Biometrics - introduction and fundamentals

1. IDENTIFYING DATA.

· Course Name.	**Biometrics - introduction and fundamentals**
· Coordinating University.	**Poznan University of Technology**
· Partner University(ies) Involved.	*[Indicate the name of the partner universities participating in the course, if any]*
· Course Field(s).	**Biomedical Engineering, Computer science,**
· Related Study Programme.	*B.Sc. & M.Sc. Biomedical Engineering, M.Sc. Environmental and Resource Management, B.Sc. & M.Sc. Mechanical Engineering, B.Sc. & M.Sc. Artificial Intelligence,*
· Course Code.	*[Indicate the code that is assigned to the course in the coordinating university's student administration system]*
· ISCED Code.	*[Indicate the International Standard Classification of Education that is used internationally as a reference for organising education programs and related qualifications by levels and fields]*
· SDG.	*Ensure inclusive and equitable quality education and promote learning opportunities for all*
· Study Level.	*The course is both part of Bachelor (B) and Master (M) programs*

· Number of ECTS credits allocated.	*2*
· Mode of Delivery.	*Online synchronous*
· Language of Instruction.	*Lectures and instructions be in English*
· Delivery Period.	*Summer semester*
· Course Dates.	*Start of course: 13 march 2023, End of course: 29 April 2023*
· Precise Schedule of the Lectures.	*90min per week (2x45min), 6x 90min*
· Key Words.	*Biometrics, biometric features, face recognition, human recognition/identification*
· Catchy Phrase.	*"Discover your biometric features"*
· Link to Course Guide.	*[Provide the link to the course guide on your website]*

· Prerequisites and co-requisites.	Basics knowledge in human anatomy. Basics knowledge in computer science. EUNICE student: enrolled as a student in one of the 10 universities of EUNICE European University alliance. English level B2
· Number of EUNICE students that can attend the Course.	21 students (3x7persons)
· Course inscription procedure(s).	Registration for the course on the EUNICE eLearning platform (moodle)

2. CONTACT DETAILS.

· Department.	Institute of Applied Mechanics
· Name of Lecturer.	dr hab. inż. Michal Rychlik, dr inż. Jakub Grabski
· E-mail.	michal.rychlik@put.poznan.pl, jakub.grabski@put.poznan.pl
· Office.	[Indicate the office to which the main lecturer is linked to]
· Other Lecturers.	-

3. COURSE CONTENT.

- *Introduce to the latest biometric technology and its applications.*
- *Basic and fundamental theories and algorithms for different types of biometrics.*
- *How to develop a biometric system.*
- *Digital image processing and 3D data processing.*

4. LEARNING OUTCOMES.

Student has basic knowledge in computer science that allows him/her to describe the architecture of computer systems; to use basics of algorithmics, databases and relational databases, internet software and tools, systems of computer aided engineering in biomedical engineering and technology. Student knows basic methods and techniques of describing the biometrics features and numerical tools (such Principal Component Analysis) for data processing, digital image processing, obtaining the 3D data of human face, hand for biometrics purpose, binary images and methods for creation of full colour images, devices used for acquisition of real images, methods of quality correction of digital images.

5. OBJECTIVES.

To familiarize students with biometric methods of person recognition and identity verification based on such individual features as face, fingerprints, iris, voice, etc.

6. COURSE ORGANISATION.

UNITS

1.	*Biometrics - general characteristics, a brief history of biometrics.*
2.	*The use of biometrics in security systems and limitations of biometrics.*
3.	*Selected image processing algorithms useful in various types of biometrics: fingerprints and iris images.*
4.	*Obtaining 3D data for biometrics: human face, hand and others.*
5.	*Principal component analysis of 3D data processing.*
6.	*Identification of people based on 3D biometrics features: face, hand and femur bones.*

LEARNING RESOURCES AND TOOLS.

eLearning platform (moodle)

PLANNED LEARNING ACTIVITIES AND TEACHING METHODS.

Lecture: multimedia presentation supported by examples on the blackboard, discussion.

7. ASSESSMENT METHODS AND CRITERIA.

Final Module Test

OBSERVATIONS.

Written examination in form of a test

8. BIBLIOGRAPHY AND TEACHING MATERIALS.

1. R.M. Bolle, J.H. Connell, S. Pankanti, N.K. Ratha, A.W. Senior, Guide to Biometrics, Springer Professional Computing, Springer New York, 2004, ISBN: 978-0-387-40089-1.
2. D. Maltoni, D. Maio, A.K. Jain, S. Prabhakar, Handbook of fingerprint recognition, Springer, 2003.
3. S.Z. Li, A.K. Jain, Handbook of face recognition, Springer, 2005.
4. Ganesh R. Naik, Applied Biological Engineering – Principles and Practice, InTech Croatia; ISBN 978-953-51-0412-4