

Study program: Forestry and Natural Resources Management			
Course title: Modern instrumental methods of analysis			
Teacher/teachers dr Milica Rančić			
Status: elective			
ECTS: 5			
Prerequisite:			
<p>Course objectives: Introduction to the latest instrumental methods of instrumental analysis of materials in wood technologies, primarily with the kind of devices that are commercially produced today. Particular attention is paid to the distinction between physical and chemical characterization. The additional objective of the course is to understand what a particular method can or can not provide as a relevant result required for scientific research or professional work. The candidate will get acquainted with the laboratories using modern laboratory equipment for instrumental analysis.</p>			
<p>Course outcome: After completing the course, student is able to state the advantages and disadvantages of destructive and non-destructive methods of chemical analysis of materials, properly select and apply a particular method or set of methods that can provide relevant results required for the scientific research or professional work. Student is also capable of critically interpreting and analyzing the obtained results and introducing new approaches to work in a professional environment.</p>			
Course content:			
<i>Theoretical classes</i>			
Introduction to instrumental methods and their application in wood technologies. Non-destructive methods in relation to destructive methods. Overview of destructive methods. Review of non-destructive methods. Types and preparation of samples for analysis. Elemental analysis methods. Methods for material characterization. Atomic emission (fluorescence) and absorption spectrometry (AAS). Molecular absorption spectrometry. Fluorimetry. Spectroscopic methods in ultraviolet, visible and infrared region (UV/VIS, FT-IR and Raman spectroscopy). Nuclear-magnetic resonance spectroscopy (NMR). Chromatographic separation methods. Gas chromatography (GC). High Efficiency Liquid Chromatography (HPLC). Mass spectrometry. Methods combined with mass spectrometry (GC-MS and HPLC-MS). X-ray methods of analysis. Thermoanalytical methods of analysis: thermogravimetric methods (TGA), differential thermal analysis (DSC). Microscopic spectroscopy: SEM, TEM, AFM. Rules for applying methods and interpreting results. Methods for qualitative and quantitative analysis. Selection of the optimal method of analysis. Interpretation of the results of the analysis.			
<i>Practical classes</i>			
Methods of elemental analysis. Methods for material characterization. Choosing the appropriate method or set of methods in accordance with the set project task. Preparation of the sample. Critical interpretation and analysis of results.			
Literature:			
<ol style="list-style-type: none"> 1. Eero Sjostrom, Raimo Alen, <i>Analytical methods in Wood Chemistry, Pulping and Papermaking</i> (1999) Springer Series in Wood Science, Springer-Verlag Berlin Heidelberg GmbH 2. Douglas Scoog, F. James Holler, Stanley R. Crouch, <i>Principles of Instrumental Analysis</i> (2016) Saunders, Philadelphia. 			
Number of active teaching hours:		Theoretical classes: 2	Practical classes: 2
Teaching methods: Lectures, laboratory work, seminars, consultations.			
Knowledge assessment (maximum number of points 100)			
Pre-exam requirements:	поена	Final examination:	поена
Activity during lectures	5	Written exam	
Practical classes	5	Oral exam	50
colloquium(s)	20	
seminar(s)	20		