# SYLLABUS

## A. Course Description

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Num.</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Lec.</th>
<th>Lab.</th>
<th>Tut.</th>
<th>Private study</th>
<th>Pre-requisites</th>
<th>Course Level</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM</td>
<td>434</td>
<td>Environmenta l chemistry</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>CHM 333</td>
<td>7</td>
<td>English</td>
</tr>
</tbody>
</table>

This course describes fundamentals of environmental chemistry, atmosphere, hydrosphere, lithosphere, ozone, environmental pollution and its sources. The course covers essential topics in environmental chemistry where concepts such as toxicological chemistry, ecology, industrial pollution, acid rains, smog and analytical methods of environmental toxins will be taught. The practical part consists of a set of experiments that reinforce the module concepts. At the end of this course the student will be able to

- Understand the basics of environmental chemistry and its impact on the biosphere.
- Develop awareness of the impact of environmental problems and ways to reduce them.
- Know the fundamental chemical processes that are central to important environmental problems.
- Utilize this knowledge in making critical evaluations of these problems.
- Carry out experiments to determine the moisture contents, alkalinity and acidity of soil.

## B. References: Required Textbook & Internal Website

I shall use *Environmental Chemistry*, Stanley A. Manahan, 7th ed., 2000, Boca Raton: CRC Press LLC: ISBN: 978-1-4398-3276-9. **Students are required to purchase the textbook/materials (it is an obligation).** The book contains the lecture notes as well as activities for the students to take part in; the book serves as a workbook. Other references:


**Google Classroom Webpage:** [http://www.imamm.org/](http://www.imamm.org/)

## C. Topics Outline

**Disclaimer:** this is a very fast-paced course. There will be little time—if any—for review. What follows is an approximate outline of the pace of the course. We may go faster or slower, contingent on the class response. The tentative list of topics to cover:

- **Theory:**
  
  **Environmental Chemistry of water:**
  
  Definition of the environment and its components - general introduction to environmental chemistry - properties and sources of water - aquatic chemistry - nitrogen oxides in atmosphere - metal ions and calcium- oxidation reduction - complexation and chelation.
  
  **Water pollution:** Nature and types of water pollutants - elemental pollutants - heavy metals - metalloids - organic and inorganic species - acidity, alkalinity and salinity - oxygen, oxidants and reductants - pesticides, polychlorinated biphenyls and radionuclides in aquatic environment.

The atmosphere and atmospheric chemistry: Atmosphere - chemistry of atmosphere - importance of atmosphere - physical characteristics of atmosphere - inversions and air pollution - chemical and photochemical reactions in the atmosphere - acid base reaction in the atmosphere - reactions of atmospheric oxygen - reactions of atmospheric nitrogen.

Inorganic air pollutants
Carbon dioxide - sulfur dioxide sources and sulfur cycle - nitrogen oxides in atmosphere - acid rain - fluorine chlorine and their gaseous compounds.


Industrial Ecology, Resource and Energy: Metal resource and ecology - world energy resource - energy conservation - petroleum, coal and natural gas - nuclear fission and fusion - the sun energy and energy from biomass.


b. Practical:
Alkalinity of streams and lakes, determination of trace levels of ions in natural waters, conductivity of various waters, determination of the hardness of natural waters, determining iron and manganese in natural waters and sediments, COD, BOD, kinetics of pollutants degradation.

D. Exams & Grading System
The semi-official dates of the exams for this course, with all the caveats, that the word “semi-official” entails, can be found here:

- **Midterm 1**: 6th or 7th week & **Midterm 2**: 11th or 12th week
- **Quizzes**: 2 quizzes
- **Homeworks**: 4 Homeworks
- **Final exam**: 16th week
<table>
<thead>
<tr>
<th>Teaching/learning activities</th>
<th>Contact Hours</th>
<th>Frequency</th>
<th>Total Contact hours</th>
<th>Self-study hours (hrs)</th>
<th>Total self-study hours</th>
<th>Student Learning Time</th>
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</thead>
<tbody>
<tr>
<td>1 Lecture</td>
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<td>15</td>
<td>30</td>
<td>2</td>
<td>30</td>
<td>60</td>
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<tr>
<td>2 Tutorial</td>
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<tr>
<td>3 Lab/Practical</td>
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<td>28</td>
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<td>1</td>
<td>14</td>
<td>14</td>
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<tr>
<td>5 Homework</td>
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<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
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<td>2</td>
<td>0.5</td>
<td>1</td>
<td>2</td>
<td>2.5</td>
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<td>7 Test (Midterm)</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>11</td>
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<tr>
<td>8 Final Exam</td>
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<td>1</td>
<td>2</td>
<td>8</td>
<td>8</td>
<td>10</td>
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<td>Total</td>
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<td>72</td>
<td>135.5</td>
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</tbody>
</table>

Independent self-study = 72/15 = 5 hrs per week

Your course grade will be based on Final Exam, Midterms, Homework, Quizzes, Participation, Attendance and Project.

<table>
<thead>
<tr>
<th>Midterm 1: 10 %</th>
<th>Midterm 2: 10 %</th>
<th>laboratory: 30 %</th>
<th>Final Exam: 40 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes; Homework &amp; Attendance &amp; Participation: 10 %</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Grading distribution:
A+: [95, 100], A: [90, 95], B+: [85, 90), B: [80, 85), C+: [75, 80), C: [70, 75), D+: [65, 70), D: [60, 65), F: [0, 60).

E. Student Attendance/Absence
Only three situations will be considered as possible excused absences:
- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams: goo.gl/ykm7t3