



Çanakkale Onsekiz Mart University

Education Information System

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Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Advanced Particle Physics II	FZ-6017		3 + 0	3.0	7.5

Prerequisites	None
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Language of Instruction	Turkish
Course Level	Third Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
Instructors	Prof. Dr. İsmail TARHAN Assist. Prof. Dr. Oktay YILMAZ
Assistants	
Course Objectives	Identification of particles, discoveries of particles, classification of particles and their interactions, relativistic kinematics, measurement techniques, accelerators, detectors, introduction to Feynman calculus.
Course Content	Symmetries and Quarks; Discoveries of the J, Upsilon, Dirac Formalism, Chirality, Helicity, Why Higgs?, Matrix, Decays, Cross Sections and Radiative Corrections, QCD, QED and EW Corrections within SM
Course Learning Outcomes	1) Study the Fundamental Building Blocks and their Interactions 2) Explain gluons, particle-antiparticle 3) Define the Local Gauge Transformation 4) Solve the Dirac Equation 5) Apply electroweak interactions 6) Study QCD, QED and Standart Model

Quick Access

Physics (PhD)

- Qualification Awarded
- Level of Qualification
- Qualification Requirements and Regulations
- Specific Admission Requirements
- Recognition of Prior Learning
- Profile of the Program
- Program Key Learning Outcomes
- Occupational Profile of Graduates
- Access to Further Studies
- Course Structure & Credits
- Exam Regulations & Assessment & Grading
- Graduation Requirements
- Mode of Study
- Programme Director(or Equivalent)
- Evaluation Questionnaire
- TYYÇ

Course Information

- Course Information
- Weekly Course Content
- Resources
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction of Fundamental Building Blocks and their Interactions	Lecture, Problem solving, Homework	
2. Week	Symmetries and Quarks; Discoveries of the J, Upsilon	Lecture, Problem solving, Homework	
3. Week	Gluons, Particle-antiparticle, Gluons inside Nucleons	Lecture, Problem solving, Homework	
4. Week	Dirac Formalism, Chirality, Helicity, Why Higgs?	Lecture, Problem	

		solving, Homework	
5. Week	Local Gauge Transformation	Lecture, Problem solving, Homework	
6. Week	Solutions of the Dirac Equation	Lecture, Problem solving, Homework	
7. Week	Matrix, Decays, Cross Sections and Radiative Corrections	Lecture, Problem solving, Homework	
8. Week	Midterm Exam	Exam	
9. Week	Unitarity Bound Violation and "New" Particles	Lecture, Problem solving, Homework	
10. Week	Bottom-up Approach: Unitarity Bounds, "New" Particles and their Coupling Constants	Lecture, Problem solving, Homework	
11. Week	Prelude to The Standard Model (SM)	Lecture, Problem solving, Homework	
12. Week	Spontaneous Symmetry Breaking and Higgs Top-down Approach	Lecture, Problem solving, Homework	
13. Week	Polarization, Propagator, Interaction Matrix, Cross Sections and Unitarity Bounds	Lecture, Problem solving, Homework	
14. Week	QCD, QED and EW Corrections within SM	Lecture, Problem solving, Homework	
15. Week	Masses and Interactions of Weak Bosons and Fermions	Lecture, Problem solving, Homework	
16. Week	Final Exam	Exam	

RESOURCES

Recommended Sources	
"Quarks & Leptons: An Introductory Course in Modern Particle Physics", Halzen, F., and A. D. Martin, Wiley & Sons, 1984. ISBN: 9780471887416.	New York, NY: John
"Collider Physics", Menlo Park, Barger, V. D., and R. J. N. Phillips., CA: Addison-Wesley, 1996. ISBN: 9780201149456.	
"Advanced Particle Physics", Volume I, O.M.Boyarkin, 2011, Taylor and Francis Group, LLC, Amerika, ISBN: 978439804148	

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Midterm Exam, Homework, Final Exam

COURSE CATEGORY

Course Category	Percentage
Area of?Specialization Courses	% 50
Support Courses	% 50

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4	DK5	DK6
<u>PY1</u>	4	5	5	4	4	3	3
<u>PY2</u>	3	4	3	3	2	3	3
<u>PY3</u>	3	3	3	3	3	3	3
<u>PY4</u>	3	4	3	3	3	2	3
<u>PY5</u>	3	3	3	3	3	3	3

<u>PY6</u>	4	4	4	4	4	4	4
<u>PY7</u>	0	0	0	0	0	0	0
<u>PY8</u>	3	3	3	3	3	3	3
<u>PY9</u>	4	5	4	4	3	4	4
<u>PY10</u>	0	0	0	0	0	0	0
<u>PY11</u>	3	4	4	3	2	2	3
<u>PY12</u>	3	3	3	3	3	3	3
<u>PY13</u>	0	0	0	0	0	0	0
<u>PY14</u>	2	3	2	2	1	2	2
<u>PY15</u>	0	0	0	0	0	0	0

*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)
Final Exam	1	4	4
Assignment 1	3	15	45
Further Study	14	3	42
Mid Term Exam 1	1	3	3
Final Exam Preparation	1	30	30
Class Hours (14 weeks)	14	3	42
Mid Term Exam Preparation	1	25	25
Total Workload			191
Total Workload / 25.5 (s)			7.49
ECTS Credit of the Course			7