Table S2.6.4. Form for the preparation of the course information sheets

Name of the subject: Remote sensing

Code of the subject	Status of the subject	Semester	Number of ECTS credits	Class load
	Optional			

Study programme for which it is organized:
PhD programme "Sustainable development"
(Module Electrical and Computer Engineering)

Dependency by other subjects: none

Objectives of studying this subject:
The objective of this course is that postgraduate students will understand the basics of remote sensing and image processing, will use gained knowledge in the analysis and evaluation of physical parameters in the remote sensing data.

Contents of the subject (teaching units, forms of students' individual work, forms of testing) presented per working weeks in the academic calendar:

Preparatory week	
I week	Remote sensing definition and short history overview.
II week	Electromagnetic radiation: description of radiation, spectral analysis of electromagnetic radiation.
III week	Interaction with atmosphere and surface: abortion, wave breaking.
IV week	Remote sensing platforms: active and passive sensors for remote sensing.
V week	Resolution of remote sensing platforms: spatial resolution, spectral resolution, radiometric resolution, time resolution.
VI week	Optical, radar and lidar systems for remote sensing of the Earth: multispectral acquisition, thermal acquisition, synthetic aperture radar, side looking radar, interaction of microwaves with Earth surface, lidar principles, data transmission and data processing, data receiving.
VII week	Image enhancement: sources of radio-metrical and geometrical distortions, radio-metric and geometric enhancement.
VIII week	Representation of remote sensing images.
IX week	Image statistics: random variables, random vectors, parameter estimation, hypothesis testing, Bayes theorem and classification.
X week	Transformations: Fourier transform, wavelet transform, image compression, noise reduction, noise estimation.
XI week	Supervised classification, maximum a posteriori, training data and learning, maximum likelihood, post-processing, Hyper-spectral analysis.
XII week	Unsupervised learning: simple cost functions, K-Means, Fuzzy K-means.
XIII week	Change detection: algebraic methods, principal components, post-classification comparison, unsupervised classification of changes.
XIV week	
XV week	

Methods of education:
- lectures
- project based teaching
- experimental lab work

Students' load

Weekly	In Semester
	- Lectures: 30 - Tutorial: 30 - Individual work: 120

Students' obligations during the teaching:

Literature:
- K. Oštir, *Daljinsko zaznavanje*, založba ZRC, Ljubljana, 2006.
- M. J. Canty, Image *Analysis, Classification and Change Detection in Remote Sensing,* Taylor and Francis Group, New York, 2007.
- Q. Weng, *Remote Sensing of Impervious Surfaces*, CRC Press, Taylor and Francis Group, New York, 2008.
- J. A. Richards, X. Jia, *Remote Sensing Digital Image Analysis*, Springer Verlag, Berlin, 2006.
- M. Soumekh, *Synthetic Aperture Radar Signal Processing*, John Wiley & Sons, Toronto, 1999.

Learning outcomes (complied with the outcomes for the study programme):

Knowledge and understanding:

On completion of this course the student will be able to

- explain principles of remote sensing systems,
- understand phenomena of observed object with remote sensing data,
- analyse scene within remote sensing data,
- Evaluate physical parameters using remote sensing data.

Transferable/Key skills and other attributes:

- Communication skills: oral lab work defence, manner of expression at written examination.
- Use of information technology: use of remote sensing software tools.
- Calculation skills: performing calculation operations in remote sensing algorithms.
- Problem solving: designing and implementing remote sensing algorithms.

Forms of tests and evaluation:
- completed lab work – 25%
- written examination – 50%
- other activities (home works…) – 25%

Name and surname of teacher and associate:
Dušan Gleich

Particularities needed to be emphasized for the subject:

Note (if needed):