



Course Specification

(Bachelor)

Course Title: Accelerator Physics

Course Code: PHYS 485

Program: Bachelor

Department: Physics and Astronomy

College: College of Science

Institution: King Saud University

Version: 2

Last Revision Date: September, 13th, 2023



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A. General information about the course:

1. Course Identification

1. Credit hours: (2+0+0)

2. Course type

- A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
- B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (8th level / 4th year)

4. Course general Description:

In this course, the students learn about the technical components of particle accelerators and their physical working principles. In addition, the students get an overview of accelerator types and applications.

5. Pre-requirements for this course (if any):

PHYS 323

6. Pre-requirements for this course (if any): Phys 481

7. Course Main Objective(s):

1. Identify the main components of the particle accelerators.
2. Use physics laws to describe charged beam dynamics.
3. Identify different charged particle sources.
4. Identify different types of particle accelerators and their applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	24	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		





No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
	Lectures	24
	Laboratory/Studio	0
	Field	0
	Tutorial	0
	Others (specify)	0
Total		24

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define the particle accelerators and recognize accelerator components and their basic operation	K1	Lecture, smart board	Exams, QZs, Presenta6on and homework
1.2	Explain the physics behind the operation of particle accelerators	K2	Lecture, smart board	Exams, QZs, Presenta6on and homework



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	Skills			
2.1	Calculate measurable quantities of a particle accelerator from its design parameters	S1	Lecture, smart board	Exams, QZs, Presenta6on and homework
3.0	Values, autonomy, and responsibility			
3.1	Conduct research independently	V1	Lecture, smart board	Exams, QZs, Presenta6on and homework

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to particle accelerators and their applications	2
2	Main components of particle accelerators	3
3	Charged particle sources	4
4	Beam Dynamics	6
5	Linear Accelerators	5
6	Circular Accelerators	4
Total		24

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	First midterm exam	week 6	20%
2	Second midterm exam	week 10	20%





No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3	Homeworks	weekly	10%
4	Research project	week 12	10%
5	Final exam	week 16-18	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Particle Accelerator Physics I , Helmut Wiedemann, Springer, 4th edition, 2015, ISBN 978-3-319-18317-6.
Supportive References	The Physics of Particle Accelerators, Klaus Wille, Oxford University Press, 2000, ISBN: 19 850549.
Electronic Materials	Particle accelerators official websites (CERN, SLAC...etc)
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	White board and Blackboard
Other equipment (depending on the nature of the specialty)	



F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students/per reviewer	direct/ indirect
Effectiveness of Students assessment	Faculty	direct
Quality of learning resources	Students	indirect
The extent to which CLOs have been achieved	Faculty	indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	7 th (1 st Term/1445)
DATE	15/05/1445

