DISCIPLINE DESCRIPTION

1. Information on the study programme

1.1 Academic institution	**UNIVERSITY OF ORADEA**
1.2 Faculty	**FACULTY OF ENVIRONMENTAL PROTECTION**
1.3 Department	**FORESTRY AND FORESTRY ENGINEERING**
1.4 Field of study	**FORESTRY**
1.5 Cycle of study	**LICENSE**
1.6 Study programme/Qualification	**FOREST EXPLOITATION/ENGINNEER**

2. Information on the discipline

2.1 Name of discipline			**REMOTE SENSING**				
2.2 Course holder			Ș.L. Dr. Ing. **BODOG MARINELA**				
2.3 Seminar/Laboratory/Project holder			Ș.L. Dr. Ing. **BODOG MARINELA**				
2.4 Year of study	**II**	2.5 Semester	**IV**	2.6 Type of evaluation	**E**	2.7 Regime of discipline	**O**

(C) Compulsory; (O) Optional; (E) Elective

3. Total estimate time (hours per semester of didactic activities)

3.1 Number of hours per week out of which:	**4**	course	**2**	laboratory	**2**
3.4 Total hours in the curriculum out of which:	**56**	course	**28**	laboratory	**14**
Time allotment					**Hours**
Study assisted by manual, course support, bibliography and notes					9
Additional documentation in the library/ on specialised electronic platforms and in the field					8
Preparation of seminars/laboratories/ topics/reports, portfolios and essays					8
Tutorship					8
Examinations					20
Other activities.....					18
3.7 Total hours of individual study	**33**				
3.9 Total hours per semester	**113**				
3.10 Number of credits	**3**				

4. Prerequisites (where appropriate)

4.1 curriculum	Topography, Soil science
4.2 competences	Fundamental notions

5. Conditions (where appropriate)

5.1. related to course	Students will not attend lectures, seminars / labs with open mobile phones. Also, telephone conversations during the course will not be tolerated, nor will the students leave the classroom in order to take personal telephone calls; Delay of students in the course and seminar / laboratory will not be tolerated as it proves to be disruptive to the educational process;
5.2. related to seminar/laboratory/ project	Rules of conduct of students in the remote sensing laboratory are those expressed in the course. The learning conditions are: active and interactive, practical-applicative, in a heuristic, problematic spirit; Laboratory with material endowments specific to remote sensing: orthophoto planes (frames), computers, special glasses, etc.

6. Specific competences acquired

Professional competences	C1.1 Theoretical and practical description of forestry processes, characteristic of the hunting, salmons and biodiversity C2.1 The technical basis for forest production process C3.1 Defining environmental risk situations, methods, techniques and procedures that can be used in ecological restoration of ecosystems C4.1 Description of the methods used to protect forest ecosystems and applied technologies to increase their productivity C1.2 Explanation and argumentation different systems of sustainable forest management C2.2 Explanation and interpretation of phenomena and processes associated domain forestry production C4.2 Explain the techniques adopted to reach internal analysis of forest ecosystems
Transversal competences	CT1. Developing and following a schedule and achieve their tasks with professionalism and rigor. CT2. Applying effective communication techniques in specific activities of teamwork; playing a role within the team and the principles of division of labour. CT3. Self-objective need for continuous training in order to adapt and meet the constant demands of economic development; use of information and communication techniques and an international language.

7. Objectives of discipline (coming from the specific competences acquired)

7.1 General objective	Acquisition of data and information remotely, on the environment or on land, the ocean and the atmosphere. Devices used for this purpose, essentially sensors record the electromagnetic waves emitted, reflected or broadcast of bodies, objects and phenomena pursued. The specific measurements of this radiation, they become carriers of information, are deducted properties and characteristics of objects and phenomena of nature.
7.2 Specific objectives	Research in airspace or outer surface of the Earth, other planets and satellites and interplanetary space you. The information obtained is of particular importance to many fields such as agriculture, forestry, geology, hydrology, cartography, etc. Remote sensing has had major themes and achieved outstanding results in evaluating the Earth's natural resources, environment deteriorating, in meteorology, etc. Determination techniques providing photographic images or non-photographic, taken away, from the simplest to the most complex. Getting central images of the objects to be measured and then extracting from these photos such as orthogonal projections: plans, maps, elevations, sections etc. graphically or numerically.

8. Content*/

8.1 Course	**Methods of teaching**	**No. of hours/Remarks**
General, basic elements, electromagnetic radiation, electromagnetic spectrum. Radiation in nature	Systematic exposure with video projector, problematization	**2**
The exchange of energy in nature, the principles of remote sensing, image sensor, means of remote sensing, remote sensing steps	Systematic exposure with video projector, problematization	**2**
Q-GIS Interpretation	Systematic exposure with video projector, problematization	**2**
Getting digital and digitized image	Systematic exposure with video projector, problematization	**2**
Stereo-photogrammetry: direct and indirect stereoscopic vision	Systematic exposure with video projector, problematization	**2**
Stereo-photogrammetry: parallax and stereoscopic measurement	Systematic exposure with video projector, problematization	**2**

Applications of photo-interpretation in the forestry sector: Metric measurements for forestry purposes, determinations on individual trees	Systematic exposure with video projector, problematization	**4**
Applications of photo-interpretation in the forestry sector: photogrammetric measurements on stands	Systematic exposure with video projector, problematization	**2**
Forest cadastre	Systematic exposure with video projector, problematization	**2**
Determination of areas by numerical methods	Systematic exposure with video projector, problematization	**2**
Determination of areas with graphical and mechanical methods	Systematic exposure with video projector, problematization	**2**
The division of surfaces by graphical method	Systematic exposure with video projector, problematization	**2**
The division surfaces and automatic numerical method	Systematic exposure with video projector, problematization	**2**

8.3 Laboratory	**Methods of teaching**	**No. of hours/Remarks**
Familiarization with the new terms	In the first hour lab will be a presentation by the teacher coordinator of the laboratory, the specific concepts related to remote sensing safety. Interactive	**2**
Spectral signatures	Systematic presentation, demonstration, problematization	**1**
Basic image analysis	Systematic presentation, demonstration, problematization	**1**
Rectifying basic images	Systematic presentation, demonstration, problematization	**2**
Orthophotoplan corrections	Systematic presentation, demonstration, problematization	**2**
Image classification	Systematic presentation, demonstration, problematization	**2**
Application programming interface. Satellite-based hyperspectral use of infested forest identification	Systematic presentation, demonstration, problematization	**4**

Bibliografie:

1. Iacobescu O., 2004 – *Fotogrametrie și teledetecție,* Editura Universității din Suceava
2. Jensen, John R., 2005, Introductory Digital Image Processing, 3rd Ed., Upper Prentice Hall.
3. Jensen, J.R. (2007) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Ed., Prentice Hall.
4. Lillesand, T., Kiefer, R., Chipman, J. (2004) Remote sensing and image interpretation, J. Wiley and Sons, London.
5. Mihai, B.A. (2007) Teledetecţie. Introducere în procesarea digitală a imaginilor., Ed. Universităţii din Bucureşti
6. Mihai, B. A. (2009) Teledetectie. Notiuni si principii fundamentale, Editura Universitatii din Bucuresti
7. Wan Bakx (2008) Principles of remote sensing. Module 2. Presentations, ITC Enschede.
8. Sabău N.C., Crainic G. C., 2007 – *Teledetecţie şi cadastru forestier*, Editura Universităţii din Oradea
9. Sabău N.C., Crainic G. C., 2007 – *Aplicaţii ale teledetecţiei în cadastru*, Editura Universității din Oradea

Websites (tutorials)

NASA – Goddard Space Flight Centre.The Remote Sensing Tutorial, http://rst.gsfc.nasa.gov/
http://ccrs.nrcan.gc.ca/resource/tutor/fundam/index_e.php
GIS development.Remote sensing tutorial, http://www.gisdevelopment.net/tutorials/tuman008.htm
CRISP Singapore. Remote sensing tutorial, http://www.crisp.nus.edu.sg/~research/tutorial/rsmain.htm
The Remote sensing tutorial, http://www.fas.org/irp/imint/docs/rst/index.html

Chesapeake Bay and Mid Atlantic from Space. Remote sensing tutorial. Glossary, http://chesapeake.towson.edu/glossary.asp
Aerial photography and remote sensing (tutorial), http://www.colorado.edu/geography/gcraft/notes/remote/remote_f.html
NASA Landsat programme page, http://geo.arc.nasa.gov/sge/landsat/landsat.html
Global Land Cover Facility. University of Maryland (Landsat data source), http://glcf.umiacs.umd.edu/data/landsat/
NASA Landsat page , http://landsat.gsfc.nasa.gov/education/tutorials.html
Landsat user's handbook (manualul Landsat), http://landsathandbook.gsfc.nasa.gov/handbook.html
Landsat USGS page , http://landsat.usgs.gov/
Center for Earth Resources Observations and Science, http://glovis.usgs.gov

* The content, respectively the number of hours allocated to each course / seminar / laboratory / project will be detailed during the 14 weeks of each semester of the academic year.

9. Corroboration of discipline content with the expectations of the epistemic community, professional associations and representative employers from the field corresponding to the study programme

Course content is adapted to meet the requirements of the labour market, being accepted by epistemic communities (who study the land use of an area as it should take place in the sciences), social partners, professional associations and employers in the license forestry. Course contents specialization is reflected in the curricula of Forestry and other universities in Romania who have accredited this specialization, knowing the basics is an urgent requirement employer in Forestry and Forestry Engineering.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the final grade
10.4 Course	The exam consists of a test with 2 theoretical questions and 2 problems	Exam writing	70%
10.6 Laboratory	Report / project on an imposed topic made in QGIS Discussion on the report / project	Oral presentation	30%

10.8 Minimum standard of performance

Implementation and / or coordination of sustainable forestry management techniques and using specific means; foundation and reasoning methods, and procedures used. Development and implementation of technical projects and processes. Making diagnoses on the needs of ecological restoration, and technology standards available options regarding its application. Diagnosing the environmental and economic risks of forest ecosystems, defining their objectives regarding the protection and improvement in complex programs.

Date of completion	Signature of course holder	Signature of laboratory holder
01.10.2020	PhD eng. lect. **Marinela Bodog** e-mail: marinelabodog@gmail.com	PhD eng. Lect. **Marinela Bodog** e-mail: marinelabodog@gmail.com
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Signature of the Head of Department*

PhD. Prof. eng. **Timofte Adrian**

.....

Dean Signature*

PhD. Prof. eng. **Chereji Ioan**

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*Name, first name, academic degree and contact details (e-mail, web page, etc) of the academic entity beneficiary of the Discipline Outline will be specified.

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