Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Symbolic Computation In Physics	FZ 5064		3 + 0	3.0	7.5

Prerequisites	None
Language of Instruction	Turkish
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Prof. Dr. İsmail TARHAN
Instructors	Prof. Dr. Hüsnü BAYSAL
Assistants	
Course Objectives	In this course; learning the calculation of some quantities in gravitational theories, calculation of the field equations, use of the methods of solution and interpretation of the results will be discussed
Course Content	The main topics of the course intent are symbolic computation, definition of function, equation and system of equations, solution ordinary and partial differantial equations, matrices and some computations of tensors, covariant-contravariant metric tensor, computation of Riemann curvature tensor, computation of Ricci tensor and symbols of Christoffel, definition of energy-momentum tensor and its computated, computation Einstein field equations and methods of solutions, finding Bianchi and Petrov types, invariants in general relativity and their computation, computation of conformal Weyl tensor, theories of gravitation and some their solutions, computation of models with gravitational constant and cosmological constant, some computations in some published paper, discussion of results and graphed.
Course Learning Outcomes	1) Apply symbolic computation softwares 2) calculate some of the quantities used in physics. 3) Analyze some calculations in their fields 4) Interpret graphic drawings using software

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction to symbolic computation	Oral lectures with interactive discussions, research, homework	

Quick Access

Physics (Master)
- 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

2. Week	Definition of function, equation and system of equations, solution ordinary and partial differantial equations	Oral lectures with interactive discussions, research, homework	
3. Week	Matrices and some computations of tensors	Oral lectures with interactive discussions, research, homework	
4. Week	Covariant-contravariant metric tensor, computation of Riemann curvature tensor	Oral lectures with interactive discussions, research, homework	
5. Week	Computation of Ricci tensor and symbols of Christoffel	Oral lectures with interactive discussions, research, homework	
6. Week	Enerji-momentum tensörleri tanımlamaları ve hesaplanması	Oral lectures with interactive discussions, research, homework	
7. Week	Computation Einstein field equations and methods of solutions	Oral lectures with interactive discussions, research, homework	
8. Week	Midterm exam	Exam by using computer	
9. Week	Finding Bianchi and petrov types	Oral lectures with interactive discussions, research, homework	
10. Week	Invariants in general relativity and their computation	Oral lectures with interactive discussions, research, homework	
11. Week	Computation of conformal Weyl tensor	Oral lectures with interactive discussions, research, homework	
12. Week	Theories of gravitation and some their solutions	Oral lectures with interactive discussions, research, homework	
13. Week	Computation of models with gravitational constant and cosmological constant	Oral lectures with interactive discussions, research, homework	
14. Week	Some computations in some published paper, discussion of results and graphed.	Oral lectures with interactive discussions, research, homework	
15. Week	Some computations in some published paper, discussion of results and graphed.	Oral lectures with interactive discussions, research, homework	
16. Week	Final	exam by using	

		computer	

RESOURCES

Recommended Sources
The Classical Theory of Fields, L. D. Landau and E. M. Lifshitz, Pergamon Press, Vol.2 (1987)

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Mid-term exam + Assignment + Research & Project and Presentation 40%, Final Exam 60%

COURSE CATEGORY

Course Category	Percentage
Support Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4
PY1	5	5	4	5	5
PY2	5	5	5	5	4
PY3	4	4	4	4	3
PY4	4	4	4	4	3
PY5	4	4	4	4	3
PY6	5	5	5	5	4
PY7	5	5	5	5	4
PY8	5	5	5	5	4
PY9	4	4	4	4	3
PY10	3	3	3	3	2
PY11	4	5	4	4	4
PY12	4	4	4	4	3
PY13	4	4	5	4	4
PY14	5	5	5	5	4
PY15	4	4	4	4	3

*DK = Course's Contrubution.

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

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	5	5
Assignment 1	11	5	55
Application/Practice	1	5	5

Final Exam	1	6	6
Presentation/Seminar	1	5	5
Mid Term Exam Preparation	1	5	5
Further Study	8	3	24
Research&Project	2	6	12
Mid Term Exam 1	1	4	4
Preliminary Study	10	3	30
		Total Workload	193
		Total Workload / 25.5 (s)	7.57
		ECTS Credit of the Course	8