



Çanakkale Onsekiz Mart University

Education Information System

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Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Classical Cosmology	FZ-6013		3 + 0	3.0	7.5

Prerequisites	None
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Language of Instruction	Turkish
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Course Level	Third Cycle
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Course Type	Elective
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Mode of delivery	Face to face
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Course Coordinator	Assist. Prof. Dr. Sezgin AYGÜN
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Instructors	Prof. Dr. İhsan YILMAZ Prof. Dr. İsmail TARHAN Assist. Prof. Dr. Melis ULU DOĞRU Assist. Prof. Dr. Sezgin AYGÜN
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Assistants	
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Course Objectives	To learn topics such as spacetime manifold, Lorentzian metric, Schwarzschild geometry, Kruskal extension, gravitational waves.
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Course Content	The spacetime manifold, Causal structure, Lorentzian metric, Tensors on manifolds, Orthonormal frame bundles, Connection and curvature, Einstein equations, Variational methods, Noether's theorem, Conservation laws, Schwarzschild geometry, Kruskal extension, Interior solutions, Formation of black holes, Black hole temperature and entropy, Charged rotating black holes, Gravitational waves are the contents of this lesson.
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Course Learning Outcomes	1) to learn about space-time manifold. 2) to be able to knowledge Lorentzian metric and Tensors on manifolds 3) to be able to define the Einstein equations, Variational methods, curvature 4) to learn Noether's theorem, Conservation laws.
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Quick Access

Physics (PhD)

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Course Information

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WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	space-time manifold	Oral lectures Homeworks	
2. Week	Causal structure, Lorentzian metric	Oral lectures Homeworks	
3. Week	Tensors on manifolds	Oral lectures Homeworks	

4. Week	Orthonormal frame bundles, Connection and curvature	Oral lectures Homeworks	
5. Week	Einstein equations, Variational methods	Oral lectures Homeworks	
6. Week	Noether's theorem	Oral lectures Homeworks	
7. Week	Conservation laws	Oral lectures Homeworks	
8. Week	Conservation laws	Oral lectures Homeworks	
9. Week	Schwarzschild geometry	Oral lectures Homeworks	
10. Week	Kruskal extension	Oral lectures Homeworks	
11. Week	Interior solutions, Formation of black holes	Oral lectures Homeworks	
12. Week	Black hole temperature and entropy	Oral lectures Homeworks	
13. Week	Charged rotating black holes	Oral lectures Homeworks	
14. Week	Gravitational waves.	Oral lectures Homeworks	
15. Week	repetition of the general period	Oral lectures Homeworks	
16. Week	repetition of the general period	Oral lectures Homeworks	

RESOURCES

Recommended Sources
Birrell N.D., P.C.W. Davies, 1982, Quantum fields in curved space, Cambridge University Press
Sean Carroll, (2003), Spacetime and Geometry, An Introduction to General Relativity, ISBN-10: 0805387323
Kolb, E.W., Turner, M.S. (1990) The early universe; Addison Wesley Publishing Company
Wald, R. M., (1984). General Relativity. Univ. Of Chicago Press.

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Mid-term exam, final exam, other

COURSE CATEGORY

Course Category	Percentage
Core Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4
<u>PY1</u>	5	5	5	5	5
<u>PY2</u>	5	5	5	5	5
<u>PY3</u>	5	5	5	5	5
<u>PY4</u>	5	5	5	5	5

<u>PY5</u>	5	5	5	5	5
<u>PY6</u>	5	5	5	5	5
<u>PY7</u>	5	5	5	5	5
<u>PY8</u>	5	5	5	5	5
<u>PY9</u>	5	5	5	5	5
<u>PY10</u>	5	5	5	5	5
<u>PY11</u>	5	5	5	5	5
<u>PY12</u>	5	5	5	5	5
<u>PY13</u>	5	5	5	5	5
<u>PY14</u>	5	5	5	5	5
<u>PY15</u>	5	5	5	5	5

*DK = Course's Contribution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Presentation/Seminar	6	2	12
Final Exam Preparation	1	18	18
Mid Term Exam Preparation	1	18	18
Further Study	6	2	12
Preliminary Study	16	2	32
Assignment 1	16	3	48
Assignment 2	3	2	6
Mid Term Exam 1	1	2	2
Final Exam	1	2	2
Total Workload			192
Total Workload / 25.5 (s)			7.53
ECTS Credit of the Course			8