

**IBDAA 2010**

**The International Biodiversity Day at Aub**

**May 21st 2010**

Organised by

**IBSAR**; Nature Conservation Center for Sustainable Futures, American University  
of Beirut

# Table of Contents

Acknowledgements (Inspired by Nature).....	5
Contributing Departments and Units.....	6
IBDAA organizing Committee.....	6
IBDAA Coordinating Committee.....	6
IBDAA Advisory Board.....	6
Introduction.....	7
Background.....	7
<i>The Convention on Biological Diversity</i> .....	7
<i>IBSAR, Nature conservation center for sustainable futures</i> .....	8
<i>International Biodiversity Day and IBDAA</i> .....	8
Participating Courses.....	9
AGSC 229 - Entrepreneurship in Agriculture.....	9
BIOL 250 - Biosphere.....	9
CIVE 351 - Environmental Microbiology.....	9
CHEM 206 - Analytical Chemistry.....	9
CHEM 215 - Quantitative Analysis.....	9
ENGL 204 - Advanced Academic English.....	10
ENHL 243 - Global Environmental Issues.....	10
FAAH 215 & 216 - Ceramics I and II.....	10
GRDS 343 - Motion Graphics.....	10
PHIL 210 - Ethics.....	10
<b>Agsc 229 – Entrepreneurship in Agriculture</b> .....	12
<i>I-guides</i> .....	12
<i>Fertilizer Residue Portable Detector</i> .....	12
<i>Sfoufna</i> .....	12
<i>Arishello</i> .....	13
<b>Biol 250 – Biosphere</b> .....	14
<i>Creating artificial reefs from used vessels</i> .....	14
<i>The Preservation of Marine Turtles in Lebanon</i> .....	14
<i>Diesel Exhaust in Lebanon</i> .....	14
<i>Pollinator decline</i> .....	15
<i>Piezo-crystals: Advances and Prospects</i> .....	15
<i>Unused Household and Industrial Lignin as a Bio-fuel Precursor</i> .....	16
<i>Crude oil spills destroy life</i> .....	16
<b>Chem 206 – Analytical Chemistry</b> .....	17
<i>Eat all your plate!</i> .....	17
<i>Flower Power</i> .....	17
<i>Green Vacuum Cleaner</i> .....	17
<i>Air Purifier</i> .....	18
<i>When life gives you lemons, make (more than) just lemonade</i> .....	18
<i>The Warm Umbrella!</i> .....	19
<i>Grow Old with your Light</i> .....	19
<i>HandSanitizer</i> .....	19
<i>Build Fresh</i> .....	20

<i>Green Heating Cup</i> .....	20
<i>Abstract for the airborne disinfectant</i> .....	20
<i>Green toilet brush cleaning solution with antibacterial properties</i> .....	21
<i>Biodegradable Cigarettes</i> .....	21
<i>I.R.T.P</i> .....	22
<i>Cinnawrap</i> .....	22
<i>A plant extract mixture to kill bacteria and fungus on the inner layer of the shoes</i> .....	23
<i>Oxoclean bleach</i> .....	23
<i>The Wireless Iron</i> .....	24
<i>Save Energy on the Highways</i> .....	24
<i>Wakbrush</i> .....	24
<i>Nicotine Munchers</i> .....	25
<i>Sage, Not Sage!</i> .....	25
<i>Let Your Laptop Chill Too!</i> .....	26
<i>Let your legs Light your way</i> .....	26
<i>N-D-Greaser Fights Numerous Diseases!</i> .....	27
<b>Chem 215 – Quantitative Analysis</b> .....	28
<i>The chemistry Behind Contact Lenses</i> .....	28
<i>Treatment of Olive Oil Mill Wastewater</i> .....	28
<i>Dust Explosion!</i> .....	29
<i>Groundwater Contamination</i> .....	29
<i>Toxins in Your Wonderful Smelling Perfume!</i> .....	30
<i>Plastics...Strength, Durability and Resistance!</i> .....	30
<i>Water Treatment using Zero Valent Iron</i> .....	31
<i>Garbage burial and its Effect on Nature</i> .....	31
<i>Meat Products in popular chocolate bars</i> .....	31
<i>I will Die in Two Years. . . Really?</i> .....	32
<i>White phosphorus bombs</i> .....	32
<i>Be careful what you eat!</i> .....	32
<i>Cement Production and its Consequences</i> .....	33
<i>Skin Candy: Tattoos</i> .....	33
<i>Forged Medicinal Drug</i> .....	34
<i>To recycle or not to recycle</i> .....	34
<i>Reducing the Amount of Carbon Dioxide Emitted</i> .....	34
<i>The Science Behind Magic</i> .....	34
<i>Charcoal</i> .....	35
<b>Cive 351 – Environmental Microbiology</b> .....	36
<i>Algae: A Renewable Source For Liquid Fuel</i> .....	36
<i>Production of non-toxic, biodegradable and environmentally friendly bioinsecticides via microbial metabolism</i> .....	36
<i>Environmentally- Friendly Bioplastics</i> .....	37
<i>Bioremediation of Endocrine Disrupting Chemicals/Pharmaceuticals</i> .....	38
<i>Bioremediation of Nuclear Waste</i> .....	39
<i>Microorganisms in Ventilation systems- Causes and Control</i> .....	39
<i>Bioremediation of Oil Spills</i> .....	40
<i>Microbial Fuel Cells: Current Applications and Environmental Sustainability</i> .....	41

<b>Engl 204 – Advanced Academic English</b> .....	42
<i>Oily Hair</i> .....	42
<i>Beiruted, Beiruting, Beiruture</i> .....	43
<i>Spread the WORDS</i> .....	43
<b>Enhl 243 – Global Environmental Issues</b> .....	44
<i>Regeneration of the ozone layer: A future outlook</i> .....	44
<i>Are these pillars enough to achieve traceability?</i> .....	44
<i>Virtual water trade: a tool for achieving long term water security on a global scale?</i> .....	45
<i>Can you handle the impact of climate change on tourism?!</i> .....	45
<i>A Town to be Drowned</i> .....	45
<i>Climate Change: It's Not Just About the Climate!</i> .....	46
<i>Management of earthquakes: How do we save human beings?</i> .....	46
<i>Wars Unveiled: The Truth behind the Lies</i> .....	47
<i>Marine oil spills: The Never-ending Burden on Marine Pollution</i> .....	48
<i>Hazardous Waste Trade; "To Dump or Not to Dump?"</i> .....	48
<i>Entertainment Noise: Music to the Ears?</i> .....	49
<i>Impact of Avian Flu on Global Health</i> .....	49
<i>Deforestation: An Ending to the Biodiversity Lifeline</i> .....	50
<i>Food Security</i> .....	50
<i>Landmines: The New Toy for Children</i> .....	50
<i>Burdens of Nuclear Waste Management</i> .....	51
<i>Child Labor: Everywhere but still invisible</i> .....	51
<b>Faah 215 &amp; 216 – Ceramics</b> .....	52
<i>Roots Of Civilisation</i> .....	52
<i>Alive in Ruins</i> .....	52
<i>Reflection (Life &amp; Death)</i> .....	52
<i>Grappled Tree</i> .....	52
<i>Bare Lebanon</i> .....	53
<i>Mother Nature</i> .....	53
<i>Our Selfish World</i> .....	53
<i>Stand Still</i> .....	54
<i>Natural Clay</i> .....	54
<b>GRDS 343 – Motion Graphics</b> .....	55
<b>Motion Graphics Flip book groups</b> .....	55
<b>Phil 210 – Ethics</b> .....	56
<i>Where do you fit environmentally?</i> .....	56
<i>Sports and the Environment</i> .....	56
<i>About Kamal in Town – A story for kids</i> .....	56
<i>To Which Party Do You Belong?</i> .....	57
<i>Anthropocentrism vs. Environmentalism</i> .....	57
<i>Why Should I preserve Biodiversity?</i> .....	58
<i>EcOstatic</i> .....	58
<b>Independent</b> .....	58
<i>The Biology and Ecology of Terellia serratulae in Lebanon</i> .....	59
<i>The Microbial Biodiversity of Jeita Grotto: A Unique Lebanese Habitat</i> .....	59

## **Acknowledgements (Inspired by nature)**

Every year a group of faculty, students, and staff form the IBDA team. This year, the initial phases of the planning process were rather smooth and we progressed like a flock of birds; all heading in one clear direction. As we advanced into the preparation process and challenges started arising, it felt more like being in an equestrian show jumping; we were all rushing but some in the team had the skills (patience and physical stamina) to bypass the many hurdles that we faced! When we got closer to the day of the event, Ibsar office transformed into a beehive and we all became workers rushing back and forth with one aim ... making sure that the event is a success. With the deadline approaching we became nocturnal animals, foxes, each trying to creatively outwit deadlocks and deadlines and coming up with improvised strategies and solutions in the late hours of the nights. Finally, no one will probably notice, but during the event we will become field mice, with a fully established underground communication network that will enable us to ensure the smooth running of the operation. In the end we will all become plants, deeply rooted in the belief that AUB, with its faculty, students, and staff, can contribute towards a better nature in Lebanon and the Middle East. Thank you, birds, horses, bees, foxes, and field mice of Ibsar!

## **Contributing Departments**

Department of Agricultural Sciences  
Department of Biology  
Department of Chemistry  
Department of Civil and Environmental Engineering  
Department of English  
Department of Environmental Health  
Department of Fine Arts and Arts History  
Department of Architecture and Design  
Department of Philosophy

## **IBDAA Coordinating Committee**

Hani Chaabo  
Mazen Ghalayini  
Layal Jradi  
Rasha Talhouk

## **IBDAA Organising Committee**

Jad Chaaban  
Rima Habib  
Amal Muraywed  
Pascal Saikaly  
Najat Saliba  
Salma Talhouk

## **IBDAA Advisory Board**

Anashar Basbous  
Nayla De Freige  
Riad Dimashkie  
Nabil Fahed  
Ricardo Karam  
Khaled Makoak  
Huda Zurayk

## Introduction

In 2002 world leaders met and recognized the need to substantially reduce biodiversity loss by 2010. The target was primarily measured in terms of species and habitats.

In 2002 AUB faculty created Ibsar with the aim of contributing to biodiversity conservation. Based on our expertise as a regional institution we decided to take a slightly unique approach by contextualizing our work within traditional and contemporary Arab culture. We used biotechnology, basic science, and clinical research to explore ancestral Arab knowledge in plant based food and medicine. We conducted floristic richness studies taking into consideration the fact that Biodiversity in Mediterranean and arid lands of the Middle East is intertwined with local culture and livelihoods and that both nature and people are marginalized. We sought interdisciplinary activities that combine field research with community engagement to identify and promote local conservation measures in parallel to scientific species and habitat assessments. We sought to develop efficient spatial planning and sustainable economic development to ensure the preservation of local landscape character and sustainable use of land resources and diversification of livelihoods. In all cases we recognized the importance of the human/cultural facet of biodiversity and focused on rural practices and vernacular traditions, integrated cultural heritage, both natural and managed, and considered alternative biodiversity related activities that can empower local population.

In 2010 the UN Secretary General sent a message to the global community informing us that “despite repeated global commitments..., the variety of life on Earth continues to decline at an unprecedented rate” and that there is a need to set a new goal ... “The goal is a new vision for biodiversity” one that “recognizes the close links between our natural capital and our development objectives, a point reflected in the theme for this year’s International Day for Biological Diversity, “biodiversity for development and poverty alleviation”.

## Background

### The Convention on Biological Diversity

In 1992 at the Earth Summit in Rio de Janeiro, world leaders agreed on a comprehensive strategy for “sustainable development” -- meeting our needs while ensuring that we leave a healthy and viable world for future generations. One of the key agreements adopted at Rio was the Convention on Biological Diversity (or biodiversity; the variety of living things; the different plants, animals and microorganisms, the genetic information they contain and the ecosystems they form). The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. This pact among governments sets out commitments for maintaining the world’s ecological underpinnings as we go about the business of economic development.

## **IBSAR, Nature conservation center for sustainable futures**

In 2002 faculty members at AUB started Ibsar, interfaculty nature conservation center for sustainable futures, because they recognized biodiversity as a regional asset and were committed to conduct multidisciplinary research to promote the conservation and sustainable use of biodiversity for the benefit of the region. Ibsar mission is to promote conservation and sustainable use of biodiversity for the purpose of enhancing wellbeing of people and nature by providing an open innovative and collaborative platform. Our mission is achieved through research, education, community outreach, and knowledge dissemination. Our vision is to establish Ibsar as a recognized reference center for the study and sustainable use of dry land biodiversity.

## **International Biodiversity Day and IBDA**

The United Nations proclaimed May 22 the international Day for Biological Diversity (IBD) to increase understanding and awareness of biodiversity issues. In response to this call, since 2007, Ibsar has decided to hold a yearly event, International Biodiversity Day At AUB, which constitutes an opportunity for students to present and share their works highlighting the innovative, creative, and leading role of the University community in addressing biodiversity conservation and sustainable utilization. Preparations for this event start in January, in preparation for the spring semester. Faculty members are invited to participate in the event by planning a class project that gives participating students the opportunity to address biodiversity conservation and sustainable utilization from various angles to develop a new understanding of the subject as they enroll in a problem solving, critical thinking, and decision making process. Contributions are invited from all disciplines and include demonstrations, models, posters, and description of research findings. On May 22, students display and explain their projects to their peers, to faculty, staff, upper administration, as well as invited members from the private and public sectors. The preparations for the event, and the event itself, constitute an opportunity to raise awareness and to promote biodiversity conservation, and to advocate for the sustainable and equitable use of biological resources in Lebanon and the region.

## Participating Courses

### **AGSC 229 - Entrepreneurship in Agriculture**

*Dr. Jad Chaaban*

*Faculty of Agricultural and Food Sciences, Department of Agricultural Sciences*

Integration of production, marketing, accounting, finance, agricultural policy, human behavior, and business environment concepts in management of agricultural businesses using the compilation by students of agribusiness plans.

### **BIOL 250 - Biosphere**

*Dr. Hala Muhtasib*

*Faculty of Arts and Sciences, Biology*

A course that focuses on defining global environmental problems such as global warming, acid rain, deforestation, and loss of biodiversity, and introduces methods that can help eliminate or reduce these problems.

### **CIVE 351 - Environmental Microbiology**

*Dr. Lucy Semarjan and Dr. Pascale Saikaly*

*Faculty of Engineering and Architecture, Department of Civil and Environmental Engineering*

A course that introduces the basic principles of environmental microbiology and discusses example applications from the natural and engineered worlds. The main goals of this course are to present an overview of important micro-organisms involved in environmental systems, their ecology, their interactions with various pollutants, and their beneficial or harmful effects on humans.

### **CHEM 206 - Analytical Chemistry**

*Dr. Najat Saliba*

*Faculty of Arts and Sciences, Department of Chemistry*

A course that covers fundamental analytical processes, including solution equilibria, titrations, electrochemical theory and applications, chromatography and spectrophotometric techniques.

### **CHEM 215 - Quantitative Analysis**

*Dr. Najat Saliba*

*Faculty of Arts and Sciences, Department of Chemistry*

A course that covers fundamental analytical processes, including solution equilibria, titrations, electrochemical theory and applications, chromatography and spectrophotometric techniques.

## **ENGL 204 - Advanced Academic English**

*Dr. Rima Deeb*

*Faculty of Arts and Sciences, Department of English*

A course designed to provide rigorous training in reading comprehension, synthesis, critiquing, and research skills. Although ENGL 204 builds on many of the skills learned in ENGL 203, it differs in that it encourages more advanced independent research as well as writing and discussion in relation to a variety of issues across the curriculum.

## **ENHL 243 - Global Environmental Issues**

*Dr. Rima Habib*

*Faculty of Health Sciences, Department of Environmental Health*

A course that reviews a specific global environmental issue in which students are required to write a paper and present a seminar on the selected topic. Emphasis is placed on stating the problem clearly and presenting control strategies and recommendations for action plans.

## **FAAH 215 & 216 - Ceramics I and II**

*Dr. Amal Muraywed*

*Faculty of Arts and Sciences, Department of Fine Arts and Art History*

Ceramics I is a studio course in basic hand building ceramics techniques; pinching, coiling, slab building, and glazing. The student potter is encouraged to create artistic functional pots, reflecting and understanding of the acquired basics. In Ceramics II all basic techniques are fully developed and redefined to suit the student's design. Design versus function is emphasized, as well as appreciation and criticism.

## **GRDS 343 - Motion Graphics**

*Dr. Lina Ghaibeh*

*Faculty of Engineering and Architecture, Department of Architecture and Design*

Motion Graphics is an advanced course in computer-related design, introducing students to multimedia design. The student explores the process of designing in relation to time and motion, and learns to adapt graphic knowledge to explore concepts of movement in time, sequential imagery, and motion graphics through animation. Projects involve the use of various animation techniques including 2D cell animation, claymation, and stop motion animation. It includes an overview of 3D modeling and animation.

## **PHIL 210 - Ethics**

*Dr. Nelly Dib*

*Faculty of Arts and Sciences, Department of Philosophy*

An introduction to some of the major normative ethical theories based on the study of the original writings of selected philosophers, including a section on applied ethics.



GS

gs.com.lb

Join our Facebook page <http://facebook.com/GS>



## Mikati CSR Initiative At AUB

- Half Million \$ Endowment for CSR Related Activities at OLAYAN SCHOOL OF BUSINESS by the MIKATI GROUP

### Objectives:

- ③ Mobilize fruitful interactions in pursuit of an active and constructive CSR discourse
- ③ Compile and disseminate knowledge through research, teaching, and other activities
- ③ Document and share best practice in relation to CSR

**I-guides**

*Mohamed Melki*

*American University of Beirut, FAFS, Agriculture Sciences*

I-guides is a free electronic software that guides you through Lebanon. It combines all the Lebanese market in one place by dividing it under the following criteria: Auto, Clothing, Hotels, Housing, Educational institutes, Mini/Super markets, Pharmacies, Hospitals, Ministries, etc...Beside guiding you through the roads and markets, it guides you through your environment with its information regarding the Lebanese weather forecast, temperature, humidity, kinds of fish we have, kinds of rocks of which our coast is made of. Moreover, I-guides has an ultimate capability of measuring the air and the noise pollution. It's everything you need under one click.

**Fertilizer Residue Portable Detector**

*Karam Mrad*

*American University of Beirut, FAFS, Agriculture Sciences*

The idea is to design and build a device that is used to detect the extra residues of fertilizers on agricultural products in the market. In today's markets, fruits and vegetables health safety on human consumption have been questioned. This prospective can assure the purchaser of safe levels of chemical residues on produce by pointing a refracto-meter like portable artifact on a sample of the fresh produce and determining the safety of the product.

**Sfoufna**

*Youssef Bissat · George Bassil*

*American University of Beirut, FAFS, Agriculture Sciences*

Sfouf is a traditional Lebanese dessert which is known as the yellow cake of Lebanon. It is a dessert made basically from semolina combined with flavorings and sugar. Our product, Sfoufna, is a dry ready-to-do dietetic sfouf mix which only needs to be combined with water, a little amount of oil, mixed and baked to produce a cake. The mix will give a low caloric, sugar free cake with a reduced fat content of approximately 50%.

## **Arishello**

*Sadek Bekhazi · Rami Rasheed · Sandra Youssef · Lynn Houssami  
American University of Beirut, FAFS, Agriculture Sciences*

We are launching a new dairy based product that represents a modernized version of Areesheh. Knowing that Areesheh is low in fat and a good source of protein, some additives were made in order to come up with a 0 % fat Areesheh. Our product is a combination of a delightful, sweetened creamy and nutritious Areesheh on top of low calorie appetizing strawberry jello. This product can satisfy your sweet urge for dessert during the day and make you maintain your track of attaining a healthy lifestyle.

**Creating artificial reefs from used vessels**

*Fay Abou Hassan · Serena Abu Samra · Nour Tahmaz · Riva Bader  
American University of Beirut, FAS, Biology*

The Environmental Protection Agency in the U.S is reusing vessels by recycling or scrapping them to create artificial reefs in the sea. Coral reefs are endangered, an estimate of 19% are already destroyed from which 50% are in the Mediterranean Sea and that within a century, all coral reefs would be gone. By creating artificial reefs, the EPA would restore marine life, that is endangered because of the loss of coral reefs and increase biodiversity. On the other hand, they are recycling vessels, preventing potential pollutants, such as fossil fuels, asbestos, PBC's and paints from being released into the ocean floors.

**The Preservation of Marine Turtles in Lebanon**

*Habeeb Dghaily · Ali Zidane · Rashed Hassoun · Ali Amro · Muhieddine Itani  
American University of Beirut, FAS, Biology*

Olive oil production is a business that causes a significant amount of pollution. Even in its most efficient implementation, the process generates liquid and solid waste in the form of vegetable oil and spent olives. Improper disposal of the untreated by-products results in harmful effects to the surrounding water, soil, and air. The objective of this project is to analyze methods that will help treat and dispose of vegetable water, which has long-been the main source of the Hasbani River pollution. Once a method that is both successful and feasible has been acquired, it will be analyzed for any necessary improvements so that it may aid in solving the pollution problem.

**Diesel Exhaust in Lebanon**

*Hadi Ramadan · Huda Sheheitli · Sahar Morkos El Hayek · Suha Jabak · Marie-  
Therezia Hadchity  
American University of Beirut, FAS, Biology*

The problem of electricity shortage in Lebanon has lead citizens to resort to diesel generators,acatastrophicalalternative.Theyhavecreatedashortageinoureenvironmental well-being. The diesel generators are a major contributor to particulate matter emission. In our poster presentation, we will be presenting the effect of particulate matter, mainly PAHs, found in diesel exhaust on human health and the environment, including plant life and water quality. We will also be providing computational analysis to illustrate the significant quantities emitted into the atmosphere.

## **Pollinator decline**

*Marie-Therese Homsj · Lina El-Bejjani · Nathalie Gharibeh · Maya Al-Haddad  
American University of Beirut, FAS, Biology*

Animal pollinators are very important components of the terrestrial ecosystem since the majority of plants rely on them to reproduce and spread all over a certain area. The *Apis Mellifera* specie, commonly known as honeybee, is one of the most spread insect pollinator worldwide. However, a global decline in their population has been observed over the past fifty years leading to damaging effects on the ecological and economical scales. In fact, scientists introduced since 2006 the term CCD (Colony Collapase Disorder) to describe this situation. What strikes our attention is that studies show that the Middle East is one of the most vulnerable regions to pollinator loss. Actually, beekeepers in Lebanon have reported a nearly one quarter loss of their bees. This phenomenon is very sensitive to changes in the environment and scientists have suggested many causes to explain it. One of the main reasons is the introduction of alien species which can be a new plant or a pollinator affecting the native population by competition over resources. Pests like viruses and the Varroa mite are another common threat. Moreover, the land-use change is leading to habitat loss. This has a negative impact on the richness and abundance of bees due to the destruction of nesting and floral resources and to the usage of pesticides. As for pollution, new studies show that the increase in air pollution is destroying the scent of flowers thus pollinators are no longer able to follow the fragrances neither to pollinate the flower nor to feed on it. However, those factors are not solely responsible for pollinator loss. Geographic differences should also be taken into account. Nevertheless, the establishment of protected area networks would represent a positive initiative. In addition, the use of eco-friendly repellents that keep away predators and parasitoids from attacking the bees may be a convenient solution for the pesticides' issue. On a local level, specialists suggest the need of the Lebanese government guidance in order to obtain modern beekeeping techniques and laboratories as well as more adapted assistance standards.

## **Piezo-crystals: Advances and Prospects**

*Sami Droubi · Mohamad Khalifeh · Rakan Nassereldine · Ralph Hachem · Roland Seif  
American University of Beirut, FAS, Biology*

Access to energy is indeed the bedrock on which modern civilization reclines. A crisis, however, looms ahead as fossil fuels are dwindling, amid increasing demand, and suffocating the atmosphere with greenhouse gases. Race is on to find alternative solutions to come through. Among the devised solutions, piezoelectricity produced by certain crystals upon mechanical pressure has enormous potential. Conventionally, piezoelectric material has been deemed too rigid to be efficient or practical. Nevertheless, scientists have recently managed to soften up the material by cutting it into nanoribbons combined with rubber or into thin fibers, thus opening the way for endless imaginable applications. A conceivable use of the piezoelectric effect is to exploit the vibrations caused by noise to produce an electric charge which harnesses hydrogen fuel from water. Other applications to harvest the "waste energy" of movement and vibrations may be viable as well.

## **Unused Household and Industrial Lignin as a Bio-fuel Precursor**

*Nour Al-Jalbout · Sarah Maria Bahouth · Maria Bou Sleiman · Yazan Daaboul · Kamel El Salek*

*American University of Beirut, FAS, Biology*

Elevated pollution rates have become intolerable for the continuity of our biosphere. Exploitation of limited fossil fuel energy resources has recently become a worldwide crisis that contributed greatly to global warming. In contrary to previous reports of inefficient biomass for energy production from lignin, recent scientific developments have made a successful breakthrough to convert lignin resourcefully from dissipated products into ethanol precursors. In the past, chemical reactions of lignin produced a wide array of undesired products; where only minimal percentage could be used as fuel. However, new approaches have amplified fuel yield, finally rendering lignin as a potential source of fuel. Green products, such as ethanol and formic acid, provide a promising renewable source of fuel. Given lignin's abundance in plant systems and its uneconomical status for higher species in the food chain, especially humans, lignin's valuable exploitation provides an alternative to conventional fuels and production of energy. The compound is typically extracted from plants in laboratories using high temperatures and acid treatment. The main concern, however, is to turn lignin into bio-fuel precursors, which has become attainable by breaking down chemical bonds of lignin through specific reactions using hot (300 °C) and pressurized (7000 kPa) water as the reaction solvent. The scope of lignin bio-fuel includes industrial utility, as well as anticipated household and transportation functions on the long run. In this bioprospective advance, lignin, as an economical bio-fuel precursor, ensures a sustainable and eco-friendly means to protect biodiversity and reduce the effects of biosphere contaminations.

## **Crude oil spills destroy life**

*Simon Barakat · Sehrish Asghar Abassi · Ghiwa Sayegh · Bassam Ashkar · Mahmoud Abed El Aziz · Dr. Hala Muhtasib*

*American University of Beirut, FAS, Biology Department*

It is known that oil spills have a devastating effect on the aquatic ecosystem extending to the death of thousands of marine and bird species. Tens of thousands of tons of crude oil have been released, in some form or another, to infest the Lebanese shoreline. From the Bluefin tuna to the Sea turtles passing through marine plants, the effect of oil spills ranges from short term to long term damage. Oil particles will remain in the plant or animal tissues for long periods of time, rendering the biological community more susceptible to toxic death. The aim of this project is to focus on the effects of oil spills on species diversity, mainly referring to the Mediterranean region. Issues concerning the socio-economic impact as well as the health impact will be discussed.

### **Eat all your plate!**

*Jean-Claude Elaramouni · Amjad Kanj  
American University of Beirut, FAS, Chemistry*

Human beings manufacture 300 million new tons of plastic each year, much of which becomes the nature's burden to dispose of. "Eat all your plate!" is a project whose soul goal is to minimize the use of non-degradable plastic tableware. Whether you go on a family picnic or a weekend camping trip, we will make sure that you leave your environment green. This project will not strike unless we tell you that the plates are not only biodegradable but also edible! Mainly, we will be focusing on producing edible plates from easily accessible ingredients such as potato starch and bleached wheat flour. Making the plates pleasant, digestible, durable and resistant to moisture are some of the challenges that we will be facing. Wish us luck!

### **Flower Power!**

*Karl Asmar  
American University of Beirut, FAS, Chemistry*

Wouldn't be great if we could wake up every morning and enjoy a pleasant odor on our clean clothes before going to work? Well, the solution is simple: the lavender capsule! It is a very simple plastic capsule containing lavender oil and silica gel that will be attached to your clothes hangers in order to protect your favorite clothes from moths and other insects. Moths will attack any natural or synthetic and natural blended fabrics, so nearly everything in your closet is a target. They will even go after leather! Lavender oil can protect your valuable wardrobe from moths with a fragrance that will soothe your soul. Unlike mothballs which smell toxic and cedar which can stain clothing, lavender can be used to prevent, clean and store your clothing as a triple threat to a Moth invasion without any negative side effects. In addition, silica gel is able to adsorb moisture that usually attracts moths into our closet. We used the combined properties of silica gel and lavender oil to create a special capsule containing those two efficient ingredients to repel moths and protect our favorite clothes. Using hangers incorporated with this capsule is a simple and green way to help keep our closet clean and organized. Imagine for once not having to toss lavender sachets almost everywhere in the house!

### **Green Vacuum Cleaner**

*Ali Alawieh · Khodor Abou Daya  
American University of Beirut, FAS, Chemistry*

Common vacuum cleaners usage of electrical power is 1000-1440 watts. Our design of a green vacuum cleaner based on mechanical energy utilization will eliminate the expenditure of electricity to clean desktops. The design also involves manufacturing a simple but effective replaceable filter.

## **Air Purifier**

*Rita Tatiana Abi Younes · Rachel El Amsar  
American University of Beirut, FAS, Chemistry*

If you're tired of the usual home air purifiers, who are only designed to give you the illusion of fresher air by only masking odors with chemicals instead of eliminating them, our product could interest you. Designed to be practical in your house, our "refresher" will gently pump the air of the room and purify it by passing it through a layer of charcoal. Not only its constituents are ecological but, also, its power supply is a solar panel, which makes it 100% eco-friendly. We focused on the impurities coming from the smoke for our product because second hand smoke is a growing problem. Many measures are taken to deal with this social issue. Would it be creating non smoking areas in public places or even progressively banning smoking in those spaces in many countries. But dividing is not always the solution, especially in our own homes. We needed another solution. That's the goal of our project. It would be very useful in crowded living rooms or student studios where smoke harms people, and get caught in furniture. Using that small device, instead of changing the whole air system in your house, is economic. It is also healthy, green and design.

## **When life gives you lemons, make (more than) just lemonade.**

*Jose Bou Nassif · Carl-Joe Mehanna  
American University of Beirut, FAS, Chemistry*

Consumption of non-biodegradable and polluting compounds such as plastic has increased exponentially since the emergence of the mass market, because of their cheap prices and easy production. However, although the price of production of plastic is cheap, those of recycling and proper disposal are the ones raising concern. Moreover, the long-term side effects are less than comforting. Therefore, one cannot but try and find valid solutions to this issue, namely try to replace these compounds by environmentally friendly ones. This is the objective of our research: replace one kind of commercial compound (e.g. plastic cups) by a worthy environmentally friendly competitor i.e., one that has the same utilities, and is less harmful. And what better substituent than a natural, biodegradable compound that we all have but thought we'd never use! This is why we had the idea of manually recycling orange peelings to make cups out of them. Now you can eat/drink your orange, and use it afterwards! We conducted several experiments to test for the usability and practicability of our orange cups: We tested for the presence of leakage, the average volume of water they hold and it's variation with time, its thermal insulating capacities (in both hot and cold solutions), its biodegradability, its reusability, its effect on taste, its ability to withstand different kinds of beverages and solutions, etc. So far, the results are very promising and the orange cup is just a while away from the market. Now, you can make more than lemonade!

## **The Warm Umbrella!**

*Fahid Al-Ghanim · Mohammed Temsah  
American University of Beirut, FAS, Chemistry*

The aim of our project is to produce an innovative and creative product that will help solve and reduce the green-house problem. Not only that but most importantly it is aimed to inspire people and other's in the design industry to take into account the huge and devastating issue of the green-house effect. Therefore, we have chose to think outside the box and create something that have never been made before. Our new product is the Warm Umbrella! An umbrella which uses wind-turbine energy to activate a dynamo that eventually produces heat to operate a hand warmer in the handle. Thus, the holder of the umbrella will be able to utilize the wind's kinetic energy in one's favor by converting it to thermal energy in the hand warmer of the handle. This will allow it's user to shield oneself from the rain and to be warm while doing that.

## **Grow Old with your Light**

*Oussama Safi · Ibrahim Katiba  
American University of Beirut, FAS, Chemistry*

Our idea consists, simply, of generating light out of magnetic energy. In fact, we are intending to construct a small device, based on some physical approach, consisting of a light cylinder, which is a kind of "roullement", standing on a fixed support, with very small frictional energy, on which we are going to attach a series of separate magnet blocks on its outer periphery, oriented to the North Pole outwards. Then, with the aid of an external magnet bar, oriented in such a way that its North Pole is facing the cylinder, we create a magnetic field, opposite to the one created by the blocks. In this way, we can induce the rotational motion of the cylindrical system. From this rotational motion, counted as mechanical motion, we can further generate electricity by just adding a dynamo, which will have its two arms fixed on the periphery of the rotating cylinder, and will convert this mechanical energy into electrical energy. Finally, we will use the electricity produced by the dynamo to illuminate a lamp. And of course, as we increase the magnets' pull force, we will generate more and more electricity, depending on the electrical consumption of the lamp or other electrical devices used.

## **Hand Sanitizer**

*Nouhad Awwad · Fatima Buhilaigah  
American University of Beirut, FAS, Chemistry*

A water-soluble polysaccharide gel having good gelling property and good antimicrobial activity was extracted from Aloe Vera. Comprises steps mincing, homogenizing, adding up a pectolytic enzyme, filtering, adding vitamin c, deaeration, pasteurization, flash cooling and proper storage. Pharmaceutical preparations were prepared using the polysaccharide gel such as, alcohol-free hand sanitizer preparation and antibacterial hand gel preparation. A plastic container for gel was also produced using potato starch acetate and ethanol.

## **Build Fresh**

*Mandy Taktouk · Toufic Feghali  
American University of Beirut, FAS, Chemistry*

Being a frequent and avid body builder, my friend has always been repulsed by the not so uncommon stench of sweat and filth during his workouts. So my friend and I have come up with an ingenious way to get rid of this nuisance in a clean and efficient way. Soon we will all be able to build fresh after installing our new product with the cleansing power of charcoal at its core. Contrary to popular belief, charcoal has a unique smell absorbing power and no horrible side effects like those aerosol air fresheners normally installed. This product would be available in frames that contain a particular paste to which the charcoal adheres. Once it is hung, you will be able to enjoy a brisk, clean and stench free workout and never again will you have to worry about spreading your own smell.

## **Green Heating Cup**

*Ali Ayoub · Mohammad Kanso  
American University of Beirut, FAS, Chemistry*

One daily action we do is to heat water for make coffee or tea or any other hot drink. This action requires a considerable amount of energy. This energy is consumed by either the electric appliances that use heating resistors that require a great deal of energy (in form of electricity), or by heating through a stove that either use natural gas or electricity and that also is harmful to the nature and is energy consuming. In our approach we are trying to heat water in an eco-friendly way, which uses an exothermic reaction that will deliver (  $\text{CaO} + \text{H}_2\text{O}$  ) sufficient amounts of energy capable to boil water. The apparatus is a two cylindrical cups (one inside the other) separated by a certain space. We put a certain amount of quicklime ( $\text{CaO}$ ) that when reacts with water in the inner cylinder to produce sufficient amount of energy that is capable to boil certain amount of water. For efficiency in heating and for the user safety, the outer layer is insulated by vacuum, in addition to Styrofoam which will cover the whole cup and provides us with maximum insulation.

## **Abstract for the airborne disinfectant**

*Siham Awada · Rani Shayto  
American University of Beirut, FAS, Chemistry*

How safe do you think a hospital is? With more than a thousand deaths per year in several hospitals around the world because of HAI (hospital acquired infections) it is imperative to employ a disinfectant that reduces these numbers and one that is harmless to the environment. Therefore our green airborne disinfectant will constitute of lemon, thyme, cinnamon, chamomile, and eucalyptus essential oils. By testing this solution on the most commonly encountered bacteria and viruses (e.g.: staphylococcus aureus and MRSA, etc...) we can ensure optimal cleanliness using this cheap, non-toxic, herb-based and effective disinfectant.

## **Green toilet brush cleaning solution with antibacterial properties**

*Pia Maalouf · Cedric Kseib  
American University of Beirut, FAS, Chemistry*

Considering the high risks of contaminations that can result from a non-hygienic environment generated by the daily use of the toilet brush, we have come up with an antibacterial toilet brush cleaning solution. The bactericidal property of Eugenol isolated from *Syzygium aromaticum* buds (clove buds) by solid-liquid extraction was tested against the growth of several bacteria present usually in feces (mainly *E.coli*). In fact, Eugenol is a phenolic compound that lyses the lipid-containing plasma membranes of bacteria. Our experiments showed that a solution of 4.8% eugenol is needed to eliminate up to 99.9% of bacteria. This cleaning solution, being prepared from natural substances and in an eco-friendly way, fits the green household product project's objectives.

## **Biodegradable Cigarettes**

*Samer Rizk · Mohammad Yassen  
American University of Beirut, FAS, Chemistry*

Considering the high risks of contaminations that can result from a non-hygienic Consumed cigarettes are negligently discarded by the billions each year and hence pose a substantial threat to the environmental makeup. The primary element factoring into said ecological hazard is the filter constituent of a cigarette, customarily composed of non-biodegradable cellulose acetate fibers. Upon consumption of a cigarette, the residual filter element can take years to break down by natural, environmental degradation. This project therefore aims to implement a subtle yet effective modification to the traditional design of cigarettes to one more conducive to the green chemistry approach. The optimized design proposed uses a "bloomed" cellulose acetate filter in contact with an acidic coating composed of a water-soluble, cellulose-hydrolyzing material. Upon contacting water (moisture, dew, rainfall, etc.), the water-soluble matrix releases the acid catalyst, in turn hydrolyzing the cellulose acetate ester into cellulose. This glucose polymer may be degraded under moderate environmental conditions and at a far greater rate than its ester precursor. With these steps, the sheer abundance of discarded cigarettes may pose a significantly lesser threat.

## I.R.T.P

*Marie Nader · Tarek Zughaib  
American University of Beirut, FAS, Chemistry*

The synthesis and use of insect repellent has always been a problematic weight on the balance of utilitarianism v/s environmentalism. In fact, effective insect repellent, which are very much spread all over the market, are synthetically made using chemicals with negative side effects for the environment. That's why we tried to combine some natural products with this property and a household product, which has a useful application in the daily life. Therefore, we came up with insect repellent wooden tableware, which could be used on picnics where the exposure to mosquitoes and flies is important. We are going to use a mixture of natural essential oils that are known to repel insects: Rosemary, Thymus, Citronella, Lavender, Cedarwood, Lemongrass and Pennyroyal; and integrate them in this tableware so that each could enjoy his picnic without worrying about mosquito bites or even polluting the environment. Of course, we are going to set up the mixture in a way that the user will not be bothered by any unpleasant smell or taste coming from the insect repellent mixture like that coming from synthesized insect repellent. Finally, the essential oil mixture that we're going to use will be tested for its efficiency in repelling insects by conducting a test on *Culex pipiens* which is the most predominant mosquito species in Lebanon, abundant and active throughout the year.

## Cinnawrap

*Riwa Sabbagh · Karen Sayad  
American University of Beirut, FAS, Chemistry*

Ever frustrated of throwing out your loaf of bread after just one week or getting rid of your bananas because they've gone bad? Well we found the solution for you. Cinnawrap! It is a wrapping paper like your average aluminum foil but it is made out of cinnamon. Cinnamon is a small evergreen plant native to Sri Lanka. The active ingredient of cinnamon bark and cinnamon oil contains antimicrobial, antibacterial and antifungal properties. We used these properties of cinnamon bark and cinnamon oil to make our own cinnamon wrapping paper to keep stored foods from rotting. Protecting the environment is important for the well being of our generation and future generations. Using cinnamon is a simple and inexpensive small way to help keep our planet green. Imagine not having to worry about inadvertently forgetting or littering a picnic park with sandwich wrappers. These wrappers made of cinnamon bark and cinnamon oil are not only eco friendly but are also very useful as they preserve food for long periods of time. Hurry up and buy cinnamon wrapping! Enjoy a fresh good tasting sandwich and help preserve our world.

## **A plant extract mixture to kill bacteria and fungus on the inner layer of the shoes**

*Emane Abdallah · Rasha Alawieh · Dana Tlais  
American University of Beirut, FAS, Chemistry*

Bacteria and fungi, although very rarely noticed by us, infest our daily lives. They are present in places that we seldom think about. Our study is concerned with such a place: the inner layer of the shoes. In order to lessen the harm that is inflicted upon us by these organisms, we prepare a mixture that possesses a powerful destruction potential over them. The components of the mixture are all retrieved from natural sources that are widely present in Lebanon. The two basic constituents are, as a matter of fact, thyme and cinnamon oil – both of which lack dangerous side effects. Many tests are performed before the final mixture is determined, and during every trial the percentage of thyme and cinnamon oil is varied. The more efficient a particular mixture is, the less is the amount of bacteria and fungi that survive. Based on this concept and on experimental results, the best mixture – the one is the most qualified to kill bacteria and fungi in the inner layer of the shoes - is reached.

## **Oxoclean bleach**

*Mano Sakayan · Hassan Beydoun  
American University of Beirut, FAS, Chemistry*

The Middle East is known to be the cradle of the Date Palm (*Phoenix dactylifera*), as dates were always known to be staple foods in the region and the basis of its indigenous traditional diet. Lately, date pits have been acknowledged to be an excellent source of oxalic acid, an acid cleaner known to have copious sterilizing and bleaching applications. Just hearing the word “acid” would sound ominous, but oxalic acid is easy and safe to use at home. Perhaps its best known use is that as a wood bleaching agent, yet it can also be used to remove food and rust stains from kitchen countertops, plumbing fixtures, tubs and sinks, metal surfaces, ceramic tiles, shower enclosures and fabrics. The extracted acid can also be of use in treating waste water, cleaning, sterilizing, eliminating persistent ink stains and eradicating hard water stains from exterior surfaces like driveways, garage floors, stucco and painted surfaces. This green product’s manufacture is both cost-effective and eco-friendly given that the amounts of materials used for extraction were methodically adjusted for minimum waste. Save money, protect your family and the environment by using safe and simple ingredients to clean your home.

## **The Wireless Iron**

*Serge Sultanem · Firas Jabbour  
American University of Beirut, FAS, Chemistry*

Heat-generating electric resistances are probably the most energy-consuming household devices. And in Lebanon electricity production is one of the major polluting factors. However in some devices heat can be generated by reversible chemical reactions. The Wireless iron is a green iron designed to work with no electric consumption. Heat is generated by the reaction of water and calcium oxide occurring in a compartment adjacent to the iron plate. A constant heat is maintained by sequential addition of water volumes to the calcium oxide stock. The observation of the plate's electrical resistivity shows that the temperature of the plate can be maintained between 250°C and 300°C which corresponds to the average temperature in a normal electric iron.

## **Save Energy on the Highways**

*Ahmad Abou Taam · Layla El Mousawe · Dania Shakaroun  
American University of Beirut, FAS, Chemistry*

A great deal of energy is lost every night on the Lebanese highways. As an attempt to minimize this loss, our research project aims at restricting the time of illuminating the lamps, and utilizing solar energy to generate the needed electric energy. The highway will be divided into independent zones each of which will be connected to a pressure detector (a rod) that functions as a switch on/off push button. When a car crosses the pressure detector, the lamps in the zone will illuminate for a specific time set by the MINP timer. When the specified time collapses, the lamps turn off and the car is in the second region where the process repeats again. The lamps on the highway will operate on electric energy generated from solar energy through photovoltaic cells. The cells are connected to an AGM battery which stores the energy generated during the day to be used during the night. Through our model, we hope this project finds its feet in real life to save energy.

## **Wakbrush**

*Maher Abou Nasr · Daniel Bassil  
American University of Beirut, FAS, Chemistry*

There are 3 essential elements necessary to maintaining proper dental hygiene. The toothbrush, obviously, toothpaste, and well...water. What if we told you that you can do away with 2 of these with your new revolutionary miswak brushes! The wakbrush releases its own liquid to clean your teeth, eliminating any need for water! Furthermore it will cleanse your mouth from any unwanted odors and bacteria. Finally, the wakbrush is a 2-3 time use brush, which is why we have implemented an interchangeable heads system in the handle so that all you need to do to keep brushing your teeth after you wakbrush is worn out, is to buy the heads provided at any pharmacy near you.

## **Nicotine Munchers**

*Fouad Badaoui · Emanuel Hitti  
American University of Beirut, FAS, Chemistry*

Nicotine, a carcinogenic not easily disposed of, is harmful to us and to the environment. In addition, when released into the air from indoor smoking, Nicotine coats the surfaces of wallpaper and most furniture fabrics and may cause color fading and quality lessening over time. The aim of this study is to isolate a Nicotine degrading strain of *Pseudomonas putida* bacteria (S16) and to determine the optimal conditions under which to present it in public and private rooms where smoking may occur. The bacteria were collected from Tobacco plants, cultivated in the Genetics laboratory and their degrading ability was measured in the Chemistry laboratories under varying conditions. Pods resembling Petri dishes and containing S16 were designed to adhere to walls and to attract airborne Nicotine. Data analysis by HPLC revealed rapid Nicotine degradation and bacterial growth under ideal conditions (neutral pH, 30oC and in centrifugation) and that S16 can survive solely on Nicotine. Indoors, the pods revealed to be effective in the cancellation of second hand smoking, the degradation of Nicotine without any unwanted byproducts and the preservation of furniture and wallpaper, all devoid of any energy cost.

## **Sage, Not Rage!**

*“A sage cream insecticide”  
Lina El-Taha · Abeer Mahfouz  
American University of Beirut, FAS, Chemistry*

When the warmth of spring melts the cold winter days, many start planning trips to explore the beauty of the Lebanese environment, or to simply enjoy tranquility of nature on starry nights. Yet there roars the buzzy alert: Mosquitoes and flies detected!!! At AUB, we are most familiar with these all around its green campus. This project comes in handy because it aims to develop a natural creamy insecticide from the endemic herb, sage (*Salvia officinalis*), which contains thujone with an effective muscle-paralyzing potential at a toxicity rate of 0.5mg/kg. You don't have to go out of rage when, instead, you may apply 20%-sage cream that deters insects or kills those that approach you. Don't worry! This concentration of sage has no side effects on humans, and definitely not the “breathtaking” smell of other insecticides. Due to its anti-inflammatory properties, it also shields your skin from infections. The efficiency of this cream was tested based on its ability to deter insects, especially off glowing surfaces, as insects are mostly attracted to these. This was done by monitoring the behavior of random samples of insects in jars treated with our cream, and comparing the mortality results of insects against control groups.

## **Let Your Laptop Chill Too!**

*Hibah Ismail · Samar Chamas  
American University of Beirut, FAS, Chemistry*

You are working on a research paper for a few hours on your laptop and suddenly you feel the intensity of the heat on your lap. The first thing you are worried about is the laptop getting ruined. Little do people know that this radiation is affecting fertility and decreases the sperm count on the long run. Unlike methods that use electricity to cool the laptop, our product will redirect the heat emitted into an endothermic reaction. The reaction will take place in plastic bags situated inside the pad. Between the laptop and the reaction is a sheet of special nylon that will allow heat to pass through and prevent any leakage of water. On the other side of the reaction we placed Styrofoam just so you will not get the chills from the temperature drop that will take place. For more comfort, the whole package is placed in a wooden container to prevent slipping, but no worries, it will feel like a pillow on your lap! Available in any color ordered!

## **Let your legs Light your way**

*Anthony Saadeh · Ralph Tayyar  
American University of Beirut, FAS, Chemistry*

Have you gotten tired of your family members' complaints when you turn the lights on to find your way to the bathroom at night? Do you want to reduce your electricity bills without harming the environment? STARCo has just the solution to all of your problems; a specially designed slipper with a built in light, operated using rechargeable batteries that are supplied with a current which comes from an electromagnetic generator. This generator converts the mechanical work produced from the movement of the foot in the slipper and converts it into electrical energy (current) that recharges the batteries. This way, you will be able to walk safely at night using an environmentally friendly manner (without consuming electricity and without throwing batteries) and a family friendly way. Order your slipper now. Our quantity is limited. PS: Make sure to get the original BirkenSTAR, beware of fake products

## **N-D-Greaser Fights Numerous Diseases!**

*Jessica El-Asmar · Ghina Alaa Eddine  
American University of Beirut, FAS, Chemistry*

Are you tired of all the rashes and allergies from household cleaning chemicals? Are you sick of spending long unsuccessful hours cleaning your stove? Well, I have the solution right here! I, the N-D-Greaser, am naturally synthesized from wood ash and almond oil. I have also been tested to assure my validity. My lye, extracted from wood ash, was titrated with a strong acid in order to make sure it was strong enough to react with the triglycerides of my almond oil. By doing this, it has been confirmed that I am competent. My job is to remove grease from your kitchen surfaces, making them new and shiny in no time. In addition, I provide a pleasant persistent smell – extracted from roses – that gives you the feeling that you are taking a stroll in nature. As a degreaser, I guarantee the elimination of germs and bacteria associated with greasy substances. As a natural degreaser, I promise I will also leave no traces behind that are harmful to your environment. I am a must-have product in every home!

### **The chemistry Behind Contact Lenses**

*Effat Zeidan · Nancy Wanna  
American University of Beirut, FAS, Chemistry*

A contact lens (also known as “contact”, for short) is a corrective or cosmetic lens placed on the cornea of the eye atop the iris. Contacts can come in a number of varieties, including hard and soft (extended-wear and disposable, respectively). The most commonly used contact lenses today, however, are of the soft variety, invented in 1961 by the Czech chemist Otto Wichterle (1913–1998). Contact lenses (both soft and hard) are made of various types of polymers, usually containing some variant of silicone hydro gel. Previously, hard contact lenses were made of a polymer known as PMMA. They have since been replaced by rigid gas-permeable (RGP) contact lenses. Many contact lenses are made of hydrophilic (water-absorbing) materials, thereby allowing oxygen to reach the cornea, and make the lens more comfortable to wear. Heavily tinted contacts are tinted to change the color of the iris, and are used for cosmetic reasons. Some standard contact lenses are slightly tinted in order to make them more visible for handling purposes. In fact, contact lenses must provide a range of physical properties in order to be effective, safe, and comfortable to wear. These properties include: (1) high oxygen permeability in order to transmit O<sub>2</sub> to the cornea, (2) hydrophilic surface so that a continuous tear film coats the lens providing lubrication and (3) resistance to bacterial and protein absorption. The researchers were able to shape the PDMS-silver into a contact-lens shape, and show that it could function as a simple pressure sensor. Glaucoma, a build-up of pressure in the eye, is a leading cause of blindness worldwide. A contact lens that could continuously measure pressure within the eye and relay the data to a computer would allow doctors to learn more about glaucoma and improve patient treatment. The researchers plan to apply for approval to begin trials of the lenses in humans, Pan said. They are collaborating with Professor James Brandt of the Department of Ophthalmology at the UC Davis School of Medicine.

### **Treatment of Olive Oil Mill Wastewater**

*Amanda Kamar · Esther Haddad · Shaza Darwish  
American University of Beirut, FAS, Chemistry*

Olive oil production is a business that causes a significant amount of pollution. Even in its most efficient implementation, the process generates liquid and solid waste in the form of vegetable oil and spent olives. Improper disposal of the untreated by-products results in harmful effects to the surrounding water, soil, and air. The objective of this project is to analyze methods that will help treat and dispose of vegetable water, which has long-been the main source of the Hasbani River pollution. Once a method that is both successful and feasible has been acquired, it will be analyzed for any necessary improvements so that it may aid in solving the pollution problem.

## **Dust Explosion!**

*Mohamad Ataya · Mark Charouf · Danny Charouf  
American University of Beirut, FAS, Chemistry*

Dust is a very dangerous substance because it is combustible. Combustible dusts are present in many process manufacturing environments. Material such as wood shavings, carbon dust, flour, custard powder, sugar, coffee, tea or aluminum dust along with air and a source of ignition such as an electrical spark or hot surface, are the only requirements for dust explosions to occur. The problem is when these combustible dusts are left to gather on hot surfaces in a workplace, such as on an overheated electric motor or fan. This can cause smoldering fires to occur, or can cause an explosion when the dust is kicked up, for example, by a person opening a nearby window. The most catastrophic consequences when the initial shock wave from the explosion kicks up more dust, which triggers a chain reaction through the plant, often resulting in mass destruction of equipment and buildings, as well as causing possible death or injury to employees. Therefore, as potential ignition sources, all electrical equipment installed in these areas, including mixers, filling hoppers, conveyor systems, mills, silos, dust extraction plant, kilns and drying systems need to be adequately protected and designed to operate under these conditions. Directors, company owners, plant managers and maintenance engineers, in fact anyone who is responsible for the health and safety of employees or for sourcing electrical equipment for hazardous areas – must be fully aware of the risks of dust explosions, the European Directives and standards relating to electrical equipment installed in hazardous areas and the measures that can be taken to eliminate the risk of dust explosions occurring.

## **Groundwater Contamination**

*Wassim Ayass · Sara Hijazi · Jaafar Zeineddine  
American University of Beirut, FAS, Chemistry*

Groundwater contamination happens when industrial products like gasoline, oil, and chemicals penetrate the groundwater, making it unsafe and unhealthy for use by humans. Sources of contamination include storage tanks, septic systems, hazardous waste sites, landfills, and the widespread use of road salts, fertilizers, pesticides and other chemicals. If groundwater becomes polluted, humans will not be able to use it for drinking. Drinking contaminated groundwater can have serious health effects (septic tank waste are precursors to Hepatitis and dysentery). In fact, the levels of contaminants in drinking water are seldom high enough to cause acute (immediate) health effects. Examples of acute health effects are nausea, lung irritation, skin rash, vomiting, dizziness, and even death. Contaminants are more likely to cause chronic health effects - effects that occur long after repeated exposure to small amounts of a chemical. Examples of chronic health effects include cancer, liver and kidney damage, disorders of the nervous system, damage to the immune system, and birth defects. Fortunately, the implementation of analytical techniques that can detect the presence of specific bacteria and nitrates could be helpful in identifying the purity of groundwater.

## **Toxins in Your Wonderful Smelling Perfume!**

*Mariam Takkoush · Sarah Daouk  
American University of Beirut, FAS, Chemistry*

Every day, we spray ourselves with perfume which quickly diffuses into the surrounding area. Perfumes contain a lot of chemicals that can have serious effects on our health. Many consumer products contain fragrances. These products include personal products (i.e. perfumes/colognes, shampoos, conditioners, hairspray, shaving cream, make-up, baby care products, deodorants, soap, feminine products, etc.), and household products (i.e. cleaners, air fresheners, bleach, laundry detergent, fabric softeners, etc.). Perfumes make their way into our mailboxes as well. Many magazines carry “perfume strip” advertisements which waft their odor into the noses of unsuspecting readers. Some companies use scented stationary for their mass mailings. Nobody seems to think that this use of fragrances is anything by pleasant and harmless. The problem is that fragrance products are not necessarily harmless, and many can cause some very unpleasant effects. Few people realize that there are at least 5,000 different chemicals used by the fragrance industry in the manufacture of fragrance products. Nor do they realize that a fragrance product such as perfume may contain as many as 600 individual chemical ingredients. Of the 5,000 different chemicals used in fragrance products, less than 20% have been tested and reported as toxic. Many of those chemicals that have been tested are regulated by the federal government as hazardous materials. The remaining chemicals have not been toxicity tested, so the health effects and regulatory potential are unknown. Of the 150 highest volume chemicals used in fragrance products, more than 100 can be identified in the air of a room using sophisticated testing techniques. Most of these 100 chemicals are known to be toxic. Diethyl Phthalate (DEP) is one of these chemicals. We will study the effect of this chemical on the consumer, focusing on how it enters the body. An analytical method that was designed to analyze the amount of DEP used in perfumes will also be evaluated.

## **Plastics...Strength, Durability and Resistance!**

*Noura Zamzam · Nehma Assaf · Riwa Aridi  
American University of Beirut, FAS, Chemistry*

Plastics, whether naturally existing or synthetically created, influence our everyday life because they are constituents of our clothing, housing, packaging, electronics, and medical implants. Plastics are polymers that are durable and easily molded, and oftentimes they degrade slowly. They are classified into two categories: thermoplastics and thermosets. We will evaluate what properties of plastics make them strong and highly resistant to degradation, focusing on how they are processed and disposed. An approach to recycling methods and green plastics will be presented, in addition to a case study about plastic industry in Lebanon.

## **Water Treatment using Zero Valent Iron**

*Lubna Dada · Mahmoud Dgheim · Rawan Hakawati  
American University of Beirut, FAS, Chemistry*

Many consider water a primary cause for death and diseases. It is categorized as a pollutant when it is impaired by anthropogenic contaminants. Water is not usable or drinkable with such contaminants, which are often chlorinated organic compounds. We will use Zero Valent Iron (ZVI) to treat such polluted ground water. The ZVI design depends greatly on the preparation of the treatment zone: isolating an area with a sheet pile and filling it with a mixture of granular iron and sand to leave behind a permeable, iron bearing, treatment zone. When contaminated water passes through the zone, dechlorination products and dissolved iron are the only remains. The iron is a bulk reducing agent; when the chlorinated organic compounds are exposed to the iron walls, a subsequent reaction takes place. Unfortunately, some chlorinated alkanes are problematic because they produce partial dechlorination products making the iron walls corrosive.

## **Garbage burial and its Effect on Nature**

*Habib Ghandour · Karim Ruzz  
American University of Beirut, FAS, Chemistry*

The most common disposal method of municipal solid waste (MSW) is burial in landfills. Quantitative analysis of speciated nonmethane organic compound (NMOC) conducted during an intensive, short-term field program measured emission rates of gases from the landfill. Over 70 individual volatile organic compounds (VOCs) were detected and quantified in the landfill gas samples. The typical gas composition for this landfill was determined, and estimates of the spatial, temporal, and measurement variability in the gas composition were calculated as well. The data for NMOC show that the gas composition within the landfill is equivalent to the composition of the gas exiting the landfill through passive vents and the soil cover.

## **Meat Products in popular chocolate bars**

*Ziad Tayara · Joseph Majdalani  
American University of Beirut, FAS, Chemistry*

Masterfoods declared on May 1, 2010, that they will increase use of Rennet in snack food production. Rennet, a chemical sourced from a calf's stomach, is used in the production of whey. It is one of the ingredients found in Bounty, Minstrels, and Milky Way products, and the ice cream versions of all Masterfoods' candy bars. A quantitative study of the rennet chemical in these products will evaluate Rennet's synthesis with chocolate and a possible method of extraction. Applications, advantages, disadvantages, and some possible alternatives will be proposed and evaluated.

## **I will Die in Two Years. . . Really?**

*Rana El-Jarrah · Tariq Buhilaigah · Omar Osman  
American University of Beirut, FAS, Chemistry*

The main aim of the project is to test whether Mailks biodegradable bags actually decompose over a period of two years or less. We will evaluate the conditions that initiate decomposition and will discuss the chemical composition of the biodegradable plastic bags.

## **White phosphorus bombs**

*Nassib Abou Haidar · Ayoub Abi Rafah  
American University of Beirut, FAS, Chemistry*

Since the past two Israeli wars in the Middle East, many human rights advocates have opposed the use of white phosphorus bombs in combat due to their devastating short-term and long-term effects on victims and civilians. We wish to investigate the chemical composition of these bombs as well as their history and evolution. The direct and indirect effects of these bombs on the residents of these attacked areas will be examined. If grievous conclusions result, it will be imperative to outlaw the use of these chemicals in artillery.

## **Be careful what you eat!**

*Mariam Kamaledine · Fayez Abou Zaki  
American University of Beirut, FAS, Chemistry*

Air pollution affects the food that we eat. Air pollution has always been a serious matter for environmentalists because the side effects are both hazardous and fatal. Rarely is there an association that takes precautions against air pollution's effects on food production and consumption; in Lebanon, there are no associations that have to do with this matter at all. Our research will investigate the extent of this problem and methods of reduction and prevention.

## **Cement Production and its Consequences**

*Ismat Mrad · Mahmoud Rahal · Hussein Hissy  
American University of Beirut, FAS, Chemistry*

In the most general sense of the word, cement is a binder, a substance which sets and hardens independently, and can bind other materials together. The word “cement” traces to the Romans, who used the term “opus caementicium” to describe masonry which resembled concrete and was made from crushed rock with burnt lime as binder. The volcanic ash and pulverized brick additives which were added to the burnt lime to obtain a hydraulic binder were later referred to as cementum, cimentum, cäment and cement. Cements used in construction are characterized as hydraulic or non-hydraulic. The most important use of cement is the production of mortar and concrete—the bonding of natural or artificial aggregates to form a strong building material which is durable in the face of normal environmental effects. Concrete should not be confused with cement because the term cement refers only to the dry powder substance used to bind the aggregate materials of concrete. Upon the addition of water and/or additives the cement mixture is referred to as concrete, especially if aggregates have been added. Instrumentation, conditions, and procedures are integral constituents in the cost-benefit analysis of cement production. A complete analysis also requires a comparative aspect that relates cement production in a Lebanese factory to cement production’s global standards. The research will evaluate the benefits of this industrial domain and any potential effects on the surrounding environment.

## **Skin Candy: Tattoos**

*Reem Yahfoufi · Serena El Choufi · Nadine Harajli  
American University Of Beirut, FAS, Chemistry*

In recent years, the popularity of tattoos has continued to grow, but now there is great concern about its potential risks. The primary risk related to the drawing of a tattoo is the use of “infected” needles which lead to the spreading of infections. The purpose of our research is to analyze the composition of the ink used and its impact on human health. Tattoo ink is composed of two parts: pigment and carrier. Pigments may be metal salts, plastics, or vegetable dyes. The purpose of the carrier is to keep the pigment evenly distributed in a fluid matrix, to prevent clumping of pigments and to aid the application on the skin. The carrier is composed of many substances that could be either safe or highly toxic: ethyl alcohol (ethanol), purified water, Listerine, glycerin, denatured alcohols, ethylene glycol, or aldehydes.

## **Forged Medicinal Drugs**

*Hussein Nassar · Dany Debs  
American University of Beirut, FAS, Chemistry*

One of the most alarming issues concerning pharmaceutical field is the black-market trade of forged medicinal drugs. During this research, we will study the composition of some pharmaceutical medicines that contain such notorious drugs, trying to find a solution for this problem.

## **To recycle or not to recycle**

*Ragheed Abdul Khalek · Farah Hoteit  
American University of Beirut, FAS, Chemistry*

Many campaigns encourage recycling to save our planet; however, studies have shown that harmful toxins can be released by recycled materials. Glass, aluminum, and plastic are only some examples of harmful products. The chemistry behind their toxins will be examined in order to weigh the negative effects of recycling against the positive effects.

## **Reducing the Amount of Carbon Dioxide Emitted**

*by Cars in Congested Streets at Night  
Teresa Eid · Laura Samaha  
American University of Beirut, FAS, Chemistry*

Gemmayze since is one of the most congested streets in Lebanon, especially during evenings and the weekend. We wish to determine the amount of carbon dioxide emitted by vehicles that use Gemmayze Street. In order to accomplish this task, we will measure the length of Gemmayze Street and determine the average number of cars present in the street during peak traffic hours. The obtained results will allow us to deduce the average amount of CO<sub>2</sub> emissions that are contributing to the pollution of the area during different times of the day. After the evaluation is complete, we will suggest methods to reduce the amount of pollutants that are being released.

## **The Science behind Magic**

*Elie Abdelnour · Karl Abi Aad · Vanessa El Kamary  
American University of Beirut, FAS, Chemistry*

What we commonly call magic is actually a combination of several factors intertwined to produce an illusion. Our research project aims at studying the different chemical processes involved in many magic tricks: burning a dollar bill and keeping it intact, holding a fireball without burning your hand, turning water into wine; all of these are only few examples where chemistry is used to trick the audience.

## Charcoal

*Samir Kayali El-Alem · Amanj Harki · Alaa Hajhasan · Alaa Khalil  
American University of Beirut, FAS, Chemistry*

Charcoal is a material of great importance in the industrial world: it used as a fuel because it burns cleaner than other materials and as a purifying agent as it absorbs a wide range of organic compounds. We also use charcoal in our personal lives when smoking “Argheelah” (where charcoal “cooks” tobacco to a temperature that so that it produces smoke) or in our art when making drawings or sketches. We will be discussing the analytical techniques and instrumentation used to study the composition of different types of charcoal (natural and synthetic) so we can relate each kind to its specific use.

### **Algae: A Renewable Source For Liquid Fuel**

*Nadia Al Jamal · Khaled El Khatib · Fady Fadel · Michelle Khouri Melki  
American University of Beirut, FEA, Civil & Environmental Engineering*

Access to energy is indeed the bedrock on which modern civilization reclines. A crisis, however, looms ahead as fossil fuels are dwindling, amid increasing demand, and suffocating the atmosphere with greenhouse gases. Race is on to find alternative solutions to come through. Among the devised solutions, piezoelectricity produced by certain crystals upon mechanical pressure has enormous potential. Conventionally, piezoelectric material has been deemed too rigid to be efficient or practical. Nevertheless, scientists have recently managed to soften up the material by cutting it into nanoribbons combined with rubber or into thin fibers, thus opening the way for endless imaginable applications. A conceivable use of the piezoelectric effect is to exploit the vibrations caused by noise to produce an electric charge which harnesses hydrogen fuel from water. Other applications to harvest the “waste energy” of movement and vibrations may be viable as well.

### **Production of non-toxic, biodegradable and environmentally friendly bioinsecticides via microbial metabolism**

*Zohair Abdallah · Kalim Korban · Nour Sobh · Serge Jacques Sofian American  
University of Beirut, FEA, Civil & Environmental Engineering*

Charcoal is a material of great importance in the industrial world: it used as a fuel because it burns cleaner than other materials and as a purifying agent as it absorbs a wide range of organic compounds. We also use charcoal in our personal lives when smoking “Argheelah” (where charcoal “cooks” tobacco to a temperature that so that it produces smoke) or in our art when making drawings or sketches. We will be discussing the analytical techniques and instrumentation used to study the composition of different types of charcoal (natural and synthetic) so we can relate each kind to its specific use.

## **Environmentally-Friendly Bioplastics**

*Abdo Abbou · Peter El-Khoury · Farah Abi Morshe · Nour Fayed  
American University of Beirut, FEA, Civil & Environmental Engineering*

A material that is used worldwide and highly used in industry is the “plastic”. Since the industrial revolution, plastics have been incorporated in the manufacturing of almost every product due to their flexibility and viability in production; however this practice was from the top causes that lead to global warming due to toxic emissions and negative effects to the underground soils and aquifers upon degradation. Appalled by these disadvantages, searching for a replacement became a necessity. A new type of plastic was innovated to serve in the decline of environmental pollution, which is “Bioplastic”. Bioplastics proved to be superior over synthetic plastics in its components of production which are more natural, in its speed of degradation, and its role in opposing the increase in carbon dioxide emission rate. We will dwell in our research on these remarkable characteristics of bioplastics and compare them to that of the traditional synthetic plastics to highlight the importance of its usage worldwide. Moreover, we will be probing on its advantages in agriculture due to its degradation to beneficial end-products. Furthermore, we will enlighten the significance of this shift from traditional plastics to bioplastics in terms of economics. We will be interpreting all benefits as well as drawbacks, if any, that result from such a new way of production. This research paper should bring into view the capacities and capabilities of bioplastics in terms of its efficiency and effectiveness in solving the dilemma of the distressing increase in pollution and global warming. In conclusion, this new generation of plastics will serve as an effective step towards environmental sustainability.

## **Bioremediation of Endocrine Disrupting Chemicals/Pharmaceuticals**

*Alma Rouphael · Nathalie Saade · Rena Menhem · Shaghig Kasbarian  
American University of Beirut, FEA, Civil & Environmental Engineering*

Endocrine disrupting chemicals (EDCs) are of particular concern as many have been recently detected in municipal wastewater and water distribution systems. EDCs affect the endocrine system, which is a system of glands secreting hormones to regulate the body. Hormones play a major role in regulatory functions including mood, growth and development, tissue function, and metabolism. However, EDCs have the ability to inhibit the effects of hormones as they tend to bind to their receptors; thus, can interfere with the natural production, release, transport, metabolism, binding action and elimination of hormones in the body (Manning, 2005). Obviously, EDCs present in the environment cause severe health disorders and should be removed from water sources. EDCs are exogenous substances that alter the hormonal and homeostatic systems, the most common of which may be present in metals, pesticides, herbicides, etc.; however, the focus in this study will be EDCs from pharmaceuticals. Some pharmaceuticals may not be properly metabolized by humans or animals after consumption, and thus are excreted in their original form, while others are transformed into other compounds (conjugates) which may be cleaved to release the parent compound during the physical and chemical treatment of sewage. Scientists have researched several ways to ensure the removal or decrease of EDCs in the environment, some of which are precautionary actions while others include elaborate methods of bioremediation. The primary objective of this project is to define endocrine disrupting chemicals, study their effects on human being, as well as identify their sources and ways of action. More importantly, treatment methods allowing the removal of EDCs, particularly focusing on bioremediation techniques, will be assessed.

## **Bioremediation of Nuclear Wastes**

*Hasan Mawassi · Hassan Skaini · Hiba Ghoson · Samer Nuwayhid  
American University of Beirut, FEA, Civil & Environmental Engineering*

The immense efforts carried out in the domain of nuclear power and weaponry over the past several decades has resulted in the vast accumulation of highly radioactive materials all over the globe. Improper methods adopted for disposal of these nuclear wastes, paired with general negligence on the part of ruling factions, has led to extensive contamination of soils, sediments, and groundwater on the global scale. The presence of such dangerous, non-biodegradable, radioactive materials in our surroundings, poses a great threat to the wellbeing of humans, animals, and the natural environment as a whole. Knowledge of the serious risks imposed on the planet by such wastes, has driven scientists and researchers in recent years to explore and propose serious solutions to the safe, efficient removal of these harmful substances. This review paper, in addition to a brief discussion on the sources, dangers, and methods for disposal of nuclear wastes, will investigate, in detail, bioremediation as a means of resolving the rising problem of radioactive matter in the environment. Topics of discussion in our study will include: techniques of bioremediation, parameters and considerations accounted for, lab and field methods, as well as the benefits and drawbacks presented by such a method. This research paper should bring into view the capacities and capabilities of bioremediation in terms of its efficiency and effectiveness in solving the dilemma of nuclear wastes.

## **Microorganisms in Ventilation systems- Causes and Control**

*Hassan Bitar · Farah Fathallah · Hassan Al Hajj Hassan · Suha Saleh  
American University of Beirut, FEA, Civil & Environmental Engineering*

The paper under study will discuss the sources and causes of microbiological indoor air pollution and possible ways of control. Microbiological indoor air pollution is due to the presence of contaminants (bio-aerosols) inside buildings and ventilation systems. Multiple sources contribute to the formation of bio-aerosols such as animal and human sources, plant sources, rural sources, urban sources, aquatic sources, and atmospheric sources. Bio-aerosols could be present as different microorganisms (Fungal Spores, Micro-algae, bacteria, and viruses). The accumulation of such contaminants may lead to health disorders as well as cause discomfort for the residents such as the sick building syndrome; therefore, controlling such pollution is crucial for ensuring the health and safety of occupants. In addition to regular maintenance of air cleaners and ventilation systems that act as the main medium for growth of microorganisms, different techniques are being adopted or evolving to control airborne microbiological contaminants. Examples of techniques that are currently being used include isolation systems, air filtration, ultraviolet irradiation, vegetation, outdoor air purging, electrostatic precipitation, and negative air ionization. Developmental control techniques include photocatalytic oxidation, microwave atomization, air ozonation, pulse light, passive solar exposure, ultrasonic atomization, and carbon adsorption.

## **Bioremediation of Oil Spills**

*Toufic Abou Khalil · Dima Azar · Guy Bou Lahdo · Marc Homsy  
American University of Beirut, FEA, Civil & Environmental Engineering*

Bioremediation is the human augmentation of biodegradation, the manipulation of microbial activity so that the ecological balance is restored in favor of the microorganisms and the contaminant destroyed. The use of bacteria to remediate oil spills is significant nowadays due to an increasing frequency of oil spills around the world and an increasing environmental awareness. The purpose of this report is to tackle the issue of oil spills and how bacteria can be used in remediation of environmental contaminants. Firstly, oil spills will be defined, their chemical composition explained, and the associated effects on the ecosystem highlighted. In view of the negative environmental consequences of oil spills, different pre-treatment techniques as well as various treatment strategies will be discussed with an emphasis on bioremediation. Oils may be basically removed from contaminated waters by biodegradation. Bioremediation is an engineered biodegradation technique whereby microorganisms are introduced and stimulated to degrade oils. However, although bioremediation can treat oil spills quite efficiently, it still has its limitations which will also be discussed. Case studies of previous oil spills such as the Exxon Valdez Oil Spill in Alaska and the Ashland Oil Spill will be included to better understand the process and application of bioremediation. Finally, the oil spill catastrophe on the Lebanese coastline caused by the July 2006 war will be studied, and the undertaken treatment attempts will be assessed including the role of bioremediation, if any.

## **Microbial Fuel Cells: Current Applications and Environmental Sustainability**

*Marwan Harajli · Karim Jarrah · Hussein Kassem · Ali Makki  
American University of Beirut, FEA, Civil & Environmental Engineering*

The world today is suffering from water, air, soil, and various types of pollution which are in part attributable to the use and combustion of fossil fuels. Fossil fuels are non-renewable and expensive, and most importantly release toxic by-products upon combustion. It is consequently essential that an alternative with the properties of being environmentally friendly and- to a certain extent- renewable be sought. Such alternatives include solar panels, wind turbines, hydro energy, and a relatively new technology: Bio Fuel Cells. Bio fuel cells are cells that harvest biochemical reactions to produce usable energy (electrical energy). There are many types of bio fuel cells; of these is the Microbial Fuel Cell, the subject of our research paper. Microbial fuel cells (MFCs) are systems that benefit from the metabolic processes of a certain type of bacteria namely: Exoelectrogens. These bacteria have the property of transferring electron to materials which are not the primary electron acceptors. Consequently, by placing the bacteria on a conductor (the anode), and immersing the latter in a wastewater medium, the organic matter in the waste is degraded by the Exoelectrogens thus leading to the abundance of electrons on the anode. To make use of these electrons, the circuit is closed, and an electric current can be detected. In our project, we will present the microbial fuel cell in its different variations and with its various components. To understand the reactions occurring in the cell, specific chemical properties are introduced or recalled. Impediments encountered during the construction of an MFC are also tackled, and some solutions presented. We then move on, to discuss the efficiency of such systems, taking into consideration the different waste-bacteria combinations, different anode materials, and in general different cell element variations. Efficiency will be assessed in terms of cost, output power, stability, safety, and mobility. Finally, the use and application of MFCs will be recommended over the use of fossil fuels to promote environmental sustainability.

### **Oily Hair**

*Xavier Chalhoub · Nicole Jamil · Nourhan Houjeij · Hind Lahham  
American University of Beirut, FAS, English*

The purpose of our project is to help the environment by demonstrating how hair can absorb oil. We gathered the following materials:

- Pantyhose
- Oil
- Hair
- Big transparent bowl
- Salt water/Sea water

We filled up a bowl with sea water and then added the oil and waited for it to settle. We then filled a panty-hose with hair and sealed it. The panty-hose was placed in water and we waited until the oil was absorbed, within minutes at most. Our research came from online sources and statistics. Hair is disposed by the tonnes into landfills because we believe it is waste. But one man's waste is another man's treasure. In other words we will show how useful hair actually is by using it to remove excess oil from the ocean.

### **Beirut, Beirut, Beirut**

*Alyssar Helou · Hawraa Duhaini · Fatmeh Nassereddine · Dina Abou  
American University of Beirut, FAS, English*

Through this project we aim to show Beirut in the past and the present and to raise awareness about how we can save Beirut in the future. We will inform our audience about overall changes that took place in this historical city of Beirut, and how they are affecting our environment. Our project depicts a physical model of Beirut, pictures, and a trivia. Since this project relates to nature, we have chosen to use recycled materials such as used plastic containers, cardboards and aluminum foil for the model. We are also going to provide our audience with actual photographs of Beirut in the past and present that would help them visualize the dramatic changes that have taken place. Finally, we have decided to reward our audience with friendly plant gifts to encourage them to become more involved in nature related issues.

## **How to grow your own vegetables**

*Farah Shami · Katia Fakh · Fatima Salhab · Hosni Omeis  
American University of Beirut, FAS, English*

Nowadays people are afraid of buying vegetables grown in farms due to the overload of chemicals fed to those plants. Our purpose is to introduce certain types of vegetables which can be easily grown in every home. We will be demonstrating how to plant, grow, and protect these vegetables along with a brief introduction about each plant. The demonstration will show the viewer how to transfer a plant from a pot into a wider land containing good soil. We plan to grow parsley, mint, potato, onion and green tea. Each demonstration will last about 15-20 minutes, and will be repeated four to five times. The only materials that will be required are; water and water sprayers, soil, shovels, seeds, containers.

## **Spread the WORDS**

*Nabil Nasr · Christina Skaff · Ghalia Korban · Tala Obeidat  
American University of Beirut, FAS, English*

The purpose of this project is to raise awareness about the issue of global warming. It aims at getting the audience involved in becoming part of the solution. The audience will be asked to form a “haiku”, which is a Japanese three verse poem of 5-7-5 syllables, and whose theme is strictly about the conservation of and the love for the environment. Haikus are relatively easy to write. Furthermore the haikus that the audience form would serve as leaves and would later be attached on to a tree like structure, which would be a metaphoric representation of nature, the environment, and more specifically other endangered plants. Therefore by participating, the audience would be taking initiative in being part of the solution; they would be giving back to nature in terms of reviving the tree. Meanwhile, for each haiku, the participant would receive a “goodie bag” that includes an environmentally friendly accessory such as an organic bracelet and a fun fact about endangered plants and global warming.

**Regeneration of the ozone layer: A future outlook**

*Ali Halas*

*American University of Beirut, FHS, Environmental Health*

This poster focuses on the ozone depletion and the decisions taken in the Montreal protocol. However, ozone layer is form of ozone molecules in the upper layer of stratosphere, and this layer protects living things by absorbing the UV radiation from the sun. The uses of ozone depleting substances (ODSs) such as chlorofluorocarbons (CFCs), and hydrofluorocarbon (HCFCs) led to the depletion of the ozone layer and caused the ozone hole. This destruction of the ozone layer affects the environment and the public health. A protocol done in 1987 at Montreal, this protocol contributes in protecting the climate and decrease to a large extend the depletion of the ozone layer as a result of taking decisions that prohibit the use, and the production of ozone depleting substances such as CFCs that are known as the main cause of the depletion of the ozone layer. Moreover, EPA strongly recommends and works to develop strategies and policies to protect the ozone layer. ODSs and their substitutes such as fluorocarbon gases are also consider as greenhouse gases, this means that the ban of ODSs and the support of the use of substitute gases protect the climate. Governments and influential stakeholders should act through developing strategies supported by political commitments aiming towards achieving ozone layer recovery.

**Are these pillars enough to achieve traceability?**

*Amani H. Majzoub*

*American University of Beirut, FHS, Environmental Health*

This paper will address a contemporary issue which is food safety. A general background about the global profile of food safety , along with the determinants of food safety(physical, chemical, microbiological) are presented. A section about the legal framework of food safety in various regions is provided; in addition to health impacts and socioeconomic impacts of food safety. A management strategy is emphasized by giving different methods such as Farm to Fork approach, good manufacturing practices, and many others; plus their advantages and limitations. A case study about melamine in infant formula milk in China is presented to shed the light on lessons learned and to explain the management strategy. In conclusion, to accomplish food safety a full system should be followed.

## **Virtual water trade: a tool for achieving long term water security on a global scale?**

*Bashayer Madi*

*American University of Beirut, FHS, Environmental Health*

Virtual water, the amount of volume required to produce a product or a service, is a new emerging concept that came as a response to the pressure that is exerted on the water resources worldwide. This poster tries to answer the question whether virtual water trade can be used as a tool to achieve water security on a global scale. It introduces the concept of virtual water trade in general and its uses in achieving water security and efficiency and in calculating the water footprint. Further, this poster illustrates the different challenges and limitation behind the use of virtual water concept and tries to come up with possible management solution to these challenges.

## **Can you handle the impact of climate change on tourism?!**

*Bouchra Oueini*

*American University of Beirut, FHS, Environmental Health*

The abstract: tourism is considered to be a major part of the economy of many countries. Climate change impacts are very dangerous on humans and the ecosystem as well. In addition tourism is now facing difficulties; these troubles are the consequence of climate change. Due to this change many natural areas are being degraded (melting of the snow, deforestation...). So my poster I am going to include the causes of climate change( global warming , industries and human activities, emission of gases...), the impact of climate change on human and the ecosystem and on the other hand I am going to include the importance of tourism for the economic development of some countries and the type of tourism affected by climate change ( ecotourism, leisure tourism...)

## **A Town to be Drowned**

*Fatima Darwich*

*American University of Beirut, FHS, Environmental Health*

Nowadays, floods have become more frequent which is resulting in more water elevated levels than before. Damages are becoming more serious and this is due basically to human activities and the inappropriate human interventions. There are three perspectives that should be tackled when coming across at which include the destruction of vegetation that leads to soil erosion. Second the land reclamation and the siltation which is reducing lake volume. And the third is the production of levees which has caused floods in the past decades. A quantitative assessment of damage that is caused by a natural disaster is said to be a complex one. The management and the safety against floods is an essential element for the public safety and the environment.

## **Climate Change: It's Not Just About the Climate!**

*Daniah Turjman*

*American University of Beirut, FHS, Environmental Health*

Every now and then the world witnesses a new natural disastrous event leading to hundreds of deaths. As has been speculated this further highlights the dangers of climate change and global warming. Although such events strike us, but there are yet many indirect impacts of climate change that are not as openly observable but as crucial and severe as the observable ones. Increase in temperature, changes in precipitation patterns, floods, droughts, disruption of ecosystems have all been considered as environmental impacts of climate change that in return impinge on the health of populations. Nevertheless bearing in mind that climate change is a global issue, thus the public health concerns associated with it are global as well. As such this poster will discuss public health impacts that climate change induces in relation to the global burden of disease. Although everyone is affected, developing countries remain the most vulnerable to any disease patterns and public health impacts that are introduced, and thus hinder sustainable development. Hence, this review will compare the impacts between developed and developing countries and will further look at the several existing international and global efforts to overcome disease spread and deterioration of the global disease profile due to climate change such as the United Nation conventions and Programs. While it is important to work at the international level, governments play a big role in preventing adverse public health effects of climate change and maintaining a healthy population, thus adaptation measures are important for this purpose. In this context, adaptation measures shall be briefly presented.

## **Management of earthquakes: How do we save human beings?**

*Nivine Issa*

*American University of Beirut, FHS, Environmental Health*

Natural disasters such as earthquakes have taken the lives of approximately 3 million lives worldwide during the past 20 years and affected the lives of at least 800 million more people and have caused more than \$50 billion in property damage. With the increasing likelihood of potential damage caused by natural disasters it is essential to implement management strategies to minimize potential impacts as much as possible. Many factors affect the severity of the earthquake ultimately affecting the morbidity and the mortality of the worldwide populations. Public health impacts are numerous and many factors shape up the fatalities and property damages. Countries had implemented many management strategies to prepare and mitigate earthquake damages and save as many human lives as possible. Because these natural disasters cannot be prevented, proper emergency planning to minimize public health impacts and property damage is of our primary concern.

## **Wars Unveiled: The Truth behind the Lies**

*Rana Tarhini*

*American University of Beirut, FHS, Environmental Health*

When talking about wars one cannot help but think of the inevitability of such an event. What if all the wars were prevented how will our five thousand years of human civilized history look like? One thing all experts agree on is that wars are preventable. Wars have several impacts (environmental, economical, psychological, and health) on countries, neighboring countries, soldiers, and most importantly civilians. The main aim of this poster is to spot the light on the consequences of wars on innocent civilians who pay the highest cost although do not participate directly or even indirectly in wars. In addition this project will discuss the main unveiled truth behind wars and the main intentional reasons behind choosing to kill innocent civilians. Bombs of all types and kinds fall on what is supposed to be military targets or places of threat to the attacking country; this is the norm, the general conception of wars. However in reality the concept of war lies on one thing and one thing only, attacking the country in where it would hurt the most, bleed the most, impair the most, and that is by attacking the civilians. Countries use different weapons beginning with the conventional such as landmines, grenades extending to the chemical-biological, and finally reaching the worst form of mass destruction: nuclear weapons. The primary focus of this research is to review the short and long term health effects that result from civilian attack along with the other factors on a psychological, economical and social level. Moreover, this report sheds light on the war theory and its implications and ethicalities on the above fields.

## **Marine oil spills: The Never-ending Burden on Marine Pollution**

*Fay Mushantaf*

*American University of Beirut, FHS, Environmental Health*

With oil being one of the main sources of energy, its production is rising and so is its transportation. As a result, massive accidental oil spills occur and everyday activities from land-based sources contribute to the never-ending input on marine pollution. Although large accidental spills account a small portion of oil in the ocean, yet they attract far more attention than other much larger sources, which are the small spills that often go unnoticed. When small spills are added together they become large persistent oil spills that contribute primarily to the global problem of marine pollution. This poster focuses on the importance of small day-to-day oil spills in contrast with the catastrophic accidental oil spills. Moreover, it demonstrates its sources, quantities, and chronic environmental effect in countries at most risk. It also discusses the socio-economic impacts on fisheries, industries, and tourism; and displays the public health effects on seafood consumers and cleanup workers. Furthermore, it suggests proper recommendation measures, for the prevention of the careless coastal activities that constantly add to the global burden on marine pollution, in accordance international conventions that govern the oil spill management.

## **Hazardous Waste Trade; “To Dump or Not to Dump?”**

*Sara Jouni*

*American University of Beirut, FHS, Environmental Health*

The annual production of hazardous waste is approximately 400 metric tons (UNEP, 1992). Therefore, these wastes have been managed through various ways including the Transboundary movement of these toxic substances. The dumping of hazardous waste in third world countries is on the rise due to its economic benefits for both participating parties (importer and receiver). The problems arising from Transboundary movement of hazardous waste is now so majestic that it is slipping off our hands. The problems arising from this practice include not only public and environmental consequences, but also the underestimation of the ethical approach regarding this practice. The environmental ethics behind this crime is a controversial issue that has been overlooked. The main principles of ethics that fall in this category are classified according to the right for living in a healthy environment, racist interference, corporate responsibility and finally the role of the government. These issues should be taken into considerations by developing countries.

## **Entertainment Noise: Music to the Ears?**

*Sima N. Hojaj*

*American University of Beirut, FHS, Environmental Health*

Setting fixed regulations regarding noise levels arising from music at the community level is a global challenge. Open air concerts and pubs are globally known as a source of entertainment. However, at the community level, some people may not be aware of the fact that such type of entertainment has a price to pay where the people who are suffering the consequences are the ones who aren't involved, people of the community living in nearby areas. The objective of this report is to review and provide evidence on the negative relationship that exists between what is known to be entertaining at the community level and the people of that community. As such, adverse health effects may differ between members of the community and can either be permanent or temporary depending on frequency, intensity and interferences from other source of noise. Some of the possible health effects include hearing impairment which will affect speech communication, a person's ability to sleep, cardiovascular and physiological effects, social behavior and annoyance and effects on performance. As such, it's important to note that music to the ears of some may be noise to the ears of others.

## **Impact of Avian Flu on Global Health**

*Sally Safa*

*American University of Beirut, FHS, Environmental Health*

The avian flu crossed borders and spread from a continent to the other, making it become an issue of a global concern, due to its ability of causing fatalities, which is estimated to be around more than a hundred million cases. Avian influenza (H5N1) is a kind of infection that is caused by viruses which mainly occur among birds and poultry, and is very transmittable among them. It started in November 2003, where nearly around 400 cases of human infection have been reported by more than twelve countries in Asia, Africa, the Pacific, Europe and the Near East. H5N1 has killed millions of poultry in a growing number of countries throughout Asia, Europe and Africa, Health experts are concerned that the co-existence of human flu viruses and avian flu viruses will provide an opportunity for genetic material to be exchanged between species-specific viruses, possibly creating a new virulent influenza strain that is easily transmissible and lethal to humans. This disease targets the molecules on the surfaces of the alveoli in the lungs. The symptoms of this flu vary from fever, sore throat, to chest pains and conjunctivitis. Its mode of transmission occurs either from animal to human, which is mainly through the fecal-oral route or through the handling of infected birds and poultry, environment to human through the oral ingestion of contaminated water or due to the use of infected and untreated avian feces as a fertilizer, or human to human.

## **Deforestation: An Ending to the Biodiversity Lifeline**

*Lama El Chaar*

*American University of Beirut, FHS, Environmental Health*

Biodiversity is a complex term that covers several factors. It includes all the interactions that occur among the biotic and the abiotic aspects of the area designated. Considering that, it's clear that biodiversity is a broad topic with multiple angles to look at. This is why it was narrowed down to deforestation, a modern and present issue worldwide. Deforestation can cause severe impacts on biodiversity surrounding us, which in consequence will affect our ecosystem and lifestyles. Learning more about deforestation will help everyone become familiar about this global challenge and study possible solutions or preventive measures for the issue.

## **Food Security**

*Lama El Ghali*

*American University of Beirut, FHS, Environmental Health*

The proceeding poster will mainly tackle the two methods commonly used in order to achieve food security; Organic farming and Genetically modified Crops. Thereby the poster will highlight the benefits and limitation of each method so that the reader will have an idea about both methods and choose the best one.

## **Landmines: The New Toy for Children**

*Leen Sraj*

*American University of Beirut, FHS, Environmental Health*

“What will happen to my family... to my mother and father? Why couldn't I have died? It would have been better if the mine had just killed me. Now I am useless and a burden on everyone, including myself”. Ahmed is a 13 year old boy from Afghanistan, he lost his leg by a blown off landmine. Also his father is amputated previously by a landmine explosion. The case of Ahmed and many others like him shows how these landmines affect the person not only physically but also psychologically. This poster will focus on the impacts of these landmines on children. How they are attracted to the landmine? What are the consequences they face after the explosion? How the international society and the UN dealing with this problem? Finally some recommendations are suggested that may help countries that have this problem, to protect the innocent lives of their children.

## **Burdens of Nuclear Waste Management**

*Sara Obeid*

*American University of Beirut, FHS, Environmental Health*

This poster represents the environmental and public health global burden of nuclear waste management, mainly the concept of geologic repositories as an answer for the disposal of radioactive waste. It discusses the political and economic factors contributing to making crucial production and management.

## **Child Labor: Everywhere but still invisible**

*Nour Zouhairy*

*American University of Beirut, FHS, Environmental Health*

According to the UNICEF: In 2009 an estimated 158 million children aged 5-14 are engaged in child labor in the world. Therefore the international community has been fighting against child labor for a long time: several conventions took place to discuss this global problem like the minimum age convention, right of children... but implementation is still the major issue. In fact, despite all the laws issued, there are still many governments inactive regarding child labor due to several factors. Moreover, children workers differ but I will mainly be focusing on children working in Mega industries and in Export Processing Zones, this type of work is one of the most dangerous, it actually involves a multitude of occupational hazards and puts the children under unbearable circumstances sometimes.

### **Roots Of Civilisation**

*Fadel Hemadeh · Mohammad Nasreddine  
American University of Beirut, FAS, Fine Arts and Art History*

My project is about the abuse of our forest fortune to replace it with cement. The main branch is made out of cement, the smaller branches represent the environment that is struggling to survive, and at the top, buildings that are the fruits of the cement civilization.

### **Alive in Ruins**

*Bane Khalife · Dima Atchan · Serene Bacouni · Siwa Echtay · Farah Al-Solh  
American University of Beirut, FAS, Fine Arts and Art History*

The reinforcements are rusting...The concrete is melting...The corners are degrading... The tower is diminishing...Metamorphosing into the vernacular context...The green... The branches became the columns of the crumbling building blossoms are spreading its aroma through the vertical cores... The tree is alive again...Alive in Ruins!

### **Reflection (Life & Death)**

*Sami Cheickh Hussein  
American University of Beirut, FAS, Fine Arts and Art History*

A piece representing a conceptual idea portraying the present state of our environment symbolized as a dying tree, along with its reflected tree representing an unaltered environment flourishing with life. The idea is based on reflection art photography, which inspired me to develop my idea using different types of clay as basic material for creating the theme. The trees are given a symbolic approach where the real branches and leaves have been replaced by spheres of different clay types, textures and glazing, to further reinforce the contrasting image of the 2 trees. Ground cover for the two trees includes live grass for the living tree, and a mixture of ash, wood chips and fired clay for the dead tree.

### **Grappled Tree**

*Abbas Jammoul  
American University of Beirut, FAS, Fine Arts and Art History*

Humans have become one of the major factors of nature deterioration. That is mainly due to the technological and industrial development that is supplying human demands and needs. This project represents the effect of the human hand (representing the roots) on trees that are deteriorating because of human control on the life of trees; man can end their life any time he wants.

## **Bare Lebanon**

*Ola Osta · Zeid Hreish · Lana Makawi  
American University of Beirut, FAS, Fine Arts and Art History*

The so-called “everlasting green” Lebanon is not green anymore. We used to see trees full of hope next to each house. However, people replaced the green scene with industrialism. Yet, some bare trees are still resisting vanishing, hoping that someone, someday, might remember the human being’s origin and sanctify out Mother Nature again. Us, human race, and trees share the same origin; clay. Thus, if we did not fight for the existence of trees, it will be too late to fight for our own existence.

## **Mother Nature**

*Tamara Nasreddine · Mohammad AlKhanji  
American University of Beirut, FAS, Fine Arts and Art History*

The so-called “everlasting green” Lebanon is not green anymore. We used to see trees full of hope next to each house. However, people replaced the green scene with industrialism. Yet, some bare trees are still resisting vanishing, hoping that someone, someday, might remember the human being’s origin and sanctify out Mother Nature again. Us, human race, and trees share the same origin; clay. Thus, if we did not fight for the existence of trees, it will be too late to fight for our own existence.

## **Our Selfish World**

*Nivine Issa · Mohamad Safieddine  
American University of Beirut, FAS, Chemistry Department*

The environment is a vital entity for survival and development but unfortunately, humans have been constantly harming it without acknowledging the impacts of such ignorance. This piece demonstrates how selfish human nature is. The dome represents the globe that we live on constituted of the 5 vital elements of life: water, fire, air, soil and space. These two hands show the contradicting nature of human beings. One hand sits comfortably on a tree trunk offering prosperity of the environment through these two small trees. Unfortunately, the missing piece of the tree is stolen by the other selfish human hand which have sneaked out of the other tree trunk.

## **Stand Still...**

*Bader Bizreh*

*American University of Beirut, Faculty Initials, Department Name*

Peace is one of the most precious of human values. We hear each day of the misfortunes that befall people because of wars and acts of terrorism. Sometimes we think that we cannot do anything about it, but our lives depend upon the attitude we adopt. That is why it is important that we, ourselves, make a simple gesture for peace. We should also remember that peace on Earth depends on whether we are able to preserve our natural resources and environment for future generations. Albert Einstein once said: "Stand still. The trees ahead and bush beside you are not lost."

## **Natural Clay**

*Farah Bahmad*

*American University of Beirut, Faculty Initials, Department name*

We are in the presence of an ancient art that stood the test of time. These ceramic pieces reveal the true nature of clay, a nature so resilient yet so concrete, so simple yet so obscure, so dead yet so alive. We are witnessing clay describing nowadays nature not with words, but with movement, color, pressure, fragility, and life. We have transferred our emotions through our body, to our hands and fingers, using our mind to mold our ambitions, to a substance that holds the secrets of our ancestors. You're welcome to see who we are and how nature has sorrowfully become!

My project is about the abuse of our forest fortune to replace it with cement. The main branch is made out of cement, the smaller branches represent the environment that is struggling to survive. The project that was worked on is in collaboration with IBSAR for the “Power of Planting” initiative dedicated to increase awareness about planting trees. The initiatives concepts became the inspiration for this work. There are 4 groups working on 4 concepts:

1. Use native, Individual involvement
2. Community empowerment
3. Local communities guardians of their nature
4. Plant a heritage

The final product is 4 animated flip books per group, and one compiled animation. revive, and at the top, buildings that are the fruits of the cement civilization.

### Motion Graphics Flip book groups

#### Group 1

- Concept 1: Noor Quoraghholli
- Concept 2: Rawane Khalil
- Concept 3: Nathalie Rashid
- Concept 4: Rasha Jamaledine

#### Group 2

- Concept 1: Miguelle Issa
- Concept 2: Naima Zein
- Concept 3: Nadine Kanafani
- Concept 4: Nathalie Rashid

#### Group 3

- Concept 1: Zeina Abou Assi
- Concept 2: Dania Bdeir
- Concept 3: Tala Murtada
- Concept 4: Romy Raad

#### Group 4

- Concept 1: Nadine Chehade
- Concept 2: Romy Saber
- Concept 3: Joyce Youness
- Concept 4: Mona Bijjani

#### Group 5

- Concept 1: Rana Zaher
- Concept 2: Stephanie Stephan
- Concept 3: Jonathan Malek
- Concept 4: Lara Attalah

#### Group 6

- Concept 1: Rayan Abou Hamdan
- Concept 2: Ziad Bou Assi
- Concept 3: Nathalie Zeytoun
- Concept 4: Abir Abdul Ahad

#### Group 7

- Concept 1: Roubina Tutujjian
- Concept 2: Farah Sleiman
- Concept 3: Elcy Rizk
- Concept 4: Yara Al-Adib

#### Group 8

- Concept 1: Dima Barbir
- Concept 2: Amanda Halabi
- Concept 3: Mira Mortada
- Concept 4: Sara Oweida

### **Where do you fit environmentally?**

*Mohammad Sabbouh*

*American University of Beirut, FAS, Philosophy*

The project will be a flash oriented game with graphics and algorithms embedded inside it. Basically, the software interviews people and see where they fit environmentally (eg. Anthropocentrists....). Once they answer the questions, they will have a profile describing they environmental character, including the positive and negative aspects.

### **Sports and the environment**

*Rashid Akidi · Lara Kharrat*

*American University of Beirut, FAS, Philosophy*

According to Thomas Hill, people who do not preserve the environment share certain character traits. They do not appreciate their place in nature and lack humility and self-acceptance. In this project we will study the literature in the philosophy of sports in order to determine which character traits sports reinforce. We will show that these same character traits are the ones needed in order to be someone who preserves the environment. As an example, we will use a Triathlon we are organizing in Tyr as a case study that illustrates our findings.

### **Abou Kamal in Town – A story for kids**

*Michel Eid · Cesar Moukarzel*

*American University of Beirut, FAS, Philosophy*

The story tackles the themes of environmental protecting from different philosophical principles, mainly utilitarianism and environmentalism. By writing for small kids, we will be introducing the concept of environmental responsibility to young minds in an funny and appealing way. The story will go as following: It starts in a town that used to be surrounded by forests. One day, Abou Kamal, the narrator, starts talking about his memories. He tells how his father worked hard to develop the town and build new towers. He tells about the importance of sacrificing tress for the benefit of human beings, encaging birds and winning hunting tournaments, and transforming a public park into a mall. After a few days, Abou Kamal's uncle, Uncle Deek, arrives from abroad. Uncle Deek plays the role of the environmentalist. He gives reasons for keeping trees because of their intrinsic value (aesthetic, natural), he talks about disease abroad and extracting medicine from nature. Moral of the story: neither the utilitarian (Abou Kamal) nor the environmentalist (Uncle Deek) is behaving the best way. A combination of these two opinions wold lead to a better result, putting some limitations on both theories and preserving therefore all aspects of biodiversity.

## **To Which Party Do You Belong?**

*Marc Antoun · Ranime el Skaff  
American University of Beirut, FAS, Philosophy*

In a country where politics are everything that matters, the environment is neglected and few are the people that could be counted as environmentalists and nature protectors. Our project will show to which environmental PARTY one belongs, based on one's beliefs and ethics, with the aim of relating the environment to people's interest. People will be filling out a multiple choice quiz, where every choice will have a point and the summation of these points will give them the results as to what environmental party do they belong and by that we mean the philosophical theory they believe in (anthropocentrism, non-anthropocentrism, Utilitarian, Kantianism...). The questions will be hypothetical, trying to create an imaginary environmental situation in which the person has to picture himself and try to figure out how he would react when faced with such a situation. On the other hand and based on these results we will be standing on the stand explaining to those people what are the implications of their theory be and what is the effect on the world and on the universe if everybody were to support the same theory. The Pre-Preparation of the project would be performing a survey on AUB students. The results of this survey would be a set of statistics showing what theory Lebanese youth mostly adhere to-And this will reflect on the level of environmental culture and awareness spread by the older generation to this age group and to much younger individuals covering by that most of the Lebanese population- and to show and illustrate the impact of this theory on the world using different graphs, charts and pictures. So, To conclude, our project would mainly be Environmental Awareness offered in a fun and interesting way, taking into consideration the interests of the Lebanese youth.

## **Anthropocentrism vs. Environmentalism**

*Mohammad Sakaya · Nour Mroueh  
American University of Beirut, FAS, Philosophy*

Lebanon's Environment has been severely damaged in recent years; forest fires and excessive hunting led to the extinction of many animals and to the loss of many forests. In this project we will be surveying random people from AUB to find out the theories they hold and to show them the implications of their theories. We will do so not only based on philosophical point of views but also based on pictures and factual data that illustrate the severity of the environmental damages taking place. We will be interviewing people and our questions will be based on both theories, Anthropocentrism and Environmentalism and see which theory the majority supports. We believe that both theories are extreme cases, and people should be aware of the consequences of following such theories. Another objective for us would be introducing people to environmental ethics, get people more involved to save Lebanon's environment.

## Why Should I preserve Biodiversity?

*Antoine Gharios*

*American University of Beirut, FAS, Philosophy*

“EcOstatic” (eco + ecstatic) is a 2-player board game, with one player representing the industry whereas the other represents nature, purely based on utility. Each will have to roll a die and move along the way to reach the end; however, it is not a matter of who reaches first, instead it is a matter of who gains the largest amount of points depending on happiness. As the player representing the industry moves along, he/she will notice that the points gained are always negative points, unlike nature, whose points are always positive. The negative points are simply there to demonstrate that the industry has been impacting beings negatively and decreasing their utility on a much larger scale than it has been impacting some positively. Additionally, nature’s positive points are there to illustrate how well it is treating us compared to how we disappointingly look after it (industry). The winner is calculated by summing up the scores of the 2 players; if the sum is negative then the industry wins over and if it is positive then nature wins. The game is merely based on utilitarianism, which states, “you should act in such a way that the consequences of actions maximize happiness for everyone counted equally”. One thing to be pointed out is that throughout this game, many methods on helping the environment will be provided and many of the points gained will be a result of hypothetically performing these methods.

## EcOstatic

*Silvana Fares*

*American University of Beirut, FAS, Philosophy*

“EcOstatic” (eco + ecstatic) is a 2-player board game, with one player representing the industry whereas the other represents nature, purely based on utility. Each will have to roll a die and move along the way to reach the end; however, it is not a matter of who reaches first, instead it is a matter of who gains the largest amount of points depending on happiness. As the player representing the industry moves along, he/she will notice that the points gained are always negative points, unlike nature, whose points are always positive. The negative points are simply there to demonstrate that the industry has been impacting beings negatively and decreasing their utility on a much larger scale than it has been impacting some positively. Additionally, nature’s positive points are there to illustrate how well it is treating us compared to how we disappointingly look after it (industry). The winner is calculated by summing up the scores of the 2 players; if the sum is negative then the industry wins over and if it is positive then nature wins. The game is merely based on utilitarianism, which states, “you should act in such a way that the consequences of actions maximize happiness for everyone counted equally”. One thing to be pointed out is that throughout this game, many methods on helping the environment will be provided and many of the points gained will be a result of hypothetically performing these methods.

## Independent

### **The Biology and Ecology of *Terellia serratulae* in Lebanon**

*Stephanie G. Haddad · Colin A. Smith · Khouzama M. Knio American University of Beirut, FAS*

In Lebanon, eighteen different species of tephritid flies infest the flower heads of thistles belonging to Asteraceae. Of these fly species, *Terellia serratulae* (Linnaeus 1758) was found at various locations and at different elevations from May to October and was reported to infest four thistles: *Carduus argentatus*, *Cirsium phyllocephalum*, *Cirsium lappaceum*, and *Cirsium acarna*. Due to its specificity for *Carduus* and *Cirsium*, *T. serratulae* is a model agent for the biological control of its host plants, which are considered aggressive agricultural weeds. Furthermore, the difference in phenology among its four hosts suggests host race formation within this species. Because there is little information on *T. serratulae*, this project aims to describe its biology and ecology using comparative biological, morphometric, behavioral, and genetic studies on its different populations collected from different host plants and at different elevations. The project also aims to determine the extent of genetic variation and gene flow within *T. serratulae* populations. Results obtained so far demonstrate that flies from *C. argentatus* are smaller in morphology and characteristics than flies emerging from the other three hosts, which is reflective of the small size of the exploited flower heads of this host plant and suggests the fly's morphological adaptation to it. Furthermore, preliminary molecular studies revealed seven different haplotypes for the ND1 gene, and that the flies emerging from *C. acarna* seem to be genetically distinct from those reared from the other three hosts. The latter result suggests that the population of flies emerging from *C. acarna* may be a genetically distinct host race.

### **The Microbial Biodiversity of Jeita Grotto: A Unique Lebanese Habitat**

*Myriam A. El Khawand · Colin A. Smith  
American University of Beirut, FAS*

Subterranean microbial ecologies are important and poorly understood. The identification and characterization of these microbes are interesting because they reside in starved environments with no sunlight and limited organic input. They mediate elemental cycles, including the carbon cycle, and they pass to drinking water. The most accessible subterranean habitats are caves, yet very few have been studied worldwide, and none have been described in Lebanon. This study aims to identify the diverse bacteria residing in Jeita Grotto at two different seasons: high flow during spring and low flow in autumn. 16S rDNA analysis identified bacteria belonging to the phyla Proteobacteria, Bacteroidetes, Actinobacteria, and Acidobacteria. Of these, Proteobacteria is the most abundant phylum with Beta Proteobacteria most common. Preliminary results suggest the presence of a complex metabolic network consisting of heterotrophs, such as Flavobacteria and Acidobacteria, and chemoautotrophs, such as *Variovorax* sp. and nitrite-oxidizing bacteria. That heterotrophs outnumber the autotrophs suggests that there is organic input. The identification of one coliform bacterium suggests sewage could be a source of organic input.

