



October 2018

Courses in water research and treatment

This is a new course, a collaboration between Tel Aviv University and the [Eilat-Eilat Renewable Energy Initiative](#). The course condensed to 5 days in the Arava desert, equivalent to a semester long course of 3 academic credit points. 'Eilat-Eilat', located in the southern Arava, has been operating for the past ten years to enhance the socio-economic and technological development of the region. Eilat-Eilat's activity focuses on the water-energy nexus as the sun is the region's main natural resource, whereas water is a scarce one. Eilat-Eilat is producing clean solar electricity for 100,000 people, promoting technological innovation and cleantech, regulation and policy promotion, international conferences, academic and educational training center and more. [The Boris Mints Institute](#) at Tel-Aviv University is an inter-disciplinary research center, working to find strategic policy solutions to global challenges, including a research lab on water issues, in cooperation with the TAU Water Research Center.

Why water?

Water is life – as simple as that. Water issues involve policy, industry, economy, technology, development and entrepreneurship, and involves many scientific fields. Application of innovative technologies in water treatment and the prevention of water contamination has the potential of creating a positive change in the lives of millions of people across the globe.

Why in the Arava?

Because of the unique development model that does not exist anywhere else in Israel. The number of technologies and exposure to start-up companies is an experience which past participants have described as the most significant seminar they had taken during four years of university studies.

What will the course include?

In this course, we will expose student to various innovative practical water technologies and solutions. The course will include academic lectures from top TAU researchers of the Water Research Center and other departments, presentations given by successful entrepreneurs, as well as hands-on experience in fieldwork.

The course will be given in English and is suitable for curious Master's students who are eager to make appositive change in the world. Our students come from various disciplines: public policy, engineering, environmental studies, life and exact sciences.



We suggest two courses:

1. Water contamination processes and mechanisms

This course will focus on the understanding of the basic principles of water pollution and water pollution issues and processes on local, regional and global scales. The course will discuss the basic chemical, physical and biological properties of water and the relevant parameter to define pollution and water contaminants. Subsequent lectures will cover specific chemical and biological contaminants in ground and surface waters; sources, fate, transport, and transformation of contaminants; monitoring techniques and toxicological concerns of chemicals in water.

Main contents:

| Day | Subject |
|-----|---|
| 1 | Definition and characterization of surface and groundwater resource |
| | Water contamination? various definitions of water qualities (ecological, chemical and regulative aspects) |
| 2 | Major water contamination sources |
| | Contamination monitoring parameters (physical, chemical and biological) |
| 3 | Microbiological contamination |
| 4 | Chemical contamination- organic and inorganic |
| | The chemical, physical and biological fate and behavior of various pollutants within the environment: biodegradation; chemical degradation; sorption; dilution; dispersion; precipitation and the formation of degradation products |
| 5 | Representative analytical methods for contamination tracing |

2. Water and wastewater treatment:

This course will focus on the basic principles of conventional treatment and select appropriate methods, depending on the nature of the impurities to be removed and the intended use of the treated water or effluent. Subsequent lectures will cover biological processes for wastewater treatment, both aerobic and anaerobic, coagulation and flocculation, activated sludge, trickling filters, physical methods for removing particulates, screening and grit removal, sedimentation, filtration, disinfection and advanced oxidation processes.

Main contents:

| Day | Subject |
|-----|---|
| 1 | <u>Drinking water treatment:</u> Physical chemical and biological parameters <u>coagulation</u> , filtration, sedimentation. |
| 2 | <u>Drinking water treatment:</u> Disinfection, membranal processes (desalination, Advanced oxidation, activated carbon). |
| 3 | <u>Wastewater treatment:</u> primary; secondary tertiary; physical chemical and biological parameters; industrial vs. municipal and agriculture |
| 4 | Trip to the Eilat-Eilat WWTP |
| 5 | <u>Wastewater reuse:</u> local and global practice and trends |



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