclear physics, and dimensional analysis in problem solving. Students of physics gain a conceptual understanding of physical systems. Students use algebra, simple statistics, and trigonometry to understand forces. They engage in experimentation, scientific reasoning and logic, and data analysis and evaluation.

Course 6. -- General Chemistry

Course Number	NSC 146
Course Title	General Chemistry
Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Science Requirement
Required	Yes
Course Description	This course covers fundamental principles and laws of chemistry. Topics include measurement, atomic and molecular structure, periodicity, chemical reactions, chemical bonding, stoichiometry, thermochemistry, gas laws, and solutions.

Course 7. -- English Composition

Course Number	EN 116
Course Title	English Composition
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Language Requirement

Required	Yes

Course 8. -- Organic Chemistry

Course Number	NSC 131
Course Title	Organic Chemistry
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Science Requirement
Required	Yes
Course Description	This course is designed to introduce organic compounds: their structures and functions in living organisms. Emphasis is made on the chemistry of living state: lipids, carbohydrates, proteins, and nucleic acids.

Course 9. -- General Biology

Course Number	NSC 150
Course Title	General Biology
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Science Requirement
Required	Yes
Course Description	This course is designed to provide the student with a background in the basic principles of biology. It will acquaint students with the classification, structure and function of living organisms. It will enable students to identify representative members of different taxonomic groups of living organisms, as well as the structural characteristics of these groups. Emphasis is made on ecology, population, cellular and organismal biology, genetics, and the diversity of life, and how you relate to your environment.

Course 10. -- Environmental Science

Course Number	ENV 101
Course Title	Environmental Science
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes

Course Description	This course intended to provide a background of the basic chemical, physical and biological concepts and processes that help to understand environment and how it works; analyze relationship between humans and the environment including causes of environmental problems and consequences of human impact on the environment; identify major environmental problems and pros and cons of possible solutions.

Course 11. -- General Elective

Course Title	General Elective
Semester/Year	2/1
Credits	3
Contact Hours	45
Category	General Elective
Required	Yes
Course Description	General elective course may be taken in areas of social studies, computer, or general science and education.

Course 12. -- Technical Writing

Course Number	EN 216
Course Title	Technical Writing
Semester/Year	1/2
Credits	3
Contact Hours	90
Category	Language Requirement
Required	Yes
Course Description	This course addresses the principles and methods of oral and written communication required in the work environment. It provides both a theoretical ground and practical experience in the field of workplace writing. In addition to creating memoranda, resumes, reports, proposals, and presentation materials, students will explore such topics as collaboration, document design, the ethical position of the workplace writer, and the special challenges posed by the increasingly international context of today's workplace environment Students will complete assignments in the classroom setting. Students will focus on interviewing skills, problem-solving skills, and technical correspondence demonstrating accuracy in grammar and mechanics.

Course 13. -- General Microbiology

Course Number	NSC 155
Course Title	General Microbiology

Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Major Requirement
Required	Yes
Course Description	This course is designed to expose students to the general concepts of microbiology including the morphology, physiology, and genetics of microbes and the importance of microbial activities from medical, industrial, and ecological standpoints.

Course 14. -- Office applications

Course Number	CS 155
Course Title	Office applications
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Major Requirement
Required	Yes
Course Description	This course is designed to provide students with a basic knowledge of computer software. It is also designed to give students a practical usage of office used applications such as word processing, spreadsheet, slideshow, database and e-mail.

Course 15. -- Environmental Geology

Course Number	ENV 216
Course Title	Environmental Geology
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	This course intended to provide a background of concepts and processes that allow us to make meaningful assessment of problems related to human interactions with nature in terms of natural disasters and natural resources management, environmental ethics and human population growth consequences.

Course 16. -- Analytical Chemistry

Course Number	NSC 246
Course Title	Analytical Chemistry

Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Major Requirement
Required	Yes
Course Description	Study of the fundamental principles of quantitative analytical chemistry including basic statistics. An intensive laboratory experience which applies these principles to gravimetric, volumetric, colorimetric, chromatographic, and electroanalytical determination. Analytical chemistry concerns itself with the techniques and methods that answer the questions "What?" and "How much?" in the analysis of the chemical composition of matter. "What?" is the province of qualitative analysis, while "How much?" is the province of quantitative analysis. In this course, our focus will be with "How much?" -- the problems associated with the quantification of the amount of a species present in a given sample. A thorough understanding of quantitative analysis is a vital necessity for virtually all physical and biological scientists who are obliged to collect analytical data and apply statistical treatments to the data. A study of quantitative analysis is also of benefit in that it places the highest premium upon careful, orderly work and intellectually honest and fair observation. There are skills worthy of cultivating regardless of one's ultimate field of endeavor.

Course 17. -- Environmental Chemistry

Course Number	NSC 346
Course Title	Environmental Chemistry
Semester/Year	2/2
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	Environmental chemistry is a branch of chemistry devoted to characterization and understanding of the chemical compositions, structures, processes, and behaviors of the environment in general, the earth surface system in particular, in its natural and perturbed states, and transport, transformation, fate, and cycling of natural chemical substances as well as pollutants within and between the compartments of the earth surface system, on various spatial and temporal scales. In a broader sense with applications in mind, environmental chemistry is also cross-linked to environmental toxicology, environmental geology, environmental biology, environmental remediation and waste treatment, environmental risk assessment, environmental medical sciences, and environmental social sciences. Generally speaking, environmental chemistry may consist of three areas: The chemistry of the natural environment, the chemistry of the polluted/disturbed environment, and the chemistry of environmental treatment and remediation. This course is designed to introduce to the students our current knowledge and understanding, as well as the

fundamental concepts and principles, of environmental chemistry and their applications.

Course 18. -- Marine Environment

Course Number	ENV 221
Course Title	Marine Environment
Semester/Year	2/2
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	his course examines physical, chemical, geological and biological aspects of the oceans, including formation of the earth and oceans, brief history of the science of oceanography, concept of plate tectonics and how the earth looks today, basic chemistry of seawater and the physics of sound and light in a water and ocean currents and the way the oceans determine our climate. Special emphasis is on marine biology: nutrient cycling and adaptations, primary productivity and oceanic food webs, primary consumers, and invertebrate animals, fish and marine mammals, marine communities and marine resources and pollution of the ocean.

Course 19. -- Sustainable Development

Course Number	ENV 222
Course Title	Sustainable Development
Semester/Year	2/2
Credits	3
Contact Hours	45
Category	Core Course
Required	Yes
Course Description	This course centers on the relationship between economic development and the environment, focusing on the concept of sustainable development. Time will be devoted to defining the term, examining its historical context, evaluating its meaning from a variety of perspectives, and assessing progress and prospects for its implementation. One premise of the course is that the implementation of sustainable development will require action at all levels of human activity: the international, national, state, local, and individual. Sustainability itself has been elevated to the status of a new global environmental and social ethic, it is the goal that guides and directs our actions. This course provides critical examination of the concepts of sustainability and insight to contemporary issues in environmental policy and management.

Course 20. -- Environmental Regulations

Course Number	ENV 224
Course Title	Environmental Regulations
Semester/Year	2/2
Credits	3
Contact Hours	45
Category	Core Course
Required	Yes
Course Description	Course is designed to introduce a global and local attempts to regulate the environment. The central issues are social movements, international environmental regimes, major environmental regulations and tools which help you to find the law, interpret it and use it.

Course 21. -- Climatology

Course Number	ENV 226
Course Title	Climatology
Semester/Year	2/2
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	Course is designed to provide students with general knowledge of climatology in terms of its definition, physical factors, climatic zones distribution, relationships, and dynamic processes.

Course 22. -- Foundation of Engineering Seminar

Course Number	ENV 241
Course Title	Foundation of Engineering Seminar
Semester/Year	2/2
Credits	1
Contact Hours	15
Category	Core Course
Required	Yes
Course Description	A course designed to introduce students to the requirements for general engineering: introduction to engineering graphics and blue prints interpretation, engineering terminology and abbreviations, and environmental systems designs analysis.Topics included are: interpreting drawings and blueprint reading in machine trades, types of lines used on a drawing, and how parts are shown in different views, Dimensioning and Tolerancing and engineering economics and thermodynamics.

Course 23. -- Introduction to Statistics

Course Number	SD 105
Course Title	Introduction to Statistics
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	General Education Requirement
Required	Yes
Course Description	Course is designed to introduce basic statistical concepts: central tendency, dispersion, variability and comparisons.

Course 24. -- Desert Environment

Course Number	ENV 311
Course Title	Desert Environment
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes

Course 25. -- Environmental Analysis

Course Number	ENV 313
Course Title	Environmental Analysis
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Major Requirement
Required	Yes
Course Description	This course introduces physical, chemical and biological analysis of environmental samples. Topics included are: sampling strategies, procedures and quality control; sample preservation; laboratory analysis and data quality assurance.

Course 26. -- Air Pollution Management

Course Number	ENV 314
Course Title	Air Pollution Management
Semester/Year	1/3
Credits	3

Contact Hours	60
Category	Core Course
Required	Yes
Course Description	Air quality protection, already a major concern throughout most of the world, is expected to increase in importance in the foreseeable future. In the U.S., the milestone Clean Air Act Amendments of 1990 have given a strong impetus to this area of environmental management. At the present time, several billions of dollars are being spent each year to protect air quality, and the statutory and regulatory programs of the federal and state governments are reaching into all aspects of our society. This course explores the nature of critical local, regional, continental and global problems associated with air pollution and covers the historical evolution of such problems. It examines the complex regulatory and institutional framework controlling air quality management and explains current air quality management concepts and processes. Specific topics studied in the course include the history of air pollution, identification of atmospheric pollutants and their sources, effects of air pollution, emission and ambient air quality sampling and analysis, monitoring and surveillance networks, transport and dispersion of air pollutants, air pollution modeling and climatology, air quality criteria and standards, elements of regulatory control, and engineering control concepts, devices and systems.

Course 27. -- Meteorology

Course Number	ENV 316
Course Title	Meteorology
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	This course is a study of atmosphere and how its working. It intends to provide comprehensive background in the basic meteorology and its tools and methods. Topics included are: structure and processes in the atmosphere, Earth-Sun relationship, atmosphere-environment relationship and recent global climate changes, specifically those induced by human activity.

Course 28. -- Environmental Instrumentation

Course Number	ENV 323
Course Title	Environmental Instrumentation
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Major Requirement

Required	Yes
Course Description	This course is an introduction to laboratory and field portable instrumentation base applications to monitoring of environmental parameters. Topics included are: setting, calibration, running and maintaining of instrumentation as well as instrumental analytical methods

Course 29. -- Solid Waste Management

Course Number	ENV 324
Course Title	Solid Waste Management
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	The course gives an introduction to management of solid wastes. Collection, separation, thermal and biological treatment and construction, operation and monitoring of sanitary landfills is in focus. The course concerns alternative strategies for waste management and recycling of different types of solid waste. These methods include incineration, composting and anaerobic digestion. Environmental assessment of the different waste management options with respect to energy and resource consumption as well as environmental pollution is also included in the course. Basic engineering design, planning, and analysis problems associated with storage, collection, processing, and disposal of solid wastes are also included.

Course 30. -- Environmental Computer Applications

Course Number	ENV 325
Course Title	Environmental Computer Applications
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	This course is a brief introduction to creating, manipulating and analyzing databases using Excel and SPSS software with emphasis on their applications for environmental data storage, organization and analysis.

Course 31. -- Principles of Ecology

Course Number	ENV 327

Course Title	Principles of Ecology
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes
Course Description	This course should enable you to understand key concepts, general principles, and terminology fundamental to ecology. You should gain a working knowledge of the interdisciplinary nature of ecology and become acquainted with approaches to undertaking ecological research. We will examine ecological processes at the individual, community, and ecosystem level and discuss both abiotic and biotic factors involved in the interactions between organisms and their environment. Field and laboratory exercises will give you hands-on experience working with live organisms and applying ecological methods.

Course 32. -- Speciality Elective

Course Title	Speciality Elective
Semester/Year	2/3
Credits	3
Contact Hours	45
Category	Speciality Elective
Required	Yes

Course 33. -- Water Quality Management

Course Number	ENV 414
Course Title	Water Quality Management
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	Throughout history, the planning and management of water resources has remained among the chief concerns of society. For example, water shortages in parts of the world over the next 25 years will pose the single greatest threat to food production and human health. This course examines the basic physical and chemical aspects of the applied interdisciplinary science of hydrology and offers a broad perspective on the underlying hydrologic processes that directly influence sound water planning and management decisions. The organization of this course around the unifying concepts of the hydrologic cycle and the watershed allows application of hydrologic theory to local problems of water quantity and quality. Laboratory and field work provide opportunities to measure stream and ground-water flow, construct physical and computer

	models of flow, sample for and analyze water quality, conduct hydrologic site investigations, and design simple engineering solutions for hydrologic hazards such as floods and droughts.

Course 34. -- Remote Sensing and GIS

Course Number	ENV 416
Course Title	Remote Sensing and GIS
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	This class is an introduction to a rapidly growing technology of the satellite imagery used in remote sensing as applied to environmental studies with emphasis on Saudi Peninsula area. Course provides hands-on experience in digital image processing techniques. In addition GIS technology will be introduced as related to GPS and map interpretation.

Course 35. -- Conservation Biology

Course Number	ENV 417
Course Title	Conservation Biology
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	Conservation biology is the science of preserving biodiversity and sustaining the earth. It is a synthetic discipline which draws upon the fields of ecology, genetics, philosophy, economics, sociology, and political science. The goal of conservation biology is the development of strategies for preserving populations, species, biological communities, and entire ecosystems. The major threat to these biological entities is the growing human population and our impact on the environment. Conservation biologists attempt to bring scientific principles and theory to bear on problems of management for preserving the richness of life on earth. In this class, we will examine human impact on biodiversity and the earth. We will also examine the contributions of theoretical biology to conservation biology. Furthermore, we will use case studies to survey the possibilities and the problems of applying conservation principles in the real world.

Course 36. -- Principles of Health Education

Course Number	ENV 419
Course Title	Principles of Health Education
Semester/Year	1/4
Credits	3
Contact Hours	45
Category	Minor Requirement
Required	Yes
Course Description	This course is designed to introduce philosophy, ethics and principles of the health education practice in schools, community, work site and hospital settings. It provides students with the background information and application on planning, implementation and evaluation of health promotion programs in a variety of settings as well as necessary communication skills.

Course 37. -- Risk Analysis and Management

Course Number	ENV 475
Course Title	Risk Analysis and Management
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	This course will provide students with an overview of human health risk assessment particularly within the context of environmental, occupational and community settings. Students will learn about the traditional and stakeholder centered risk assessment process including hazard identification, exposure assessment, risk assessment, characterization, and communication. Case studies will be emphasized to provide a real world grounding for studentsSpecial emphasis is on the complexity of making decisions about threats to human health and the environment when people's perception of risks and their decision-making process differ from expert views. Recognizing the limitations of individuals in processing information the course explores the role of techniques such as decision analysis, cost-benefit analysis, risk assessment and risk perception in structuring risk management decisions. The policy tools such as risk communications, incentive systems, third party inspection, insurance and regulation are also explored.

Course 38. -- Environmental Economics

Course Number	ENV 422
Course Title	Environmental Economics
Semester/Year	2/4

Credits	3
Contact Hours	45
Category	Major Requirement
Required	Yes
Course Description	This course focuses on the relationship between the economy and the environment. It examines the causes of environmental problems and potential policies that can be used to address them. The role of externalities, property rights, and public goods is considered. The advantages and disadvantages of different regulatory responses are discussed. These include direct regulation and the more recent innovations such as incentive-based measures: emission taxes and tradable emission permits. The course examines methods used to value the costs and benefits of achieving a given level of environmental quality. Class debates focus on important and controversial environmental policy issues. Tools of the environmental economics, its policies and global and local environmental issues are addressed as well.

Course 39. -- Environmental Impact Assessment

Course Number	ENV 423
Course Title	Environmental Impact Assessment
Credits	3
Contact Hours	60
Required	Yes
Course Description	This course intended to provide the student with a fundamental understanding of environmental impact analysis process and methodologies; National Environmental Protection Act (NEPA) and related regulations; various environmental documents prepared in response to NEPA requirements; international perspectives; and contemporary issues related to environmental assessment. Environmental Impact Statement spans the environmental review process and environmental impact statement preparation to integrated assessment and adaptive management. The problem-based approach will incorporate the dual facets of environmental impact assessment found in the real world: impact assessment and decision making.

Course 40. -- Environmental Research Methods

Course Number	ENV 425
Course Title	Environmental Research Methods
Semester/Year	2/4
Credits	3
Contact Hours	60
Category	Core Course
Required	Yes

Course Description	Course uses reading, case studies, and conceptual and mathematical modeling to develop an understanding of experimental design, data collection and analysis, and conceptual and basic mathematical models used in environmental research.

Course 41. -- Principles of Environmental Engineering

Course Number	ENV 441
Course Title	Principles of Environmental Engineering
Semester/Year	2/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Required	Yes
Course Description	Introduction to environmental engineering principles and survey of environmental designs and applications.

Course 42. -- Speciality Elective

Course Title	Speciality Elective
Semester/Year	2/4
Credits	3
Contact Hours	45
Category	Speciality Elective
Required	Yes

Course 43. -- Iternship

Course Number	ENV 521
Course Title	Iternship
Semester/Year	3/4
Credits	4
Contact Hours	450
Category	Minor Requirement
Required	Yes
Course Description	On-site- job training, course description depend on the Ministry or institute visited.

Course Configuration

Semester	Course #	Course Title	Credits	Contact Hrs	Category
1/1	SS 112	Values and Loyalties	3	45	General Education Requirement
1/1	IE 101	Islamic Education	2	30	General Education Requirement
1/1	ENG 115	English 1(ESP)	3	60	Language Requirement
1/1	NSC 111	Mathematics for Environmental Sciences	3	60	Major Requirement
1/1	NSC 112	General Physics	3	60	Major Requirement
1/1	NSC 146	General Chemistry	3	60	Science Requirement
		Semester Total	**17**		
2/1	EN 116	English Composition	3	60	Language Requirement
2/1	NSC 131	Organic Chemistry	3	60	Science Requirement
2/1	NSC 150	General Biology	3	60	Science Requirement
2/1	ENV 101	Environmental Science	3	60	Core Course
2/1		General Elective	3	45	General Elective*
		Semester Total	**15**		
1/2	EN 216	Technical Writing	3	90	Language Requirement
1/2	NSC 155	General Microbiology	3	60	Major Requirement
1/2	CS 155	Office applications	3	60	Major Requirement
1/2	ENV 216	Environmental Geology	3	60	Core Course
1/2	NSC 246	Analytical Chemistry	3	60	Major Requirement
		Semester Total	**15**		
2/2	NSC 346	Environmental Chemistry	3	60	Minor Requirement
2/2	ENV 221	Marine Environment	3	60	Core Course
2/2	ENV 222	Sustainable Development	3	45	Core Course
2/2	ENV 224	Environmental Regulations	3	45	Core Course
2/2	ENV 226	Climatology	3	60	Core Course
2/2	ENV 241	Foundation of Engineering Seminar	1	15	Core Course

		Semester Total	**16**		
1/3	SD 105	Introduction to Statistics	3	60	General Requirement
1/3	ENV 311	Desert Environment	3	60	Core Course
1/3	ENV 313	Environmental Analysis	3	60	Major Requirement
1/3	ENV 314	Air Pollution Management	3	60	Core Course
1/3	ENV 316	Meteorology	3	60	Core Course
		Semester Total	**15**		
2/3	ENV 323	Environmental Instrumentation	3	60	Major Requirement
2/3	ENV 324	Solid Waste Management	3	60	Core Course
2/3	ENV 325	Environmental Computer Applications	3	60	Core Course
2/3	ENV 327	Principles of Ecology	3	60	Core Course
2/3		Specialty Elective	3	45	Specialty Elective**
		Semester Total	**15**		
1/4	ENV 414	Water Quality Management	3	60	Minor Requirement
1/4	ENV 416	Remote Sensing and GIS	3	60	Minor Requirement
1/4	ENV 417	Conservation Biology	3	60	Minor Requirement
1/4	ENV 419	Principles of Health Education	3	45	Minor Requirement
1/4	ENV 475	Risk Analysis and Management	3	60	Minor Requirement
		Semester Total	**15**		
2/4	ENV 422	Environmental Economics	3	45	Major Requirement
	ENV 423	Environmental Impact Assessment	3	60	
2/4	ENV 425	Environmental Research Methods	3	60	Core Course
2/4	ENV 441	Principles of Environmental Engineering	3	60	Minor Requirement
2/4		Specialty Elective	3	60	Specialty Elective
		Semester Total	**15**		
3/4	ENV 521	Internship	4	450	Minor Requirement
		Semester Total	**4**		
		Program Total	**127**		

* Students should take minimum of 3 credits of general electives

** Students should take minimum of 3 credits of specialty electives

Industrial Hygiene, Occupational Health and Safety Program

Program Information

Instructional Level	Bachelor or Science
Instructional Area	Environment
Original Developer(s)	Dr. Areena Muard, Dr. Bader Al-Khalaf
Last Revision Date	12/20/2004
Revised By	Dr. Bader Al-Khalaf

Target Population

This program is designed for those who is seeking jobs in the area of Industrial Hygiene, Occupational and Environmental Health, Occupational Risk Analysis and Management

Description

This program is designed to teach and train workforce for government and private sector in the area of Industrial Hygiene and Occupational Health (mainly in oil industry). Graduates will be able to apply acquired knowledge to assess environmental health and occupational problems, analyze and compare environmental and occupational pollution criteria and standards, and apply mitigation procedures.

Career/Job Titles

1. Health Inspector
2. Occupational Safety Officer
3. Occupational Health Inspector
4. Industrial Hygiene Officer

Related DACUM Studies DACUM A

DACUM Title	EHS DACUM
Date	03/03/04
Organization	CDC, PAAET
Facilitator	Dr. Areena Murad, Dr. Bader Al-Khalaf
Method	DACUM

Entry Requirements

1. High School Graduate with Science Inclination
2. High School GPA of minimum 70%
3. Satisfactory result on the personal interview administered by the Department
4. Placement tests: English (minimum 65%), Mathematics (minimum 65%), Chemistry (minimum 65%), Physics (minimum 65%) or 60% minimum score on placement tests and successful completion of the preparatory semester (minimum 65%)

Program Outcomes

1. MONITOR STATUS OF THE ENVIRONMENT

Criteria

A. Demonstrate understanding of principles of environmental monitoring
B. Communicate monitoring information
C. Write report on environmental status
D. Conduct evaluation of the status of the environment
E. Collect environmental data
F. Use portable labs for environmental monitoring
G. Calibrate portable equipment
H. Apply emergency planning procedures

Direct Measures

1

2. APPLY MATHEMATICAL MODELS (DISPERSION MODEL) TO ENVIRONMENTAL MONITORING PRACTICE

Criteria

A. Apply knowledge of principles of modeling to dispersion model analysis
B. Apply basic oceanography principles to model analysis
C. Apply basic meteorological principles to model analysis
D. Use USEPA regulations (comparison of ambient emissions)
E. Apply KUEPA regulations (comparison of ambient emissions)
F. Calculate ambient conversions
G. Complete data entry (use mathematical formulas)
H. Identify type of model
I. Identify source of emission (type, etc.)

Direct Measures

1

3. APPLY ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS) TO OCCUPATIONAL ANALYSIS

Criteria

A. Develop sample EMS
B. Demonstrate understanding of principles of EMS
C. Conduct baseline study for EMS
D. Develop policy procedures
E. Use models for EMS for occupational analysis
F. Maintain EMS model

4. APPLY SH&E IMPACT ASSESSMENT PROCEDURES TO OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT PRACTICE

Criteria

A. Conduct HAZOP
B. Apply PHA
C. Demonstrate understanding of principles of exposure assessment (dose-response)
D. Write HSEIA plan
E. Demonstrate understanding of principles of EIA

5. APPLY WASTE MANAGEMENT PROCEDURES TO SOLID AND HAZARDOUS WASTE MANAGEMENT PRACTICE

Criteria

A. Demonstrate understanding of principles of waste management
B. Communicate hazard information
C. Demonstrate understanding of economics of treatment system
D. Determine optimum treatment
E. Identify waste type
F. Practice waste management rules and regulations
G. Specify collection system
H. Specify treatment system and disposal
I. Maintain data QC/QA standards
J. Analyze samples
K. Sample waste
L. Monitor the disposal sites

6. PARTICIPATE IN RISK ASSESSMENT AND RISK COMMUNICATION (HSE)

Criteria

A. Conduct hazard identification
B. Recommend measures for hazard mitigation
C. Measure hazard levels
D. Identify risk matrix
E. Prioritize risk
F. Locate hazardous spots ("hot spots")
G. Carry out exposure assessment
H. Communicate hazard information (community, media, stakeholders, etc.)
I. Calculate hazard levels

7. MAINTAIN LABORATORY AND FIELD EQUIPMENT

Criteria

A. Maintain and calibrate air sampling equipment

B. Maintain and calibrate water sampling equipment
C. Maintain and calibrate sludge sampling equipment
D. Maintain and calibrate chemical waste sampling equipment
E. Maintain and calibrate soil sampling equipment
F. Maintain and calibrate medical waste sampling equipment
G. Maintain and calibrate biological sampling equipment
H. Maintain and calibrate radiation measuring equipment

8. COLLECT AND PRESERVE ENVIRONMENTAL SAMPLES

Criteria

A. Identify sample location (geographical)
B. Assess sampling results
C. Record sample custody information
D. Report sampling information
E. Transfer sample custody to the lab
F. Transport the sample
G. Preserve the sample
H. Collect needed samples
I. Identify sampling strategy
J. Prepare sampling equipment
K. Identify sampling equipment to use
L. Identify sample type
M. Identify sample matrix
N. Identify sample size

9. ANALYZE ENVIRONMENTAL SAMPLES

Criteria

A. Perform biological analysis of water
B. Perform terrestrial biological analysis
C. Perform air analysis
D. Perform biological analysis of sediments
E. Perform chemical analysis of sediments
F. Perform chemical oceanography analysis
G. Perform physical oceanography analysis

10. ANALYZE ENVIRONMENTAL SAMPLES USING PROTOCOLS

Criteria

A. Use Stockholm Agreement Protocol for analysis of environmental samples
B. Use Shuaiba Industrial Area Protocol for analysis of environmental samples
C. Use ROPME Protocol for analysis of environmental samples
D. Use MSDS Protocol for analysis of environmental samples
E. Use WHO Protocol for analysis of environmental samples
F. Use EPA Protocol for analysis of environmental samples
G. Use OSHA Protocol for analysis of environmental samples

11. APPLY STATISTICAL ANALYSIS TO ENVIRONMENTAL DATA

Criteria

A. Assess environmental data
B. Retrieve results of analysis
C. Run statistical package (SPSS)
D. Do data transformation and coding
E. Sort data
F. Enter data into computer

12. INTERPRET STATISTICAL OUTPUTS

Criteria

A. Demonstrate understanding of principles of design of environmental experiment
B. Interpret results of significance test
C. Interpret results of linear regression
D. Interpret results of ANOVA analysis
E. Interpret results of linear correlation
F. Interpret results of data central tendency and dispersion
G. Use scientific method in experimental design

13. WRITE SCIENTIFIC/TECHNICAL REPORT

Criteria

A. Collect references
B. Prepare and conduct presentation
C. Organize the report order
D. Draw conclusions
E. Draft recommendations
F. Interpret data (results)
G. Define scope of work
H. Conduct baseline analysis

14. DEMONSTRATE UNDERSTANDING OF BASIC ENGINEERING DESIGNS

Criteria

A. Demonstrate understanding of basic principles of design
B. Demonstrate understanding of principles of ergonomics
C. Read blueprints (electrical, mechanical, logos)
D. Demonstrate understanding of basic terminology of design

15. ASSIST IN EPIDEMIOLOGICAL STUDIES

Criteria

A. Demonstrate understanding of basic epidemiological concepts
B. Conduct critical review of epidemiological studies
C. Prepare epidemiological report
D. Interpret epidemiological data analysis results
E. Execute data analysis
F. Conduct surveillance of the work-related conditions
G. Apply epidemiological methods

General Education Outcomes

1. Apply scientific concepts and terminology.
2. Develop familiarity with the scientific method.
3. Explain the cell concept in the organization of living things.
4. Discuss the energy intake, storage, and use in living systems.
5. Describe the concept of atoms and molecules and their relationship to all matter.
6. Describe the symbols for the importance of the major atoms found in living things: C, H, O, N, Na, and K.
7. Use the writing process to prepare and present written documents.
8. Apply mathematical symbols and concepts to area of study.
9. Use word processing software to employ the writing process to create effective paragraphs, expository writings, and business correspondence utilizing appropriate methods.
10. Use research effectively and correctly to create oral and written presentations.
11. Create documents following appropriate layout and design.
12. Read and understand written passages.
13. Student will demonstrate knowledge of introductory computer concepts with hands-on application. .
14. Apply economics to the environmental research and experimental design
15. Interpret current trends impacting the workplace.
16. Technical Reporting (Associate Degree)
17. Economics - Upon successful completion of this course, the student will be able to:
18. Use various communication strategies to share meaning orally.
19. Use a scientific calculator to perform mathematical calculations.
20. Recognize appropriate sources for current information.
21. Written Communication (Associate Degree)
22. Read and understand technical materials
23. Written communication
24. Report writing
25. General Anatomy and Physiology
26. Statistics
27. Surveillance Methods
28. Disease symptoms
29. Solve simple equations.
30. Use given formula(s) to solve problems.
31. Demonstrate the concept of balanced chemical reactions.
32. General Education Chemistry and Physics - General Education Chemistry and Physics at FVTC provides students with a physical science foundation so that they may recognize and apply scientific concepts in their programs, careers, and lives. Student will have acquired the tools to develop logical, problem solving skills. Problem solving includes data collection and analysis. The acquisition of data required participation as a member of a team, as well as utilization of computers and laboratory equipment. The analysis of data requires decision making, interpretation, and communication of results. Critical thinking in the physical sciences demands a basic understanding of the relationships between matter and energy. In Physics, the emphasis is on concepts of energy such as mechanics, heat, fluids, light, electricity, and magnetism. In Chemistry the emphasis is on the structure (atoms, compounds, and mixtures) and changes (chemical reactions) of matter.
33. Determine laboratory procedures needed for correct diagnoses.
34. Integrate the fundamental chemistry conc. of measurement, calc., observation, and occupational applications.
35. Use percent formula(s) in solving applications.
36. Interpret basic statistical data.
37. Use both United States Customary System and the Metric System of measurement, and convert between the two systems.
38. Understand governmental participation at the grass-roots level.

39. Upon completion of the Economics course, individuals will be able to:
40. Oral/Interpersonal Communication (Associate Degree)
41. Introduction to Computer Literacy (2 and 3 credits) - The computer novice who successfully completes Introduction to Computer Literacy (2 credits) will demonstrate knowledge of introductory computer concepts through exploration and hands-on application. The concepts explored include basic computer systems, operating systems, Internet and email, word processing, spreadsheets, databases, presentation graphics and social issues of computer use. The student who successfully completes Introductory to Computer Literacy (3 credits) will have additional keyboarding experience.
42. Algebra - The student who successfully completes Algebra will apply basic algebraic concepts (integers, equations, factoring, graphing, formula rearrangement, and systems of equations) and problem-solving skills to meet specific Computer Information Systems program requirements.
43. Anatomy and Physiology 1 and 2 - A student who successfully completed Anatomy and Physiology 1 and 2 will have the knowledge of the complex structural and physiological interrelationships within the human body. This will be accomplished by a study of the cellular basic of life and a comprehensive study of all the major body organ systems, fluid, electrolyte, and acid base balance through study of current scientific knowledge and investigation during applicable laboratory activities. The student will be able to integrate and apply this information in their program courses, clinical and community setting, and continued professional advancement.
44. Microbiology - The student who successfully completes Microbiology demonstrates a knowledge of the dynamic relationship between microorganisms and the human body in health and disease. The student can apply this knowledge to their program courses, community and clinical health care needs, and continued professional advancement. Students differentiate among the variety of microorganisms (bacteria, viruses, fungi, protozoa, and helminthes), their natural habitat, structural features, and method of transmission. Students will begin the process of applying this knowledge to basic principles of treatment and prevention of disease in their occupation field. Students use critical thinking skills and strategies for solving problems: interpretation of microbiology laboratory data, demonstrating understanding of isolation procedures in a hospital setting, predicting why and how public health strategies prevent community outbreaks of infectious diseases. Students work safely with microorganisms in the laboratory and apply this skill to prevention of disease in the health care setting and for their own safety. Students work successfully in laboratory teams and, utilizing computers, complete laboratory data analysis.
45. Biology - The student who successfully completes Biology demonstrates a knowledge of the unity and diversity of life and the dynamic interactions among all organisms. Students differentiate among organisms, their role in the biosphere and their relationship to each other. Students will apply this knowledge to responsible utilization of earth's resources and appropriate preservation of the environment. Students work safely and carefully in a laboratory setting and apply this skill to acquiring and interpreting data in their occupational field.
46. General Chemistry (Associate Degree) - Students enrolled in the Associate Degree Nursing, Dental Hygiene, Natural Resources, Agriculture Science and Technology, and Fire Protection Technology programs will have gained experience with inorganic chemical structures, e.g. writing and balancing chemical equations. They will also have studied organic chemical structure, properties, and names, and to a lesser extent, reactions in organic chemistry.
47. Introduction to Psychology - Upon successful completion of this course, the student will be able to:
48. Perform mathematical calculations.

Core Abilities

1. Information Literacy and Research
   Indicators
   A. learner identifies, locates and uses informational tools for research purposes
2. Global Perspective

Indicators

A. learner demonstrates understanding of the value of a global perspective on society with respect to past, present and future events

3. Apply academics
   Indicators
   A. learner transfers academic knowledge and principles to life and work situations
4. Work effectively in teams
   Indicators
   A. learner demonstrates awareness of and respect for individual team member's differences.
   B. learner completes own share of tasks necessary to complete project/activity.
   C. learner encourages team members by listening and responding appropriately to their contributions.
   D. learner gives and accepts constructive criticism.
5. Develop self-awareness
   Indicators
   A. learner recognizes his/her individual self-worth, strengths, weaknesses and potential for growth
   B. learner recognizes his/her individual biases and values
   C. learner demonstrates the ability to give and receive constructive feedback
   D. learner develops time and stress management skills
   E. learner sets goals and devises strategies for educational, personal, and professional development in a changing world, consistent with his/her abilities and circumstances
6. Communicate effectively utilizing reading, writing, speaking and listening skills
7. Communicate in written for effectively (in English)
   Indicators
   A. learner communicates effectively in written forms
   B. learner uses appropriate technology that supports or facilitates communication
8. Apply scientific and mathematical knowledge
   Indicators
   A. learner collects, organizes, computes and interprets quantitative and qualitative data and/or information
   B. learner applies mathematics, science and technology to make decisions
9. Think critically in the problem solving process
   Indicators
   A. learner thinks critically
   B. learner solves problems using basic research, analysis and interpretation
10. Have global perspect of the local problems
    Indicators
    A. learner demonstrates understanding of the value of a global perspective on society with respect to past, present and future events
11. Use computer technology
    Indicators
    A. learner recognizes the impact of technology
    B. learner selects and uses appropriate technology
12. Develop job-seeking skills
    Indicators

A. learner identifies job possibilities
B. learner writes a resume
C. learner completes an application for a job
D. learner participates in an effective interview
E. learner accepts or rejects a job offer
F. learner develops a record keeping system for job search
G. learner researches job clusters to determine possible careers
H. learner determines career choices and alternative using personal information and career research
I. learner sets long-range and short-range goals
J. learner develops a plan of action to achieve goals
K. learner networks with peer groups and people in their career field

13. Communicate effectively
    Indicators
    A. learner applies appropriate reading, writing, speaking, and listening skills to express information, ideas, and opinions
    B. learner interprets non-verbal communication
14. Learn effectively
    Indicators
    A. learner takes responsibility for self as a learner
    B. learner applies the learning process: assessing, planning, implementing, and evaluating
    C. learner identifies, assimilates, and integrates information and ideas
    D. learner organizes and uses learning activities in a lifelong process
15. Demonstrate social interaction
    Indicators
    A. learner behaves appropriately in a variety of situations, circumstances, and roles
    B. learner works effectively in pairs, as well as small and large groups
    C. learner demonstrates awareness of, and respect for, personal differences
    D. learner recognizes conflicts and uses conflict resolution skills when appropriate
16. Use appropriate technology
    Indicators
    A. learner selects procedures, equipment, tools and resources to produce desired results.
    B. learner analyzes technology resources to meet needs.
    C. learner demonstrates knowledge of technology on the job and in personal life.
17. Behave ethically
    Indicators
    A. learner accepts responsibility for his/her actions
    B. learner demonstrates respect for the rights, views, and work of others
    C. learner exhibits personal, professional, and academic honesty
    D. learner recognizes his/her responsibility to personal, social, professional, and educational environments and makes informed decisions based on that responsibility
    E. learner displays behavior consistent with the ethical standards within a discipline or profession
18. Take responsibility for her or his own actions.

Indicators

A. learner acknowledges one's actions
B. learner acknowledges one's role in group activities
C. learner reviews the results of one's actions
D. learner identifies the successes resulting from one's actions
E. learner identifies any problems resulting from one's actions and makes adaptations
F. learner evaluates and acts upon feedback

19. Social and Civic Responsibility
    Indicators
    A. learner demonstrates ethical and cultural awareness
    B. learner demonstrates an understanding of cultural diversity
    C. learner demonstrates effective and appropriate modes of social interaction
20. Use technology
    Indicators
    A. learner recognizes the impact of technology
    B. learner selects and uses appropriate technology
21. Act responsibly
22. Work cooperatively
    Indicators
    A. learner works with others to complete tasks, solve problems, resolve conflicts, share information, and offer support with a global and cultural awareness
23. Analytical skills
24. Research skills
25. Interpersonal skills
26. Ethics
27. Critical Thinking and Problem Solving
    Indicators
    A. learner thinks critically
    B. learner solves problems using basic research, analysis and interpretation
28. Use mathematics
    Indicators
    A. learner performs computations using appropriate methods
    B. learner demonstrates knowledge and application of measurement
    C. learner reads, interprets, and generates graphical information
    D. learner demonstrates knowledge and application of formulas
    E. learner uses critical thinking skills in a mathematical context
29. Scientific, Mathematical & Technological
    Indicators
    A. learner collects, organizes, computes and interprets quantitative and qualitative data and/or information
    B. learner applies mathematics, science and technology to make decisions
30. Think critically and creatively
    Indicators
    A. learner applies the principles and strategies of purposeful, organized thinking
    B. learner practices analytical, explorative, and innovative thinking

C. learner demonstrates the integration of culturally and aesthetically based knowledge and understanding into problem solving activities

31. Solve problems
    Indicators
    A. learner identifies problems to be solved, tasks to be performed, or decisions to be made.
    B. learner formulates alternative solutions, processes, or decisions and identifies potential consequences.
    C. learner selects appropriate solutions, processes or decisions.
    D. learner evaluates problems, monitors the feedback and revises plans indicated by the findings.
32. Cultivate global awareness
    Indicators
    A. learner expresses an understanding of the interconnections and interactions among people and systems
    B. learner accumulates knowledge of, and experience with, people in his/her own and other cultures, and how they live, think, communicate, and view the world
    C. learner describes the impact of the global economy on life, work, and opportunities
    D. learner recognizes the commonality of human experiences across cultures
    E. learner recognizes the influence of diverse cultural perspectives on human thought and behavior
33. Use science and technology
    Indicators
    A. learner demonstrates knowledge of scientific terminology and principles
    B. learner uses scientific principles appropriately in problem-solving and decision-making
    C. learner applies the scientific method by organizing, analyzing, and interpreting data
    D. learner uses appropriate scientific equipment, methods, and safety precautions
    E. learner describes the changing nature of the interaction among science, technology, and society
    F. learner uses critical thinking skills to approach and use new technology
34. Apply effective problem solving strategies

Program Course Detail

Course 1. -- Values and Loyalties

Course Number	SS 112
Course Title	Values and Loyalties
Semester/Year	1/1
Credits	3
Contact Hours	45
Category	General Education Requirement

Course 2. -- English (ESP)

Course Number	ENG 115
Course Title	English (ESP)

Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Language Requirement
Course Description	This course in critical reading for special purposes and expository writing offers training in the writing process, the development and organization of expository prose, and research techniques. The course emphasizes quality in logic and diction.

Course 3. -- Mathematics for Enviromental Science

Course Number	NSC 111
Course Title	Mathematics for Enviromental Science
Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Major Requirement
Course Description	The course is designed to introduce basic analytic and geometric properties of the algebraic functions with heavy emphasis on the trigonometry. Topics included are: algebraic and trigonometric techniques, coordinate geometry, functions and relations and their graphic representation, and common logarithms.

Course 4. -- General Physics

Course Number	NSC 112
Course Title	General Physics
Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Science Requirement
Course Description	Study of principles and applications of concepts in mechanics, energy and heat, wave motion, sound, light and waves , electricity and principles of nuclear physics, and dimensional analysis in problem solving. Students of physics gain a conceptual understanding of physical systems. Students use algebra, simple statistics, and trigonometry to understand forces. They engage in experimentation, scientific reasoning and logic, and data analysis and evaluation.

Course 5. -- General Chemistry

Course Number	NSC 146
Course Title	General Chemistry

Semester/Year	1/1
Credits	3
Contact Hours	60
Category	Science Requirement
Course Description	Course Description. This course covers fundamental principles and laws of chemistry. Topics include measurement, atomic and molecular structure, periodicity, chemical reactions, chemical bonding, stoichiometry, thermochemistry, gas laws, and solutions

Course 6. -- Islamic Education

Course Number	IE 101
Course Title	Islamic Education
Semester/Year	1/1
Credits	2
Contact Hours	30
Category	General Education Requirement

Course 7. -- English Composition

Course Number	EN 116
Course Title	English Composition
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Language Requirement

Course 8. -- Organic Chemistry

Course Number	NSC 131
Course Title	Organic Chemistry
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Science Requirement
Course Description	This course is designed to introduce organic compounds: their structures and functions in living organisms. Emphasis is made on the chemistry of living state: lipids, carbohydrates, proteins, and nucleic acids.

Course 9. -- General Biology

Course Number	NSC 150
Course Title	General Biology
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Science Requirement
Course Description	This course is designed to provide the student with a background in the basic principles of biology. It will acquaint students with the classification, structure and function of living organisms. It will enable students to identify representative members of different taxonomic groups of living organisms, as well as the structural characteristics of these groups. Emphasis is made on ecology, population, cellular and organismal biology, genetics, evolution, and the diversity of life, and how you relate to your environment.

Course 10. -- Environmental Science

Course Number	ENV 101
Course Title	Environmental Science
Semester/Year	2/1
Credits	3
Contact Hours	60
Category	Core Course
Course Description	This course intended to provide a background of the basic chemical, physical and biological concepts and processes that help to understand environment and how it works; analyze relationship between humans and the environment including causes of environmental problems and consequences of human impact on the environment; identify major environmental problems and pros and cons of possible solutions.

Course 11. -- Ceneral Elective

Course Title	Ceneral Elective
Semester/Year	2/1
Credits	3
Contact Hours	45
Category	General Elective
Course Description	General elective course may be taken in areas of social studies, computer, or general science and education.

Course 12. -- Technical Writing

Course Number	EN 216

Course Title	Technical Writing
Semester/Year	1/2
Credits	3
Contact Hours	90
Category	Language Requirement
Course Description	This course addresses the principles and methods of oral and written communication required in the work environment. It provides both a theoretical grounding and practical experience in the field of workplace writing. In addition to creating memoranda, resumes, reports, proposals, and presentation materials, students will explore such topics as collaboration, document design, the ethical position of the workplace writer, and the special challenges posed by the increasingly international context of today's workplace environment Students will complete assignments in the classroom setting. Students will focus on interviewing skills, problem-solving skills, and technical correspondence demonstrating accuracy in grammar and mechanics.

Course 13. -- Office Applications

Course Number	CS 115
Course Title	Office Applications
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Major Requirement
Course Description	This course is designed to provide students with a basic knowledge of computer software. It is also designed to give students a practical usage of office used applications such as word processing, spreadsheet, slideshow, database and e-mail

Course 14. -- General Microbiology

Course Number	NSC 155
Course Title	General Microbiology
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Minor Requirement
Course Description	This course is designed to expose students to the general concepts of microbiology including the morphology, physiology, and genetics of microbes and the importance of microbial activities from medical, industrial, and ecological standpoints

Course 15. -- Analytical Chemistry

Course Number	NSC 246
Course Title	Analytical Chemistry
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Major Requirement
Course Description	Study of the fundamental principles of quantitative analytical chemistry including basic statistics. An intensive laboratory experience which applies these principles to gravimetric, volumetric, colorimetric, chromatographic, and electroanalytical determination. Analytical chemistry concerns itself with the techniques and methods that answer the questions "What?" and "How much?" in the analysis of the chemical composition of matter. "What?" is the province of qualitative analysis, while "How much?" is the province of quantitative analysis. In this course, our focus will be with "How much?" -- the problems associated with the quantification of the amount of a species present in a given sample. A thorough understanding of quantitative analysis is a vital necessity for virtually all physical and biological scientists who are obliged to collect analytical data and apply statistical treatments to the data. A study of quantitative analysis is also of benefit in that it places the highest premium upon careful, orderly work and intellectually honest and fair observation. There are skills worthy of cultivating regardless of one's ultimate field of endeavor.

Course 16. -- Enviromental Geology

Course Number	ENV 216
Course Title	Enviromental Geology
Semester/Year	1/2
Credits	3
Contact Hours	60
Category	Core Course
Course Description	This course intended to provide a background of concepts and processes that allow us to make meaningful assessment of problems related to human interactions with nature in terms of natural disasters and natural resources management, environmental ethics and human population growth consequences.

Course 17. -- Anatomy and Physiology

Course Number	MED 158
Course Title	Anatomy and Physiology
Semester/Year	2/2
Credits	3

Contact Hours	60
Category	Minor Requirement
Course Description	This course is designed to introduce students to the structure and organization of various systems in the human body. It deals with the structure and function of the musculoskeletal system, nervous system, circulatory system, blood, digestive system, urinary system, endocrine and reproductive systems. Using a body systems approach, the course emphasizes the interrelationships between structure and function at the gross and microscopic levels of organization of the entire human body.

Course 18. -- Introduction to Statistics

Course Number	SD 105
Course Title	Introduction to Statistics
Semester/Year	2/2
Credits	3
Contact Hours	60
Category	General Education Requirement
Course Description	This course will introduce the concepts of probability, including: sets, Venn diagrams, definition of probability, algebra of probabilities, counting principles, some discrete random variables and their distributions, graphical displays, expected values, the normal distribution, the Central Limit Theorem, applications, and some statistical concepts

Course 19. -- Environmental Regulations

Course Number	ENV 224
Course Title	Environmental Regulations
Semester/Year	2/2
Credits	3
Contact Hours	45
Category	Core Course
Course Description	Course is designed to introduce a global and local attempts to regulate the environment. The central issues are social movements, international environmental regimes, major environmental regulations and tools which help you to find the law, interpret it and use it.

Course 20. -- Foundation of Engineering Seminar

Course Number	ENV 241
Course Title	Foundation of Engineering Seminar
Semester/Year	2/2
Credits	1

Contact Hours	15
Category	Core Course
Course Description	A course designed to introduce students to the requirements for general engineering: introduction to engineering graphics and blue prints interpretation, engineering terminology and abbreviations, and environmental systems designs analysis.Topics included are: interpreting drawings and blueprint reading in machine trades, types of lines used on a drawing, and how parts are shown in different views, Dimensioning and Tolerancing and engineering economics and thermodynamics.

Course 21. -- Public Health

Course Number	ENV 274
Course Title	Public Health
Semester/Year	2/2
Credits	3
Contact Hours	45
Category	Core Course
Course Description	Course introduce concepts of demography, fundamental aspects of public health, environmental impacts on health and principles of communicable and prevention of diseases.

Course 22. -- General Elective

Course Number	ENV 212
Course Title	General Elective
Semester/Year	2/2
Credits	3
Contact Hours	45
Category	General Elective

Course 23. -- Clinical Medicine

Course Number	MED 160
Course Title	Clinical Medicine
Semester/Year	1/3
Credits	3
Contact Hours	45
Category	Minor Requirement
Course Description	This course will emphsis the First Aid basic procedures. It will focus on the immediate care given to the injured or suddenly ill person. It is the temporary assistance that is rendered until competent medical care, if required, arrives and takes over. This is a basic course on health care

	issues. This course will provide the learner the skills of First Aid practices in work or lifestyle places in locations where the EMS (Emergency Medical Services) response time is questionable.??CrLf??

Course 24. -- Environmental Analysis

Course Number	ENV 313
Course Title	Environmental Analysis
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Major Requirement
Course Description	Laboratory and lecture on sampling. Field and laboratory analysis of chemical and physical agents found in the occupational and ambient environments.

Course 25. -- Air Pollution Management

Course Number	ENV 314
Course Title	Air Pollution Management
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Core Course
Course Description	Air quality protection, already a major concern throughout most of the world, is expected to increase in importance in the foreseeable future. In the U.S., the milestone Clean Air Act Amendments of 1990 have given a strong impetus to this area of environmental management. At the present time, several billions of dollars are being spent each year to protect air quality, and the statutory and regulatory programs of the federal and state governments are reaching into all aspects of our society. This course explores the nature of critical local, regional, continental and global problems associated with air pollution and covers the historical evolution of such problems. It examines the complex regulatory and institutional framework controlling air quality management and explains current air quality management concepts and processes. Specific topics studied in the course include the history of air pollution, identification of atmospheric pollutants and their sources, effects of air pollution, emission and ambient air quality sampling and analysis, monitoring and surveillance networks, transport and dispersion of air pollutants, air pollution modeling and climatology, air quality criteria and standards, elements of regulatory control, and engineering control concepts, devices and systems.

Course 26. -- Meteorology

Course Number	ENV 316
Course Title	Meteorology
Semester/Year	1/3
Credits	3
Contact Hours	60
Category	Core Course
Course Description	This course is a study of atmosphere and how its working. It intends to provide comprehensive background in the basic meteorology and its tools and methods. Topics included are: structure and processes in the atmosphere, Earth-Sun relationship, atmosphere-environment relationship and recent global climate changes, specifically those induced by human activity.

Course 27. -- Ergonomics

Course Number	ENV 374
Course Title	Ergonomics
Semester/Year	1/3
Credits	3
Contact Hours	45
Category	Minor Requirement
Course Description	The Ergonomics course is concerned with the achievement of optimal relationships between humans and their work environment. Topics include the capabilities and limitations of humans and machines, simulation of design and training, principles of symbolic and pictorial displays, static and dynamic forces on the human body, responses to environmental stress, injuries from poorly designed workplaces, and repetitive motion with emphasis on prevention.

Course 28. -- Occupational Health and Safety

Course Number	ENV 325
Course Title	Occupational Health and Safety
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Minor Requirement
Course Description	This course introduce the effects of exposure to chemical, physical, and biological agents, embracing the community and workplace environments. It examines scientific determinations of environmental risks and explores how such determinations are evaluated by affected communities and society. It employs risk analysis to integrate technical knowledge in hazard identification and exposure assessment to provide a more rational basis for environmental policies.

Course 29. -- Environmental Instrumentation

Course Number	ENV 323
Course Title	Environmental Instrumentation
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Major Requirement
Course Description	This course is an introduction to laboratory and field portable instrumentation base applications to monitoring of environmental parameters. Topics included are: setting, calibration, running and maintaining of instrumentation as well as instrumental analytical methods.

Course 30. -- Solid Waste Management

Course Number	ENV 324
Course Title	Solid Waste Management
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Core Course
Course Description	The course gives an introduction to management of solid wastes. Collection, separation, thermal and biological treatment and construction, operation and monitoring of sanitary landfills is in focus. The course concerns alternative strategies for waste management and recycling of different types of solid waste. These methods include incineration, composting and anaerobic digestion. Environmental assessment of the different waste managment options with respect to energy and resource consumption as well as environmental pollution is also included in the course. Basic engineering design, planning, and analysis problems associated with storage, collection, processing, and disposal of solid wastes are also included.

Course 31. -- Environmental Computer Applications

Course Number	ENV 325
Course Title	Environmental Computer Applications
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Core Course

Course Description	This course is a brief introduction to creating, manipulating and analyzing databases using Excel and SPSS software with emphasis on their applications for environmental data storage, organization and analysis

Course 32. -- Environmental Toxicology

Course Number	ENV 346
Course Title	Environmental Toxicology
Semester/Year	2/3
Credits	3
Contact Hours	60
Category	Minor Requirement
Course Description	The course presents an introduction to the study of hazardous substances, their effect on humans and their action and movement in the environment. Emphasis is placed on substances of a particular concern today.

Course 33. -- Principles of Industrial Hygiene

Course Number	ENV 474
Course Title	Principles of Industrial Hygiene
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Course Description	The philosophy of the course is to teach students the basic tenets of industrial hygiene and to impress upon them their responsibility as health and safety professionals to anticipate, recognize, evaluate and control those environmental factors or stresses, arising in or from the workplace, which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among workers or among the citizens of the community.This course also considers the principles and practices of the fundamentals of Occupational Safety & Health and its relationship to Industrial Safety with the focus on the process of safety, environmental technology and management needs of the safety professional, we will focus on the basics that the safety and health professionals need to understand before they can accept responsibility for reducing hazards and "Loss Prevention," by the conservation of our physical and human resources by protecting people, property, and the environment from undesired outcomes that depreciate them or inhibit their enrichment entrusted to them. Performance Management will be discussed throughout the semester. Stress is made on basic concepts of industrial hygiene including anticipation, recognition, evaluation and control of environmental and safety hazards as they pertain to the workplace.

Course 34. -- Water Quality Management

Course Number	ENV 414
Course Title	Water Quality Management
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Core Course
Course Description	Throughout history, the planning and management of water resources has remained among the chief concerns of society. For example, water shortages in parts of the world over the next 25 years will pose the single greatest threat to food production and human health. This course examines the basic physical and chemical aspects of the applied interdisciplinary science of hydrology and offers a broad perspective on the underlying hydrologic processes that directly influence sound water planning and management decisions. The organization of this course around the unifying concepts of the hydrologic cycle and the watershed allows application of hydrologic theory to local problems of water quantity and quality. Laboratory and field work provide opportunities to measure stream and ground-water flow, construct physical and computer models of flow, sample for and analyze water quality, conduct hydrologic site investigations, and design simple engineering solutions for hydrologic hazards such as floods and droughts.

Course 35. -- Principles of Epidemiology

Course Number	ENV 418
Course Title	Principles of Epidemiology
Semester/Year	1/4
Credits	3
Contact Hours	60
Course Description	Course introduces the concepts of epidemiology, measurements of health and diseases, types of epidemiological studies, causation and environmental epidemiology.

Course 36. -- Risk Analysis and Management

Course Number	ENV 475
Course Title	Risk Analysis and Management
Semester/Year	1/4
Credits	3
Contact Hours	60
Category	Minor Requirement
Course Description	This course will provide students with an overview of human health risk assessment particularly within the context of environmental, occupational and community settings. Students will learn about the traditional and

	stakeholder centered risk assessment process including hazard identification, exposure assessment, risk assessment, characterization, and communication. Case studies will be emphasized to provide a real world grounding for studentsSpecial emphasis is on the complexity of making decisions about threats to human health and the environment when people's perception of risks and their decision-making process differ from expert views. Recognizing the limitations of individuals in processing information the course explores the role of techniques such as decision analysis, cost-benefit analysis, risk assessment and risk perception in structuring risk management decisions. The policy tools such as risk communications, incentive systems, third party inspection, insurance and regulation are also explored.

Course 37. -- Speciality Elective

Course Title	Speciality Elective
Semester/Year	1/4
Credits	3
Contact Hours	45
Category	Speciality Elective

Course 38. -- Environmental Economics

Course Number	ENV 422
Course Title	Environmental Economics
Semester/Year	2/4
Credits	3
Contact Hours	45
Category	Major Requirement
Course Description	This course focuses on the relationship between the economy and the environment. It examines the causes of environmental problems and potential policies that can be used to address them. The role of externalities, property rights, and public goods is considered. The advantages and disadvantages of different regulatory responses are discussed. These include direct regulation and the more recent innovations such as incentive-based measures: emission taxes and tradable emission permits. The course examines methods used to value the costs and benefits of achieving a given level of environmental quality. Class debates focus on important and controversial environmental policy issues. Tools of the environmental economics, its policies and global and local environmental issues are addressed as well.

Course 39. -- Environmental Research Methods

Course Number	ENV 425
Course Title	Environmental Research Methods
Semester/Year	2/4
Credits	3
Contact Hours	60
Category	Core Course
Course Description	Course uses reading, case studies, and conceptual and mathematical modeling to develop an understanding of experimental design, data collection and analysis, and conceptual and basic mathematical models used in environmental research.

Course 40. -- Sampling Methods in Industrial Hygiene

Course Number	ENV 485
Course Title	Sampling Methods in Industrial Hygiene
Semester/Year	2/4
Credits	3
Contact Hours	45
Category	Minor Requirement
Course Description	Air sampling methods for gases, vapors, aerosols and fibers including integrated, direct reading, bulk, surface and biological methods. Control procedures including instrument calibration, preparation of test atmospheres, and statistical methods for data analysis. Design of sampling strategies.

Course 41. -- Principles of HSE Inspection

Course Number	ENV 484
Course Title	Principles of HSE Inspection
Semester/Year	2/4
Credits	3
Contact Hours	45
Category	Minor Requirement
Course Description	This course is designed to provide students with basic information on the concepts and principles of Health, Safety and Environmental Inspection which can be used by the regulatory and HSE Departments within governmental and private organizations and ensure all activities are according to accepted standards, laws and regulations. Topics included are: definition of the environmental inspection and its objectives, inspection activities and writing inspection reports.

Course 42. -- Speciality Elective

Course Title	Speciality Elective
Semester/Year	2/4
Credits	3
Contact Hours	45
Category	Speciality Elective

Course 43. -- Iternship

Course Number	ENV 523
Course Title	Iternship
Semester/Year	3/4
Credits	4
Contact Hours	450
Category	Minor Requirement
Course Description	On-site- job training, course description depend on the Ministry or institute visited.

Course Configuration

Semester	Course #	Course Title	Credits	Contact Hrs	Category
1/1	SS 112	Values and Loyalties	3	45	General Education Requirement
1/1	ENG 115	English (ESP)	3	60	Language Requirement
1/1	NSC 111	Mathematics for Enviromental Science	3	60	Major Requirement
1/1	NSC 112	General Physics	3	60	Science Requirement
1/1	NSC 146	General Chemistry	3	60	Science Requirement
1/1	IE 101	Islamic Education	2	30	General Education Requirement
		Semester Total	**17**		
2/1	EN 116	English Composition	3	60	Language Requirement
2/1	NSC 131	Organic Chemistry	3	60	Science Requirement
2/1	NSC 150	General Biology	3	60	Science Requirement
2/1	ENV 101	Environmental Science	3	60	Core Course
2/1		General Elective	3	45	General Elective*
		Semester Total	**15**		
1/2	EN 216	Technical Writing	3	90	Language Requirement
1/2	CS 115	Office Applications	3	60	Major Requirement
1/2	NSC 155	General Microbiology	3	60	Minor Requirement
1/2	NSC 246	Analytical Chemistry	3	60	Major Requirement

1/2	ENV 216	Enviromental Geology	3	60	Core Course
		Semester Total	**15**		
2/2	MED 158	Anatomy and Physiology	3	60	Minor Requirement
2/2	SD 105	Introduction to Statistics	3	60	General Requirement
2/2	ENV 224	Environmental Regulations	3	45	Core Course
2/2	ENV 241	Foundation of Engineering Seminar	1	15	Core Course
2/2	ENV 274	Public Health	3	45	Core Course
2/2		General Elective	3	45	General Elective
		Semester Total	**16**		
1/3	MED 160	Clinical Medicine	3	45	Minor Requirement
1/3	ENV 313	Environmental Analysis	3	60	Major Requirement
1/3	ENV 314	Air Pollution Management	3	60	Core Course
1/3	ENV 316	Meteorology	3	60	Core Course
1/3	ENV 374	Ergonomics	3	45	Minor Requirement
		Semester Total	**15**		
2/3	ENV 325	Occupational Health and Safety	3	60	Minor Requirement
2/3	ENV 323	Environmental Instrumentation	3	60	Major Requirement
2/3	ENV 324	Solid Waste Management	3	60	Core Course
2/3	ENV 325	Environmental Computer Applications	3	60	Core Course
2/3	ENV 346	Environmental Toxicology	3	60	Minor Requirement
		Semester Total	**15**		
1/4	ENV 474	Principles of Industrial Hygiene	3	60	Minor Requirement
1/4	ENV 414	Water Quality Management	3	60	Core Course
1/4	ENV 418	Principles of Epidemiology	3	60	
1/4	ENV 475	Risk Analysis and Management	3	60	Minor Requirement
1/4		Speciality Elective	3	45	Speciality Elective**
		Semester Total	**15**		
2/4	ENV 422	Environmental Economics	3	45	Major Requirement
2/4	ENV 425	Environmental Research Methods	3	60	Core Course

2/4	ENV 485	Sampling Methods in Industrial Hygiene	3	45	Minor Requirement
2/4	ENV 484	Principles of HSE Inspection	3	45	Minor Requirement
2/4		Speciality Elective	3	45	Speciality Elective
		Semester Total	**15**		
3/4	ENV 523	Iternship	4	450	Minor Requirement
		Semester Total	**4**		
		Program Total	**127**		

* Students should take minimum of 3 credits of general electives

** Students should take minimum of 3 credits of specialty electives