Programmatic Content

Course: **Soil Spectroscopy from Laboratory to Satellite to foster agriculture optimization**

Academic Credit (Msc. BSc. Level): 2

Executer: Prof. José Alexandre Demattê (Full Prof. Remote Sensing and Soils), University of São Paulo, Brazil
Prof. Eyal Ben-Dor (Full Prof. Remote Sensing), University of Tel Aviv, Israel

Eligible: MSc. Students with a background in the course such as "introduction to remote sensing" or equivalent by the lectures permission
The course will be opened to all Israeli universities (by a bilateral VATAT agreement) and to International students under agreement with TAU

PERIOD: June 2023; 26 hours total
DATES: A weekly meeting, all day 14:00-18:00 hs (physical presents, online will be considered)
DYNAMIC: Each session – 2 hours frontal lecture, Exercise as provided
Local: Israel, Tel Aviv, Yad Avner, Zlig 10 Afeca, Room 2012
Final : An online multi-choice exam

Guest lectures: Prof Mcbrateny (Sidney University) , Prof, Bo Stenberg (Sweden University), De, Maria Knadel (Aharus University)

Open: to MSc students with Introduction to Remote Sensing or equivalent background course.

Duties: Full attendees, Exam, and Exercise

T: theoretical presentation
E: exercise (to do at home or in class)
P: discussion of the previous exercise.

Class	Program	Lecture
Number/date	**June 2023**	
TLV Time: Open slot 14:00-18:00		
(1) 6/6/2023 14-16	T- Introduction to soil spectroscopy and remote sensing of soils. Past present and future directions and the benefit for agriculture activity and mankind. JD The importance of soil remote sensingas stated by FAO, EC, and other international bodies BD	Ben-Dor, Demattê
	E1- Google search after key words and statistical demonstration	
(2) 6/6/2023 14-16	P: Discussion on E1 T: Fundamentals of Soil spectroscopy (VIS-NIS-SWIR-TIR) - BD E2-home: Soil spectral interpretation (VIS-NIS-SWIR) - JD	Ben-Dor, Demattê
(3) 7/6/202 14-16	P: Discussion on E2	Ben-Dor

	T: Measurement scheme of soil spectral information and systematic and -non-systematic effects, standiraztion, and harmonization, SSL E3-home: Review of existing Soil spectral library Vis-NIR-SWIR)	
(4) 7/6/2023 14-16	P: Discussion E3 T: Fundamentals on the determination of soil attributes by spectroscopy (dataset, processing, spectral libraries, methods Use of SSLs to describe variation at small scales(field farm) **14:15 TLV time 13:15 CET** **P:Discustion** E4-home: Soil spectral interpretation using an exercise SSL JD	Invited lecture Bo Stenberg
(5) 13/6/2023 14-16	P: Discussion E4 T Remote sensing of soils in the passive domain: sensors, platforms, challenges, space agencies activity from field to space. JD E5-home: high and low spectral resolution of soil BD	Dematte Ben-Dor
(6) 13/6/2023 16-18	P: Discussion E5 Ta: Quantify soil properties by spectroscopy – software and algorithm, Prones and cones Tb: Soil mineralogy, quantification and classification on images (Both Online Exercise software - zoom). E6-class: Analyzing lab and RS data for soil attributes extraction	Dematte
(7) 14/6/2023 10-12	**9:00 CET** T: An invited lecture Prof. Macbratney: Pedometrics and soil sensing: fundamental, perspectives and limitation (60 min	Invited lecture Prof Mcbrateny
(8) 14/6/2023 14-16	P: Discussion E6 T: Soil Spectral Library (SSL): international collaboration, protocol, harmonization, notation, definition, global coverage, and limitation. Brazilian dynamics. IEEE SA P4005 WG BD E7-home: Online soil classification and proximal sensing JD	Dematte Ben-Dor
(9) 14/6/2023 16-18	T: Remote sensing of soil properties – qualitative and quantitative information, Detection of bare soil by satellite images, soil mapping as a final product, and citizen involvement E8: Comparison – qualitative and quantitative spatial soil-based information	Dematte
(10) 20/6/2023 14-16	P; Discussion E-9 T: Field measurement and proximal sensing. BD Upscaling laboratory SSL to satellite levels using the transfer function. JD Problems and solutions E9: A transfer function from an exercise data set JD	Ben-Dor Dematte
(11) 20/6/2023 14-16	**An invited lecture by Dr. Maria Knadel, Aarhus University, Denmark on FieldProb program and practical soil spectroscopy** **14:15 TLV time** P: Discussion E-9 E10: MIR region in general - proximal vs MIR regions and soil properties Problems and solutions. JD E10 : Extracting the emissivity spectrum from soil LWIR radiance BD	Invited lecture Maria Knade Dematte Ben Dor
(12) 21/ 6/2023 14-16	P: Discussion E-9 P: Soil sensing in agriculture and environment monitoring: Applications. The potential of soil spectroscopy in the commercial markets: Present and future activity. JD A general discussion BD	Dematte/ Ben Dor

Exam 1 round (14 hs) 25/6/2023	All content BD	N
Exam 2 round (14 hs) 27/6/2023	All contente BD	N

Final note equation
Note = ((average of 8 Exercises)*3+(average E1,E2)*7)/10 = final note

Working dynamics

Dynamics by zoom

• The online system should be indicated by the local university.

• During the presentations audience will be stimulated to participate on questions and debate. After each class a theorical list of exercise will be delivered to students which has to be send back 6 days after class. Each exercise will have a note.

• Some classes will be of practice. Since this will be by zoom, students will receive a tutorial to prepare their computers with the exercise. This exercise will have to be studied before the class. During the class, we will make the exercise together with debates. We will use Qgis, excell, alrad and R.

Doubt jamdemat@usp.br

Exercises attached