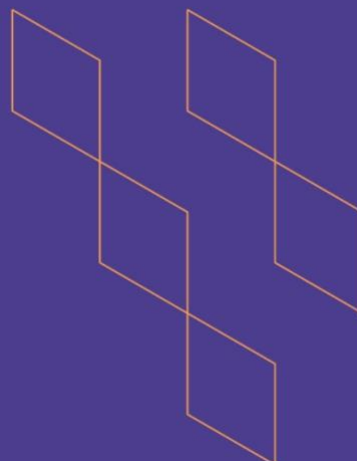# Course Specification

Course Title: Astrophysics 1

Course Code: Phys 411

Program: B.Sc. in Physics

Department: Department of Physics and astronomy

College: College of Science

Institution: King Saud University

Version: : 2.0.0

Last Revision Date: Feb. 2024

Table of Contents:

A. General information about the course:

Course Identification				
1. Credit hours:	**2(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

The course aims to introduce students to the basic concepts of the structure and evolution of stars. The main topics are: Stars: magnitude – luminosity – introduction to spectra – stellar spectra – stellar parallax, stellar velocities- HR diagram – binary stars and stellar masses – star formation – series of stellar nuclear reactions and stellar ages- stellar evolution and structure – cluster of stars.

5. Pre-requirements for this course (if any): Astro 102

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)
1. Advance in some fundamentals in Astronomy and Astrophysics.
2. Radiation production in astronomical objects.
3. Get familiarize with some basic concepts of Stellar physics.
4. Applying physical laws and principles to interpret stars's properties (spectra, luminosity, structure, evolution/life phases).
5. Using Astrophysical concepts and related analysis approaches to improve the generic skills such as: knowledge – interpersonal – communication – problem solving – IT.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	30	100%
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	

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	Knowing the main observational properties and physical characteristics of stars	K1	• Give extensive examples during lectures. • Give problem sheets to be discussed during lectures.	• Hold Class discussion, tutorial sessions. • Give quizzes, mid-term exam and final exam.
1.2	Knowing the laws governing the stability, energy production and life of stars	K2		
2.0	Skills			
2.1	The ability to manipulate physical equations and formulae related to basic stellar Astrophysics.	S1	• Give extensive examples during lecture • Give problem sheets to be discussed during lectures. • assignments.	• Hold Class discussion, tutorial sessions. • Give quizzes, mid-term
2.2	The ability to describe and			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	understand the HR-diagram for stars and clusters.	S2	• Discussions in the classes	exam and final exam.
3.0	Values, autonomy, and responsibility			
3.1	Work independently and as a team-Computations and data analysis-Manage resources and time-Communicate results of the work to others-Report writing	V1	• Assignments. • Homeworks • Data analysis and interpretation.	• Hold Class discussions

C. Course Content

No	List of Topics	Contact Hours
1.	Stars : magnitudes – spectra – HR diagram	6
2.	Stellar distances , parallax, stellar velocities and stellar masses	6
3.	Star formation	4
4.	Series of nuclear reactions	4
5.	Stellar evolution, Clusters of stars	8
6.	Introduction to stellar structure	2
Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class activities: HWs and tasks, reports, presentations.	Weekly	20%
2.	Mid-exam I	Approx. 6	20%
3.	Mid-exam II	Approx. 12	20%
4.	Final examination	From 16 to 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	- An introduction to modern Astrophysics Authors: Bradley Carroll and Dale Ostlie, Addison Wesley Publisher: Pearson; 2 edition (July 28, 2006) - Introduction to Astronomy (in Arabic) Authors: M. Nawawy, A. Kordi and H. Al-Trabulsy King Saud University Publisher, 2011
Supportive References	- Astrophysics I: Stars Authors: Richard L. Bowers, Terry Deeming Publisher: Jones and Bartlett Publishers, 1984 Digitized: 8Feb. 2010
Electronic Materials	Astrophysics-Stars web sites of interest, provided by the instructor
Other Learning Materials	Multi media materials accompanying the text books and the relevant websites (provided by the instructor, when needed)

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students. (make use of the facilities at the Astronomy Unit, when needed)
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	17th (2nd term /1445)
DATE	16\10\1445