DFC.210.HEP Introduction to VHDL

1. Study program

1.1. University	University of Bucharest, West University of Timișoara,
1.2. Faculty	Faculty of Physics
1.3. Department	Department of Electricity, Solid State Physics and Biophysics (Bucharest)
1.4. Field of study	Physics
1.5. Course of study	Master of Science
1.6. Study program	High Energy Physics (in English)
1.7. Study mode	Full-time study

2. Course unit

2.1. Course unit title	Introduction to the standard model of elementary particles							
2.2. Teacher				Prof.Dr. Lucian Ion				
2.3. Tutorials/Practicals instructor(s)				Prof. Dr. Lucian Ion				
2.4. Year of study	II	2.5. Semester	1	2.6. Type of evaluation	V	2.7. Type of course unit	Content[1)]	**DC**
							Type[2)]	**DFC**

[1)] fundamental (DF), specialized (DS); complementary (DC)
[2)] compulsory (DI), elective (DO), noncompulsory disciplines (DFC)

3. Total estimated time (hours/semester)

3.1. Hours per week in curriculum	**4**	distribution: Lecture	**2**	Practicals/Tutorials	**2**
3.2. Total hours per semester	**56**	Lecture	**28**	Practicals/Tutorials	**28**

Distribution of estimated time for study	**hours**
3.2.1. Learning by using one's own course notes, manuals, lecture notes, bibliography	**15**
3.2.2. Research in library, study of electronic resources, field research	**10**
3.2.3. Preparation for practicals/tutorials/projects/reports/homeworks	**15**
3.2.4. Preparation for exam	**4**
3.2.5. Other activities	**0**

3.3. Total hours of individual study	**44**
3.4. Total hours per semester	**100**
3.5. ECTS	**4**

4. Prerequisites (if necessary)

4.1. curriculum	-
4.2. competences	Knowledge about: computer programming

5. Conditions/Infrastructure (if necessary)

5.1. for lecture	Video projector
5.2. for practicals/tutorials	computing lab

6. Specific competences acquired

Professional competences	• Proper use of the concepts and methods of modeling of digital systems • Solving problems under given conditions • Ability to use this knowledge in interpretation of experimental results and understand experiments
Transversal competences	• Efficient use of sources of information and communication resources and training assistance in a foreign language • Efficient and responsible implementation of professional tasks, with observance of the laws, ethics and deontology.

7. Course objectives

7.1. General objective	Understanding the foundations of modeling of digital systems using VHDL
7.2. Specific objectives	Acquire the skills to develop VHDL programs

8. Contents

8.1. Lecture [chapters]	Teaching techniques	Observations/ hours
VHDL - fundamental concepts	Systematic exposition - lecture. Examples	2 hours (online)
Lexical elements and syntax	Systematic exposition - lecture. Examples	6 hours (online)
Basic modeling constructs	Systematic exposition - lecture. Examples	6 hours (online)
Subprograms. Procedures and procedure parameters. Functions	Systematic exposition - lecture. Examples	4 hours
Packages and use clauses	Systematic exposition - lecture. Examples	6 hours
Resolved signals. Parameterizing behavior and structure	Systematic exposition - lecture. Examples	4 hours
Bibliography: 1. O. Gazi, *A tutorial introduction to VHDL programming*, (Springer, Singapore, 2019). 2. P.J. Ashenden, *VHDL Tutorial* (https://www.eecs.umich.edu/courses/doing_dsp/handout/vhdl-tutorial.pdf)		
8.2. Lab [main themes]	Teaching and learning techniques	Observations/hours
Development and simulation of VHDL code (using GHDL, GTKWAVE, etc.)	Problem solving	28 hours
Bibliography: 1. O. Gazi, *A tutorial introduction to VHDL programming*, (Springer, Singapore, 2019). 2. P.J. Ashenden, *VHDL Tutorial* (https://www.eecs.umich.edu/courses/doing_dsp/handout/vhdl-tutorial.pdf)		

9. Compatibility of the course unit contents with the expectations of the representatives of epistemic communities, professional associations and employers (in the field of the study program)

This course unit develops some programmimg competences that are important for a Master student in the field of modern physics, corresponding to national and international standards. The contents is in line with the requirement of the main employers of research institutes and universities.

10. Assessment

Activity type	10.1. Assessment criteria	10.2. Assessment methods	10.3. Weight in final mark
10.1. Lecture/Lab	- ability to use specific VHDL programming methods - ability to analyse the results	project/oral examination	100%
10.6. Minimal requirements for passing the exam			
Attendance of at least 50% for the lectures and 100% for the lab sessions. **Correct solutions to the indicated subjects for obtaining the grade 5 (10 points scale).**			

Date
4.10.2024

Teacher's name and signature

Prof.Dr.Lucian Ion

Practicals/Tutorials instructor(s) name(s) and signature(s)

Prof.Dr.Lucian Ion

Date of approval

Head of Department
Lect.dr. Roxana Zus