Basic data of the subject	
University:	**University of Applied Sciences in Ferizaj**
Academic unit:	**Faculty of Engineering and Informatics**
Program:	**Applied Informatics**
Title of the subject:	**Internet of Things Application**
Level:	**Bachelor**
Course Status:	**Obligatory**
Year of studies:	**III, Semester VI**
Number of hours per week:	**3**
Value of Credits - ECTS:	**5**
Time / location:	
Course lecturer:	
Contact details:	
Course Description:	*This course provides students with basics of internet of things. It analyses characteristics and definitions, hardware for implementation of internet of things. Students acquires knowledge and practical skills designing, programming, installing and maintaining specific internet of things domains including home automation, smart city, business and industry systems. It is analysed wearable devices and its programming platforms. During the course students develops their practical skills by performing practical tasks and developing their internet of things technologies and frameworks (JSON, XML, HTTPlib, URLLib, Xively Cloud, Python Django, RESTful Web API) based project. It is addressed data safety and privacy problems, best and worst practices.*
Objectives of the course:	*To teach students to develop products based on internet of things technologies according to customer and platform technical requirements.*
Expected learning outcomes:	*Upon successful completion of this course, student will be able to:* • *Understand devices, data exchange protocols and standards used in internet of things.* • *Choose and customize appropriate algorithms for special internet of things products.* • *Lists main application domains of internet of things products.* • *Explain main disadvantages of internet of things technologies.* • *List standards, protocols and frameworks used for internet of things products development.* • *Design special internet of things based software and hardware products according to specified requirements and limitations.*

	• *Use the acquired knowledge develops not complex but standard software components.* • *Develop non-complex JSON, XML, HTTPlib, URLLib, Xively Cloud, Python Django, RESTful Web API software components.* • *Install and administrates developed products in special servers.*
Prerequisites:	*Basic knowledge in the field of information and communication technology, general knowledge about computer networks and their protocols, knowledge of programming, knowledge of database, knowledge of basic elements of information security and privacy.*

Contribution to the student load (which must correspond with learning outcomes)			
Activity	**Hour**	**Day/Week**	**In total**
Lectures with numerical exercises	3	15	45
Internship			
Contacts with teacher / consultations			
Field exercises			
Midterm, seminars and projects.	3	2	6
Homework			
Self-learning time student (at the library or at home)	3	15	45
Final preparation for the exam	7	2	14
Time spent on evaluation (tests, quiz and final exam)			
Projects and presentations.	3	5	15
Total			**125**

Teaching methodology:	*The course takes 15 weeks with 1.5 hours of lectures and 1.5 hours weekly individual and group exercises.* *Exercises will be held in the form of individual and group work in which concrete examples will be discussed.* *Active participation is extremely important so students are encouraged to attend lectures and exercises regularly and contribute to the discussions that take place in lectures. Lectures, exercise, individual work, discussions and group work.*
Assessment methods:	*The student can choose to be assessed one of the two forms of assessment, given below:* *1. Form 1: Evaluation with colloquiums and project* *2. Form 2: Evaluation with the final exam.* ***Form 1:*** *In the first form of assessment "Assessment with colloquiums and project" the student is assessed in four activities that are carried out during the lectures:*

	1. *Colloquium 1 (35%), individual assessment* 2. *Colloquium 2 (35%), individual assessment* 3. *Class activity (10%), individual assessment* 4. *Project (20%), group assessment.* *If the student is not satisfied with the assessment achieved according to form 1, then he can undergo the assessment according to form 2 to obtain a higher assessment.* ***Form 2:*** *Through the final exam, the student can achieve a maximum of 70% of the points from the total of 100 points.* *The rest of the 20% points must be completed by group work in the Project, an activity carried out during the lectures.* *In Colloquium 1, Colloquium 2 and the final exam, the evaluation of the students will be done through an evaluation form, which must be completed individually by the student. The evaluation form will contain 5 tasks through which the student's learning outcomes will be evaluated.* *Activity in the class means the student's engagement in dealing with the issues discussed in the class, during the lectures.* *Project (20%), group assessment: it is an activity in which students apply the acquired knowledge in a concrete project. It is carried out in groups of 3 or 4 students who are obliged to carry out the activity, document and present it to the subject professor.* ***Rating:*** *91-100 points – graded 10 (ten)* *81-90 points – graded 9 (nine)* *71-80 points – grade 8 (eight)* *61-70 points – grade 7 (seven)* *51-60 points – grade 6 (six)* *0-50 points – The student repeats the exam*
The ratio of theory and practice:	*70% theory with exercises and 30% laboratory work.*
Literature	
Basic Literature:	1. *A Bahga, V Madisetti (2014) Internet of Things: A Hands-On Approach. Vijay Madisetti.* 2. *R. Buyya, A. Dastjerdi (2016) Internet of Things: Principles and Paradigms. Morgan Kaufmann.*
Additional Literature:	1. *A. McEwen, H. Cassimally (2013) Designing the Internet of Things. Wiley.*
Designed learning plan	

Week:	Lectures and exercises to be held
Week one:	*Introduction*
Week two:	*Conception of internet of things.*
Week three:	*Internet of things for specific domains.*
Week four:	*Internet of things and M2M (machine to machine) communication.*
Week five:	*Software development methodology for Internet of things.*
Week six:	*Internet of things systems development using Python.*
Week seven:	*Test 1*
Week eight:	*Hardware devices for Internet of things.*
Week nine:	*Servers for Internet of things platforms.*
Week ten:	*Programming frameworks for Internet of things.*
Week eleven:	*Programming frameworks for Internet of things (continued).*
Week twelve:	*Data safety and privacy in Internet of things.*
Week thirteen:	*Wearable devices and technologies.*
Week fourteen:	*Use cases of Internet of things.*
Week fifteen:	*Test 2*
Academic policies and rules of conduct	
Regular attendance of lectures and exercises is necessary, as well as active participation with discussion and solution of tasks. Not impeding the progress required for learning using mobile phones turned off or in silent mode.	