Anexa nr. 2

SYLLABUS

1. Information on the study programme

1.1. Higher education institution	WEST UNIVERSITY OF TIMISOARA
1.2. Faculty	FACULTY OF PHYSICS
1.3. Department	PHYSICS DEPARTMENT
1.4. Study program field	EXCACT SCIENCE
1.5. Study cycle	MASTER
1.6. Study programme / Qualification	PHYSICS AN TECHNOLOGY OF ADVANCED MATERIALS / according to COR: physicist (211101); gymnasium teacher (232201 -according to the law); research assistant (248102); referent specialist in education (235204); analyst (213101).

2. Informations on the course

2.1. Course title			EXTREME LIGHT PTAM 2303				
2.2. Lecturer instructor			Dr. Ioan Dancus				
2.3. Seminar / Laboratory instructor			Dr. Ioan Dancus				
2.4. Study year	2	2.5. Semester	1	2.6. Examination type	V	2.7 Course type	Op-**PTAM2303**

3. Estimated study time (number of hours per semester)

3.1. Attendance hours per week	3	out of which: 3.2. lecture	2	3.3. seminar / laboratory	1
3.4. Attendance hours per semester	42	out of which: 3.5. lecture	28	3.6. seminar / laboratory	14

Distribution of the allocated amount of time*	**hours**
Study of literature, course handbook and personal notes	20
Supplementary documentation at library or using electronic repositories	14
Preparing for laboratories, homework, reports etc.	14
Exams	8
Tutoring	14
Other activities……	

3.7. Total number of hours of individual study	**84**	
3.8. Total number of hours on semester	**42**	
3.9. Number of credits (ECTS)	**6**	

4. Prerequisites (if it is the case)

4.1. curriculum	• General physics, Algebra and Calculus
4.2. competences	•

5. Requirements (if it is the case)

5.1. for the lecture	• laptop • projector
5.2 for the seminar / laboratory	• laptop • projector

6. Specific acquired competences

Professional competences	• Capacity of description and analysis of light using diferent models (photon, ray, wave) • Capacity of understanding the architecture and subsystems of an ultrashort pulse laser and its characterization. • Capacity of understanding the needs of a proposed experiment in terms of laser pulses quality, interaction with target, diagnostics. • Capacity to propose experiments using extreme light.
Transversal competences	• Lecture of a scientific journal paper in the field of extreme light • Ability to write a report on a specific topic of extreme light • Ability to write a power point presentation • Ability to give a scientific presentation

7. Course objectives

7.1. General objective	OG: Acquaintance with the laser technologies for extreme light
7.2. Specific objectives	Optical design and ray tracing Acquaintance with the Laser technology Acquaintance with Laser diagnostics Acquaintance with Laser design

8. Content

8.1. Lecture	Teaching methods	Remarks, details
1. Introduction to Extreme Light (2 hr.)	Exposure, introductory conversation, heuristic conversation, illustration using analogies. Use of black/white board, computer presentation, calculations and simulations.	The lecture will be interactive, conducting learning being facilitated by engaging students in conversation episodes - to catching the attention, for updating of some knowledge acquired at university courses and systematization / fixing the new knowledge. Students will develop their ability in of analysis and synthesis,
2. From Maxwell equation to geometrical optics (2 hr)		
3. Optics and matrix formalism (2 hr.)		
4. Computation related to optical systems (2 hr.)		
5. Lasers (2 hr.)		
6. Femtosecond laser oscillators (2 hr.)		
7. Laser amplifiers (2 hr.)		
8. Chirp pulse laser amplifiers (2 hr.)		

9. Optical stretches and compressors (2 hr.) 10. Optical parametric amplifiers (2 hr.) 11. Laser diagnosis (2 hr.) 12. From Laser to target (2 hr.) 13. Beam quality and conditioning (2hr.) 14. Extreme light infrastructure – Nuclear Physics. (2 hr.)		Students will use correctly the terminology in physics in writing and oral communication. Students will become familiar with a scientific environment based on values and quality

Recomanded literature

1. W. Koechner, M. Bass, Solid State Lasers: A Graduate Text, Springer (2003) ISBN: 0-387-95590-9
2. N. Lindlein, Geometrical land Technical Optics, Extended edition, University of Erlangen-Nurnberg, (2007)
3. W.J. Smith, Modern Optical Engineering, Third Edition, Mc Graw-Hill (2000) ISBN: 9780071476874
4. R. Dabu, Lumina extrema. Lasere de mare putere, Editura Academiei Romane (2015) ISBN: 973-27-2561-0

8.2. Seminar / Laboratory	**Teaching methods**	**Remarks, details**
1. Geometrical optics calculations (2 hr) 2. Optical design (2 hr) 3. Ray tracing (2 hr) 4. Laser cavities (2 hr) 5. Optical gain (2 hr) 6.Design of a single shot autocorrelator (2 hr) 7. Design of an experiment (2 hr)	On the table demonstrative experiments Based on calculation at the black/white board and on computer calculations/simulations using specific software (Mathematica, OpticStudio) and general software (Excel).	Students will form / practice / develop: • ability to calculate complex optical systems • identify laser components • calculate basic laser parameters • design diagnostics tools • experiment assessment

Recomanded literature

1. 1. W. Koechner, M. Bass, Solid State Lasers: A Graduate Text, Springer (2003), ISBN 0-387-95590-9
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9. Correlations between the content of the course and the requirements of the professional field and relevant employers.

10. Evaluation

Activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Weight in the final mark

10.4. Lecture	answers at exams (final evaluation)	oral	50%
10.5. Seminar / Laboratory	final answers at laboratory activities	oral	25%
	tests along the laboratories	oral	25%
10.6. Minimum needed performance for passing			
correct formulation of the proposed subject without demonstrations			

Date of completion: 22 September 2020

Signature (lecture instructor): Dr. Ioan Dancus

Signature (seminar instructor): Dr. Ioan Dancus

Signature (director of the department)
Lect.dr. Nicoleta Stefu