Short Name of the University/Countrycode **Date (Month/Year)**	**AUP- BG** **2019**
TITLE OF THE Curricula/Module	**Code**
Using of SENTINEL1-2-3 imagery for agricultural field monitoring- 4 ECTS; 30 contact hours; 50 praxis; 45-student workload.	

Teacher(s)	**Department**
Coordinating: **Assoc. Prof. Zhulieta Arnaudova Ph.D** **Others:** **Ass. Prof. Vera Stefanova Ph.D**	Melioration, Land Surveying and Agrophysics AUP

Study cycle	**Level of the module**	**Type of the module**
BA/**MA**/PhD	Master	

Form of delivery	**Duration**	**Langage(s)**
offline	15weeks	English Bulgarian

Prerequisites	
Prerequisites: To know: Geodesy, Land Surveying and knowledge about land use Informatics, basics of GIS, Basic informatics skills To be able to: Use application of GIS – ArcGIS, QGIS	**Co-requisites (if necessary):**

ECTS (Credits of the module)	**Total student workload hours**	**Contact hours**	**Praxis**	**Individual workhours**
4	**125**	30	50	45

Aim of the module (course unit): competences foreseeen by the study programme		
The aim of this course is to provide knowledge on the methods and means of obtaining incoming digital information from satellites Sentinel-1, Sentinel-2, Sentinel-3. How to used it in the field - mapping of boundaries, soils, spatial analyzes based on soil analysis and yield, as well as preparation of outgoing information to appropriate software. Using a GIS to read and analyze information. Creation and fill of technology maps in the field of plant growing, vegetable growing, viticulture, selection of suitable terrains for sustainable use of agricultural lands in the plant breeding industry.		
Learning outcomes of module (course unit)	**Teaching/learningmethods**	**Assessment methods**

To Explore free open source toolboxes for the scientific exploitation of Earth Observation missions under the the Scientific Exploitation of Operational Missions (SEOM) program elements. To explain structure of SNAP, land monitoring services by Copernicus, Mosaic hub, PEPS To numerate Access to Global, Pan-European, Local, Imagery and reference data To recognize Copernicus land services from satellite images and in-situ data in order to create reliable products and services.	Lectures, presentations, seminars, practical lessons, self-study	Participation in discussions, course project Work with software Quiz
Using a digital information from Sentinel satellites for precision agriculture To describe basic methods for gathering information, database, georeferncing of spatial information, work with Mosaic hub, PEPS, SNAP, GIS software To formulate basic principles, methods and tasks abou t using an information for precision agriculture		
To be able to: • work with Mosaic hub,PEPS, SNAP, GIS software • Imagery and reference data • Queries, analysis and editing of the information • Technology maps • Modeling of information.	Implementation of the training project	Presentation of an educational project
Knowledge of using satellite imagery and in-situ data in order to create reliable products and services. Spatial analysis, modeling the data for land use different kind of analysis and take decisions	Implementation of the training project	Presentation of an educational project

Themes	**Contactworkhours**							**Time and tasks for individual work**	
	Lectures	Consultations	Seminars	Practiaclwork	Laboratory work	Placements	**Total contactwork**	**Individual work**	**Tasks**

Sentinel satellites- introducing. Contributing mission	2			3	0	0	**5**	**5**	Contributing missions, Sentinel-1, Sentinel-2, Sentinel-3
Land Monitoring science by Copernicus **Global Land Services** – vegetation state (vegetation properties, indicators, productivity, soil water index) **Pan European imagery** – Natura 2000 **Local and Imagery and Reference data** – EU-DEM, EU-Hydro, European and Global Image Mosaic	6			6			**12**	**15**	Global imagery Local imagery Pan European Download and work with images
Free access data – STEP (Scientific Toolbox Exploitation Platform**)** **Mosaic hub –**Registration, Mosaic ordering, Mosaic Algorithm **SNAP –**Sentinel Application Platform **Using a GIS**	6	1		6			**13**	**25**	Mosaic hub Sentinel data hub SNAP –Sentinel ApplictionPlatform
Total	14	1		15			**30**		

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Running control 1	15	8 week	preliminary presentation of the project
Running control 2	70	14 week	Presentation of an educational project

Final exam	15	15 week	Final quiz

Compulsoryliterature/Aut hor	**Year ofissu e**	**Title**	**No of periodical or volume**	**Place of printing. Printing house or internet link**
Arnaudova Zhulieta	2019	Using of SENTINEL1-2-3 imagery for agricultural field monitoring-	Lectures presentations	Electronic version
ESA				https://www.esa.int/ESA
PEPS				https://peps.cnes.fr
Copernicus Land Monitoring Services				https://land.copernicus.eu/
Additional literature				

ANOTATION /course summery

The Common Agricultural Policy (CAP) came into force in 1962 to ensure affordable food for European citizens and a fair standard of living for farmers. While this philosophy remains at policy's heart, the focus is also now firmly on sustainability, environmental protection, biodiversity and the climate. Sentinel-1 and Sentinel-2 missions will now be used to advance the CAP. Their data will make this important policy more efficient and easier to implement, and above all make the life of the farmers easier so that they have more time to focus on farming the food.
The aim of this course is to provide the knowledges of the methods and means of obtaining incoming digital information from satellites Sentinel-1, Sentinel-2, Sentinel-3. How to used it about the field - mapping of boundaries, soils, spatial analyzes based on soil analysis and yield, as well as preparation of outgoing information to appropriate software. Using a GIS to read and analyze information. Creation and fill of technology maps in the field of plant growing, vegetable growing, viticulture, selection of suitable terrains for sustainable use of agricultural lands in the plant breeding industry.