The soil-plant-atmosphere continuum in arid regions - Agricultural management and environmental aspects

SUMMER COURSE - **1-24 July 2014**

We invite outstanding students who are interested in agricultural and environmental processes in arid regions to register for this unique intensive summer course.

INTRODUCTION

The Jacob Blaustein Institutes for Desert Research (BIDR) of the Ben-Gurion University of the Negev (BGU) is an acknowledged leader in desert studies, widely respected in the international scientific community for the quality and creativity of its research and study programs. BGU also runs the Albert Katz International School for Desert Studies (AKIS), which offers programs in English, leading to Master's and Ph.D. degrees in Desert Studies.

Among the wealth of specializations, two are directly related to agriculture:

1. Irrigation and plant environment
2. Agriculture and biotechnology for sustainable development

SCOPE AND RATIONALE

The course "The soil-plant-atmosphere continuum in arid zones – agricultural and environmental aspects" will provide the students with cutting-edge knowledge and expose them to the latest developments in agricultural technologies aimed at improving food and water use. The innovative, multidisciplinary program is structured to offer students exceptional opportunities to pursue a combination of basic and applied research in agricultural and environmental aspects. This course is offered within the framework of the bi-lateral agreements of the State of Israel with the Republic of India and the People's Republic of China. In addition, these agreements support future academic collaboration, conferences, knowledge sharing, and student exchanges.

COURSE PLAN

An integrated understanding of the continuum components, along with practical aspects, will be achieved through lectures, field and greenhouse experiments, and seminars led by professors at BGU. The experiments will be especially designed for the course, conducted by the students, and supervised by the scientists: Prof. Pedro Berliner, Prof. Moshe Silberbush, Prof. Jhonathan Ephrath, Prof. Moshe Sagi, Dr. Naftali Lazarovitch, Dr. Shimon Rachmilevitch, Dr. Gilboa Arye, and Dr. Nurit Agam. The course will include 96 academic hours of lectures, hands-on experience in field experiments, weekly educational tours to relevant sites in the Negev Desert, and cultural events. Specific topics to be taught are:

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Water flow and solute transport in the rhizosphere *(2 credit points)*

- The solid phase
- Soil-water relations
- Saturated and unsaturated water flow
- Field water processes
- Origin and nature of salts in agricultural soils
- Determination of salt properties in the liquid and solid phases
- Reactive reactions – adsorption, cation exchange and precipitation/dissolution
- Salt influence on plant growth and soil structure
- Modeling salt transport in soils – implications for irrigated soils
- Soil fertility and nutrient uptake by plant roots
- Mechanisms of ion uptake by roots
- Nutrient interactions
- Nutrient supply by the soil
- Nutrient uptake under water and salinity stress

Plant physiology in response to abiotic stress *(2 credit points)*

- Plant stress indicators: methods and instrumentation
- Carbon metabolism in plants
- Eco-physiology of plants under stress
- Water relations in plants
- Effects of flooding and lack of oxygen on plants
- Plant drought stress and ABA
- Salt stress – effects on plants, salt absorption, salt removal
- How plants respond to changes
- Heat stress
- Freezing and cold stress
- Reactive oxygen species and their importance
- Stress and early senescence

Agro-meteorology *(2 credit points)*

- Time and space scales in micro-meteorology – an introduction
- The effect of agricultural fields on the radiation balance in drylands
- The energy balance components in irrigated vs. non-irrigated fields: Soil heat flux; Sensible heat flux; Latent heat flux
- The role of soil evaporation in agricultural fields and its effect on water management

Student evaluation for Courses I-III: 80% - exam, 20% - oral presentation

Integrative seminar and field experiments *(1 credit)*

Various topics related to the soil-plant-atmosphere continuum – field work and oral presentations. Oral presentations will include current research topics at the French Associates Institute for Agriculture and Biotechnology of Drylands.

Student evaluation: 25% - field work, 75% - final report based on experiment results

ACCOMMODATIONS AND LIVING STANDARDS

BIDR offers high-standard accommodations, including dormitories and a guest house that are maintained by the University staff. All accommodations include kitchenettes and in-room bathrooms and are suitable for extended stay. A large common and fully-equipped kitchen and a dining room are also available for the students.

TIME SCHEDULE FOR COURSE PREPARATION

Deadline for registration – 1 March 2014
Notification of acceptance – 1 April 2014
Course dates – 1-24 July 2014

HOW TO APPLY

This course is open to B.Sc., M.Sc., and Ph.D. students. The enclosed registration form, a letter of intent, a B.Sc. or M.Sc. transcript, a brief CV and two recommendation letters should be sent to Dr. Shimon Rachmilevitch at rshimon@bgu.ac.il.

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APPLICATION FORM

Surname:	Name:
Nationality:	Passport Number:
Date of birth: / /	❑ Male / ❑ Female
E-mail address:	
Tel:	

Education/university degrees, dates of awards and names of granting institute:

Please indicate your knowledge in English:

	Excellent	Very good	Good	Poor
Writing	❑	❑	❑	❑
Reading	❑	❑	❑	❑
Speaking	❑	❑	❑	❑

Major Fields of studies (please give general fields):

Signature: Date: / /

Please attach: *Curriculum Vitae. Certified true copy of diploma. Certified true copy of academic records*
Please arrange: *Two letters of recommendation to be sent to us directly*