DESCRIPTION OF TRAINING PROGRAMME

FOT THE DOCTORAL SCHOOLAT THE KAZIMIERZ WIELKI UNIVERSITY

INFORMATION ON COURSE	
Course	**Researcher's workshop II**
Type of classes	specialistclasses
Academicyear	**2021/2022**
Field of science	engineering and technology
Discipline of science	**mechanical engineering**
Class instructor	dr hab. inż. Marek Macko, prof. uczelni dr inż. Katarzyna Kazimierska-Drobny
Name and surname of the personal credit / examination	dr hab. inż. Marek Macko, prof. uczelni
Number of hours	**30**
Forme of classes	**Lab**
Pass rules	**credit with grade**
Language of lecture	**English**
Framework learning outcomes (8 PRK)	• knows and understands to such an extent that is possible to revise existing paradigms – world heritage, including theoretical foundations, general issues and selected specific issues – specific to a scientific or artistic discipline • knows and understands the main trends in the development of the scientific or artistic disciplines covered in the curricula • knows and understands research methodology • is able to critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development • is able to use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: o define the purpose and subject of scientific research, formulate a research hypothesis, o develop research methods, techniques and tools, and use them creatively, o draw conclusions on the basis of scientific research • is ready for critical evaluation of the achievements of a given scientific or artistic discipline

DETAILED DESCRIPTION OF CLASSES	
Particular learning outcomes	**Methods of verifications of learning outcomes**
U1.Student is able to identify available computational methods and IT tools useful in solving research tasks. U2. Student is able to apply adequate calculation methods and can implement solutions in SolidWorks, Matlab or Comsol U3. Students are able to draw conclusions of research character.	- Multimedia presentation prepared and presented by students, - Oral statement, participation in discussion, - Other individual and group work performed during the classes

PROGRAM CONTENT IMPLEMENTED DURNING CLASSES	
Issues that will be modeled in SolidWorks, Malab or Comsol: • Peristaltic Pump • Biomechanical Model of Human Body • Plastic Deformation in Biomedical Stent • Connecting Shell and Solids • Modeling deformation of a water balloon (Water Balloon Inflation) • Biot Poroelasticity model • Submodeling of a Shaft • Electrical Signals in Heart	
Didactic methods and eduactional techniques	conversational and laboratory exercises, discussion methods
Evaluation criteria	Assessment of papers, class activity, preparation of written materials - reports on the developed and solved models
The form and conditions of passing (the form of verification of learning outcomes)	Preparation of two reports on numerical calculations in Comsol and SolidWorks.
Literature	1. Tabatabaian M. Comsol for Engineers. Mercury Learning and Information 2014; 2. Datta A., Rakesh V. An Introduction to Modeling of Transport Processes.Camridge University Press 2010; 3. Zimmerman W. Multiphysics Modelling with Finite Element Methods. Word Scientific 2006; 4. Fournier R.L. Basic Transport Phenomena in Biomedical Engineering. Taylor & Francis. New York 2007. 5. Kurowski P.M. Engineering analysis with SolidWorks simulation 2012. Missions KS : Schroff Development Corporation Publications, 2012. 6. SolidWorks® 2013 : SolidWorks Simulation Professional / SolidWorks Corporation. Waltham, MA : Dassault Systemes, 2013. 7. SolidWorks® 2013 : SolidWorks Simulation Premium : Dynamics / SolidWorks Corporation. Waltham, MA : Dassault Systemes, 2013.