

## SYLLABUS

<b>I. GENERAL DATA ON SUBJECT COURSE</b>	
CODE AND NAME OF SUBJECT (in Estonian and English)	<b>CNS.028 Testing Equipment in Radio Electronics</b> <i>Katsetehnika raadioelektronikas</i>
ACADEMIC YEAR, TERM	2019/2020 fall and spring term, full-time
CURRICULUM, SPECIALITY AND MODULE WHERE THE SUBJECT BELONGS TO	Course aimed at Erasmus exchange students
VOLUME OF SUBJECT (ECTS)	2.0 ECTS
FORM OF CONTROL	Non-differentiated assessment
WORKLOAD AND FORMAT OF STUDIE	Contact – 32 hrs, individual work – 20 hrs
LANGUAGE OF INSTRUCTION	English
ADDITIONAL INFORMATION (PREREQUISITE SUBJECT COURSES, RESTRICTIONS)	-
LECTURER	Veiko Leps

<b>II. GOAL OF SUBJECT, LEARNING OUTCOMES AND SHORT DESCRIPTION OF THE COURSE</b>	
GOAL OF SUBJECT COURSE	The aim of this course is to give an overview of the testing equipment used in radio electronics, also of how to use the devices directly and remotely by computer. For automation both NI LabVIEW and original software equipped with the respective devices are used.
LEARNING OUTCOMES	After the completion of the course the student: <ol style="list-style-type: none"> <li>1. Knows the basic functions of testing equipment available at communication laboratory.</li> <li>2. Is able to use the factory software coming along with the testing equipment.</li> <li>3. Is able to evaluate simple problems in communication path (from transmitter to receiver).</li> <li>4. Has got the basic knowledge of the automation and simulation software LabVIEW by NI.</li> <li>5. Is able to operate different devices using NI LabVIEW software.</li> <li>6. Is able to use the network interfaces of testing equipment.</li> </ol>

	<p>7. Is able to measure and evaluate the basic parameters of radio transmitters and receivers.</p> <p>8. Is able to use the knowledge acquired at the current course to independently solve some general communication related problems (project work).</p>
SUBJECT COURSE DESCRIPTION	The course starts with learning the basics of testing equipment and the direct use of the equipment. Next the factory provided remote control software is introduced and tested. Finally, the LabVIEW software is used to do some simple automation exercises.

### III. GRADING SYSTEMS AND CRITERIA

FORMATION OF EXAMINATION MARK/OF PRELIMINARY EXAM	All the tasks given at practical training have been done and reports submitted. The report will receive a pass when all the questions at the end of each instruction have been answered correctly. If there are any mistakes in the report, the student will be notified and will be given some time to make corrections.
	If a student has an acceptable reason for not participating in a practical training session, another time for having practical training shall have to be agreed on. If there is no alternative time to offer, we will agree on some other ways of acquiring the topics covered during the session – for example, it is possible to remote control most of the laboratory equipment. Also, in some cases a theoretical research might cover the subject.
<b>RESPECTIVE MARKING CRITERIA</b>	
1. Knows the basic functions of the testing equipment of communication lab.	Is able to set the window of a spectrum analyzer (centre frequency, span, resolution). Is able to use the basic functions of a digital oscilloscope (switching the channels, autoset, scales)
2. Is able to use the factory software provided together with the testing equipment of comm. lab	Knows the principles of remote controlled devices and is able to use the factory software for simulating signals.
3. Is able to evaluate simpler communication nodes.	Is able to measure antenna reflections, cable loss and evaluate free space path loss (FSPL).
4. Has some knowledge about simulation and automation software NI LabVIEW	Knows the difference between block diagram and frontpanel in LabVIEW. Is able to use built-in help function and create some simple simulation programs.
5. Can operate and manage different devices of testing equipment making use of NI LabVIEW software.	Is able to use the LabVIEW drivers for following devices: HAMEG spectrum analyzer HMS1010, HAMEG signal generators HMF2525 and HM8134-3, Rohde & Schwarz (R&S) spectrum analyzers FSV 13 and FS300, R&S Signal generators Am300, SM300 and SMBV100A.
6. Can make use of network interfaces of testing equipment.	Knows how to switch the network interfaces on and off. Is able to use network commands at the prescribed web environment.

7. Can measure and evaluate the basic parameters of a radio transmitter/receiver.	Is able to measure the following parameters of a radio receiver/transmitter: transmitted power, frequency shift between channels and sensitivity of a receiver.
8. Is able to apply their knowledge in solving simpler problems independently (projects).	Has solved the problems and exercises cropping up at the last practice.

#### IV. SCHEDULE AND LIST OF TOPICS

WEEK OF YEAR	WORK FORMAT	TOPICS	LECTURER
Week 1	Practice, 4h	Introduction of the testing equipment	V. Leps
Week 2	Practice, 4h	Remote control and automation of testing equipment using the factory software	V. Leps
Week 3	Practice, 4h	Study and measurement of different communication nodes	V. Leps
Week 4	Practice, 4h	Introduction of LabVIEW (The Getting Started With LabVIEW Tutorial by NI)	V. Leps
Week 5	Practice, 4h	Remote control and automation using LabVIEW	V. Leps
Week 6	Practice, 4h	Remote control and automation over local network using LabVIEW	V. Leps
Week 7	Practice, 4h	Transmitter and receiver measurements	V. Leps
Week 8	Practice, 4h	Projects	V. Leps

#### V. LEARNING MATERIALS

Compulsory materials:

Moodle course: [Testing Equipment in Radio Electronics](#)

Experiment instructions, sample programs, NI LabVIEW tutorial (Getting Started with LabVIEW 2012).

Additional materials recommended:

**Learn LabVIEW:**

<http://www.ni.com/academic/students/learn-labview/>

**"LabVIEW for Everyone: Graphical Programming Made Easy and Fun (3rd edition)"** Jeffrey Travis

**"LabVIEW Graphical Programming"** Gary Johnson