University: University of Presov in Presov	
Faculty: Faculty of Humanities and Natural Sciences	
Subject code: 2BIO/EROSJBIOM/22	**Subject name:** Biometrics
Type, scope and method of educational activity: Type of educational activity: *Lecture, Practical seminar* Scope of educational activity: *2,2 hour per week, 26,26 per semester* Method of educational activity: *Attendance*	
Number of ects: 4	
Semester: Summer	
Degree of study: Master	
Conditions for passing the course: Participation in lectures and exercises is mandatory for successful completion of the course. Continuous assessment will take place in the form of a written review of the material covered. The condition for successful completion of the written examination is obtaining at least 50 % of the total number of points. A condition for successful completion of the course is also the preparation and submission of exercise reports according to the teacher's instructions. The evaluation of the exercises will represent 20 % of the course grade. The remainder of the assessment will be a written examination of the lectures. A: 100 – 90% marks, B: 89 – 80% marks, C: 79 – 70% marks, D: 69 – 60 % marks, E: 59 – 50 % marks. Attendance at lectures and tutorials is compulsory. A student may have up to 2 absences excused on the basis of a medical certificate. For absences, the student will be given make-up assignments or attend a tutorial. In the case of unexcused absence or a greater number of absences, no credit will be awarded. Final evaluation: Exam	
Learning outcomes: The graduate of the course will be able to: - define and explain in their own words the concept of biometrics, define the basic historical milestones of this scientific field; - characterize the concepts of identification and verification; correctly interpret the concepts of identity and identification; - describe the most widespread methods of external identification of human beings - first and last name, birth number, identification numbers and codes, microchips; - highlight the importance of animal identification through microchips; point out the shortcomings of microchips; - correctly describe the distribution of biometric identification methods in practice and their use; - characterize the performance measurement coefficients of biometric systems - FAR, FRR, FIR, FNMR; - clarify the importance of the use of anthropometric methods in the identification of persons; - describe and classify patterns of dactyloscopic patterns, markers; - correctly interpret and explain the structure and physiological functions of the skin, the possibilities of fingerprinting and evaluation; - describe and classify iris patterns; describe the anatomical structure of the eye; - characterize and describe the basic observed features of the morphoscopic method of ear recognition; - characterize the external features used in the identification of persons; - define and explain in their own words the concept of voice identification and verification; - explain the advantages and disadvantages of computer keystroke biometrics, anatomical and behavioral characteristics that will manifest in the signature; - describe the most common molecular genetic methods used in forensic practice and civil law.	

The graduate of the course will be able to apply the acquired knowledge in solving assigned practical tasks. He/she has the competences: to understand interrelationships, to look for causal relationships in biometric fingerprints and processes, thus developing logical thinking, to use knowledge of anatomy and physiology of the human body in dactyloscopy, biometry of visual and auditory analyzers, to know positive and negative aspects of practical use of biometric methods, can safely handle chemicals and materials in the creation, collection and processing of fingerprints, palm prints and footprints in the laboratory, has the ability to work with laboratory instrumentation, laboratory aids, present and argue the results of assigned practical tasks and compare them with the results of other studies. The acquired knowledge, skills and abilities enable the student to further his/her studies and also to apply them in practice.

Syllabus:

The importance and history of biometrics.

Identification and verification. Basic data of personal identification - ownership, personal documents, identification numbers and codes, identification cards and chips, microchips.

Identification and verification based on biometric characteristics. Distribution of biometric identification. Overview of biometric identification methods in practice. Classification categories of biometric applications. General principles of biometric technologies - collection, transmission, processing of biometric data, quality control, template matching, identification of a person or object, storage of acquired biometric data.

Performance measurement of biometric technologies - FAR, FRR, FIR, FNMR, identity theft and its protection.

The use of anthropometric methods in the identification of persons - history, life and work of Alphonso Bertillon. Identification of a person using anthropometric method of Alphonso Bertillon.

Fingerprint biometrics and dactyloscopy. The structure and physiology of the skin. Research on dermatoglyphs, evaluation of fingerprints, fingerprinting, dactyloscopic traces - their detection and evaluation, factors influencing the stability of dactyloscopic traces.

Hand geometry - sensing and evaluation of hand geometry, blood vessels of the back of the hand, practical use (advantages and disadvantages) of the biometric method of hand geometry.

Facial biometrics - importance of facial identification in forensic practice, morphological features of the human face - importance in identification, portrait identification. Verification by biometric characteristics of teeth.

Iris biometry - iris biometry of human eye, history of iris identification, iris specification, principle of iris biometry, advantages and disadvantages of iris biometry. Retinal biometry - history of identification of persons through retinal scanning; importance, uses, advantages and disadvantages of retinal biometry.

Auditory analyzer biometry - examination of the auricle in the context of historical development; identification of a person by the auricle; methods of recognizing the auricle.

Voice and speech biometrics - definition of basic terms, methods and techniques of voice recognition, use of voice signal in forensic practice.

Biometry of gait. Identification of a person by means of a plantogram. Handwriting and signature. Dynamics of computer keystrokes.

Genetic DNA analysis technology - PCR methods - sample collection and preparation, DNA extraction, sequence analysis, use of genetic analysis in criminal practice and civil law.

Animal biometrics - biometrics of nose print, retina of eye of animals - principles, advantages and disadvantages of animal biometrics.

Application of selected biometrics methods in exercises (e.g. dermatoglyphics, eye (iris) biometry, ear biometry, palm prints).

Recommended literature :

RATHA, N. K. 2008. Advances in Biometrics. Sensors, Algorithms and Systems. London: Springer. 503 p. ISBN 978-1-84628-920-0.
TISTARELLI, M., LI, S. Z., CHELLAPPA, R. 2009. Handbook of Remote Biometrics for Surveillance and Security. London: Springer. 381 p. ISBN 978-1-84882-384-6.
VACCA, J. R. 2007. Biometric Technologies and Verification Systems. USA: Butterworth-Heinemann, Elsevier. 625 p. ISBN 978-0-7506-7967-1.

Language: english

Evaluation of subject:

A	B	C	D	E	FX

Lecturers:

Assoc. Prof. RNDr. Vincent Sedlák, PhD.
Assoc. Prof. RNDr. Marta Mydlárová Blaščáková, PhD.

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