(GRADUATE STUDIES)

Master of Science Programs

STATUS REPORT

NOVEMBER 2008
Program Detailed Structure

M.Sc. Program

(B) Environmental Engineering
# M.Sc. in Construction and Building Engineering

## (B) Environmental Engineering

### Program Structure

### Core Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB 720</td>
<td>Water Quality Management and Waste Water Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CB 721</td>
<td>Air Pollution and Indoor Air Quality</td>
<td>3</td>
</tr>
<tr>
<td>CB 722</td>
<td>Management of Solid, Hazardous and Radioactive Waste</td>
<td>3</td>
</tr>
<tr>
<td>CB 723</td>
<td>Environmental Impact Assessment of Civil Engineering Projects</td>
<td>3</td>
</tr>
</tbody>
</table>

**Subtotal**: 4 Courses * 3 Credit Hours = 12

### Elective Courses: Group (1)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB 724</td>
<td>Environmental Legislation and Regulation</td>
<td>3</td>
</tr>
<tr>
<td>CB 725</td>
<td>Ecological Concepts</td>
<td>3</td>
</tr>
<tr>
<td>CB 726</td>
<td>Noise Pollution</td>
<td>3</td>
</tr>
<tr>
<td>CB 727</td>
<td>Marine Pollution</td>
<td>3</td>
</tr>
<tr>
<td>CB 728</td>
<td>Environmental Economy and Sociology</td>
<td>3</td>
</tr>
<tr>
<td>CB 729</td>
<td>Energy and Natural Resources Conservation</td>
<td>3</td>
</tr>
<tr>
<td>CB 720-E</td>
<td>Environmental Modeling</td>
<td>3</td>
</tr>
</tbody>
</table>

**Subtotal**: 3 Courses * 3 Credit Hours = 9

continued/…
ELECTIVE COURSES: GROUP (2)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB 714</td>
<td>Advanced Systems Analysis for Construction Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CB 763</td>
<td>Surface and Subsurface Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CB 740-S</td>
<td>Finite Element Method</td>
<td>3</td>
</tr>
<tr>
<td>CB 734</td>
<td>Soil Stabilization Techniques</td>
<td>3</td>
</tr>
<tr>
<td>CB 752-T</td>
<td>Advanced Construction Surveying</td>
<td>3</td>
</tr>
<tr>
<td>CB 759</td>
<td>Traffic Engineering and Environment</td>
<td>3</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1 Course * 3 Credit Hours</strong></td>
<td><strong>3</strong></td>
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</tbody>
</table>

RESEARCH THESIS:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB 701</td>
<td>Master's Research Thesis (Part 1)</td>
<td>6</td>
</tr>
<tr>
<td>CB 702</td>
<td>Master's Research Thesis (Part 2)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>2 Parts * 6 Credit Hours</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

**Total** 36
Course Code: CB 720

Course Title: Water Quality Management and Waste Water Treatment

Credit Hours: 3

Course Description
Water quality standards, water quality management in rivers and lakes, water pollutants sources, water and waste-water treatment systems, pollution of natural water bodies, ground water pollution, effects of water pollution on health and vegetation, development and implementation of pollution prevention programs.

Course Objectives
To enable the student to acquire the steps of water and waste water treatment, identify the characteristics of different water pollutants, and evaluate the effects of water pollution on health and vegetation.

Course Topics
- Water quality standards
- Water quality management in rivers and lakes
- Water pollutants sources, water and waste-water treatment systems
- Pollution of natural water bodies
- Ground water pollution
- Development and implementation of pollution prevention programs

References
Course Code : CB 721
Course Title : Air Pollution and Indoor Air Quality
Credit Hours : 3

Course Description
Air pollution sources and identification, modeling of air pollution, monitoring and control instruments, green house effect, air-water exchange, emission standards from industrial sources, atmospheric dispersion, effects of air pollution on health and vegetation, automotive exhaust emissions, meteorology, acid rains, sources and control of indoor air pollution.

Course Objectives
To enable the student to identify the characteristics of different air pollutants, acquire the methods of air pollution control, and evaluate the effects of air pollution on health.

Course Topics
- Air pollution sources and identification
- Modeling of air pollution
- Air-water exchange
- Atmospheric dispersion
- Effects of air pollution on health and vegetation, meteorology
- Sources and control of indoor air pollution, measurement techniques

References
Course Code : CB 722
Course Title : Management of Solid, Hazardous and Radioactive Waste
Credit Hours : 3

Course Description
Sources and characteristics of solid waste and hazardous, collection and transportation systems, solid waste storage and recycling, waste minimization, resource conservation and recovery, treatment technologies, ground water contamination and remediation, management of radiological solid waste, effects of radioactive waste on health and vegetation.

Course Objectives
To enable the student to identify the characteristics of different Solid waste and hazardous, acquire the methods of solid waste storage and recycling, and evaluate the effects of radioactive waste on health and vegetation.

Course Topics
- Sources and characteristics of solid waste and hazardous
- Collection and transportation systems
- Solid waste storage and recycling
- Waste minimization, resource conservation and recovery
- Treatment technologies
- Ground water contamination and remediation
- Management of radiological solid waste

References
Course Code: CB 723

Course Title: Environmental Impact Assessment of Civil Engineering Projects

Credit Hours: 3

Course Description
Origins of Environmental Impact Assessment, EIA procedure, policy options, legislative options, methods of project screening for EIA, preparation and review of an EIA, contribution of Civil Engineer in environmental control, case study.

Course Objectives
To enable the student to learn the procedure for conducting an Environmental Impact Assessment (EIA), understand the civil engineer role in environmental control, and evaluate the environmental impact of civil engineering projects.

Course Topics
- Origins of Environmental Impact Assessment
- EIA procedure
- Policy and legislative options
- Methods of project screening for EIA
- Preparation and review of an EIA
- Contribution of Civil Engineer in environmental control
- Case studies

References
Course Code: CB 724
Course Title: Environmental Legislation and Regulation
Credit Hours: 3

Course Description
Comparison of the environmental legislation and regulation in different countries, evolution of environmental regulations, international environmental agreements, law number 4 for 1994 and its executive regulations, environmental ethics.

Course Objectives
To enable the student to understand the impact of environmental legislation, apply the local environmental law, and evaluate the efficiency of environmental regulation.

Course Topics
- Comparison of the environmental legislation and regulation in different countries
- Evolution of environmental regulations
- International environmental agreements
- Law number 4 for 1994 and its executive regulations
- Environmental ethics

References
Course Code : CB 725
Course Title : Ecological Concepts
Credit Hours : 3

Course Description
Ecological perspective, the value of the environment, atmosphere constitution, solar radiation, flow of energy in ecosystem, climatic diagram of globe, microclimate, water cycle, rainfall, geological cycle, soil classification, ecological classification, ecosystems constitution, biosphere, population biology, substances cycle.

Course Objectives
To enable the student to learn the ecological basics of changing environments, acquire the water and substances cycle, and evaluate the effects of stresses in ecosystems.

Course Topics
- Ecological perspective
- The value of the environment
- Atmosphere constitution
- Flow of energy in ecosystem, and climatic diagram of globe
- Water cycle, rainfall, and geological cycle
- Soil classification
- Ecological classification
- Substances cycle

References
Course Code : CB 726
Course Title : Noise Pollution
Credit Hours : 3

Course Description
Physical properties of sound, effects of noise on people, noise sources and criteria, noise standards, noise measurement, outdoor propagation of sound, noise section of an Environmental Impact Assessment, traffic noise prediction, noise pollution control and prevention, noise regulation.

Course Objectives
To enable the student to learn the physical properties of sound, identify the noise sources and the means of noise reduction, and evaluate the effects of noise on human beings.

Course Topics
- Physical properties of sound
- Effects of noise on people
- Noise sources, criteria, and noise standards
- Outdoor propagation of sound
- Noise section of an Environmental Impact Assessment
- Traffic noise prediction
- Noise pollution control and prevention
- Noise regulation

References
Course Code : CB 727
Course Title : Marine Pollution
Credit Hours : 3

Course Description
Sources of marine pollution, marine ecology, oil and seashore pollution, monitoring and control instruments, modeling of marine pollution, ecological effects, prevention and regulation in marine sector, effect of marine pollution on birds and aquatic beings, marine pollution costs, case studies.

Course Objectives
To enable the student to identify the sources of marine pollutants, learn new techniques of monitoring and control instruments, and evaluate the effects of marine pollution on health and economy.

Course Topics
- Sources of marine pollution
- Monitoring and control instruments
- Modeling of marine pollution
- Prevention and regulation in marine sector
- Effect of marine pollution on birds and aquatic beings
- Marine pollution costs, case studies

References
Course Code: CB 728

Course Title: Environmental Economy and Sociology

Credit Hours: 3

Course Description
Estimation of pollution damages, economic evaluation of benefits, risk assessment, development of information required for the analysis of design problems in environmental engineering, analysis of alternatives, cost assessment and analysis, impact of human activities on environment, environmental policy and social development, impact of political consideration, public participation in environmental decision-making, industrial ecology, demographic impact, desertification, social problems.

Course Objectives
To enable the students to estimate the economic damage of pollution, appreciate the role of public participation in environmental decision-making, and evaluate the impact of social development on environment.

Course Topics
- Estimation of pollution damages
- Economic evaluation of benefits and risk assessment
- Analysis of alternatives, cost assessment and analysis
- Impact of human activities on environment
- Environmental policy and social development
- Impact of political consideration and public participation in environmental decision-making
- Industrial ecology, demographic impact

References
Course Code : CB 729

Course Title : Energy and Natural Resources Conservation

Credit Hours : 3

Course Description
Methods of energy conservation in buildings, natural resources conservation, environmental architecture, selection of green materials, resource recovery, recycling, life cycle strategy, elements of waste minimization strategy, benefits of waste minimization, waste reduction techniques, case study

Course Objectives
To enable the student to acquire the methods of energy conservation and selection of green materials, understand the vitality of natural resources conservation, and learn new techniques of recycling and waste minimization.

Course Topics
- Methods of energy conservation in buildings
- Natural resources conservation, environmental architecture
- Selection of green materials
- Resource recovery, recycling, life cycle strategy
- Elements of waste minimization strategy
- Benefits of waste minimization
- Waste reduction techniques
- Case study

References
Course Code : CB 720-E
Course Title : Environmental Modeling
Credit Hours : 3

Course Description
Mechanism of pollutant fate in the environment, models of physical systems, hydrodynamics modeling for rivers, modeling water quality in lakes and reservoirs, groundwater modeling, modeling of waste water treatment, air quality modeling.

Course Objectives
To enable the student to apply the different methods of environmental modeling, apply the computer methods for simulating the environmental pollution, and exploit the numerical data on ecological modeling.

Course Topics
- Mechanism of pollutant fate in the environment
- Models of physical systems
- Hydrodynamics modeling for rivers
- Modeling water quality in lakes and reservoirs
- Groundwater modeling
- Modeling of waste water treatment
- Air quality modeling

References