|  |  |
| --- | --- |
| **Course Title:**  | **General Astronomy II** |
| **Course Code:** | **ASTR 202** |
| **Program:** | **ASTR-PHYS** |
| **Department:**  | **Astronomy** |
| **College:** | **Science** |
| **Institution:** | **King AbdulAziz University** |

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# A. Course Identification

|  |  |
| --- | --- |
| **1. Credit hours:** |  |
| **2. Course type** |
| **a.** | University | **✓** | College |  | Department | **✓** | Others |  |  |
| **b.** | Required | **✓** | Elective | **✓** |  |
| **3. Level/year at which this course is offered:** | **Start from 2nd year – Level 3** |
| **4. Pre-requisites for this course** (if any)**: None** |
| **5. Co-requisites for this course** (if any)**: None** |
|  |

## 6. Mode of Instruction (mark all that apply)

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage**  |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | **4** | **100%** |
| **2** | **Blended**  |  |  |
| **3** | **E-learning** |  |  |
| **4** | **Correspondence** |  |  |
| **5** | **Other**  |  |  |

**7. Actual Learning Hours** (based on academic semester)

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Learning Hours** |
| **Contact Hours** |
| **1** | **Lecture** | **45** |
| **2** | **Laboratory/Studio** | **15** |
| **3** | **Tutorial**  |  |
| **4** | **Others** (specify) |  |
|  | **Total** | **60** |
| **Other Learning Hours\*** |
| **1** | **Study**  | **90 (minimum)** |
| **2** | **Assignments** |  |
| **3** | **Library** |  |
| **4** | **Projects/Research Essays/Theses**  |  |
| **5** | **Others** **(Lab report + visual exercises)** | **30 (minimum)** |
|  | **Total** | **120** |

**\*** The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

# B. Course Objectives and Learning Outcomes

|  |
| --- |
| 1. Course Description This course contains the following subjects: The main characteristics of stars (distance, brightness, magnitude, surface temperature, color index, radius, mass, size, chemical composition) Spectral type. Stellar velocity (proper motion, radial motion, space velocity). H.R. diagram. The Stellar systems (single, double, Variables, clusters).  |
|  |
| 2. Course Main Objective1. Describe where they are in the universe.
2. Discuss the features of the Milky Way Galaxy.
3. Summarize the overall properties of the Sun and the processes that occur within it.
4. Demonstrate an understanding of light and how the information contained in light can be deciphered by astronomers.
5. Present the properties, classification system, and life cycle of stars including objects like white dwarfs, red giants, super-novae, pulsars, neutron stars, and black holes. To help understand qualitatively some of the physical laws that lead to these phenomena.
 |
|  |

## 3. Course Learning Outcomes

| **CLOs** | **Aligned****PLOs** |
| --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | Describe our place in the universe. | K1, K4  |
| 1.2 | Define the characteristics of normal and active galaxies. | K3, K11 |
| 1.3 | Define the astronomical units. | K2, K9 |
| 1.4 | List the electromagnetic radiation bands. | K8, K9 |
| 1.5 | Define the spectral and luminosity classifications of stars. | K3, K11 |
| 1.6 | Define the types of variable and binary stars. | K2, K11 |
| 1.7 | Describe the different regions of the H-R diagram. | K8, K11 |
| **2** | **Skills :** |  |
| 2.1 | Explain the stellar properties in light of the H-R diagram. | S1, S7 |
| 2.2 | Differentiate between the different types of binary stars.  | S4, S7 |
| 2.3 | Measure the stellar masses using binary systems.  | S3, S7 |
| 2.4 | Derive the stellar distances using their apparent and absolute magnitudes. | S1, S11 |
| 2.5 | Derive the space velocity using the radial and tangential velocities. | S1, S11 |
| 2.6 | Apply computer software in laboratory to determine the stellar properties. | S12, S14 |
| **3** | **Competence:** |  |
| 3.1 | Work in a laboratory group. | C1 |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | Cosmic JourneyLab. 1: Graphs, slopes and rate of change | 4 |
| 2 | Cosmic JourneyLab. 2: Scale of the Universe | 4 |
| 3 | Light and spectrumLab. 3: Galactic speeds and Hubble’s Law | 4 |
| 4 | Light and spectrumLab. 4: Stellar parallax | 4 |
| 5 | Light and spectrumLab. 5: Color temperature of stars I | 4 |
| 6 | Our Sun: our shining star Lab. 6: Color temperature of stars II | 4 |
| 7 | Our Sun: our shining starLab. 7: Cepheid variable stars | 4 |
| 8 | Stellar motions and magnitudesLab. 8: Radial motion of Stars | 4 |
| 9 | Stellar motions and magnitudesLab. 9: Proper motion of stars | 4 |
| 10 | Stellar motions and magnitudesLab. 10: Spectroscopic parallax | 4 |
| 11 | Hertzsprung-Russel diagramLab. 11: The Hertzsprung-Russel diagram I | 4 |
| 12 | Hertzsprung-Russel diagramLab. 12: The Hertzsprung-Russel diagram II | 4 |
| 13 | Binary starsLab. 13: Visual binary stars | 4 |
| 14 | Binary starsLab. 14: Eclipsing binary stars | 4 |
| 15 | Binary stars | 4 |
| **Total** | **60** |

# D. Teaching and Assessment

## 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| **Code** | **Course Learning Outcomes** | **Teaching Strategies** | **Assessment Methods** |
| --- | --- | --- | --- |
| **1.0** | **Knowledge** |
| 1.1 | Describe our place in the universe. | Lecture & PowerPoint presentation. | Exams |
| 1.2 | Define the characteristics of normal and active galaxies. |
| 1.3 | Define the astronomical units. |
| 1.4 | List the electromagnetic radiation bands. |
| 1.5 | Define the spectral and luminosity classifications of stars. |
| 1.6 | Define the types of variable and binary stars. |
| 1.7 | Describe the different regions of the H-R diagram. |
| **2.0** | **Skills** |
| 2.1 | Explain the stellar properties in light of the H-R diagram. | Lecture & PowerPoint presentation. | Exams |
| 2.2 | Differentiate between the different types of binary stars.  |
| 2.3 | Measure the stellar masses using binary systems.  |
| 2.4 | Derive the stellar distances using their apparent and absolute magnitudes. |
| 2.5 | Derive the space velocity using the radial and tangential velocities. |
| 2.6 | Describe the different regions of the H-R diagram. | Group discussion | Lab. Exam |
| **3.0** | **Competence** |
| 3.1 | Work in a laboratory group. | Group discussion | Lab. Exam |

##

## 2. Assessment Tasks for Students

| **#** | **Assessment task\***  | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Exam 1 | 4th | 20% |
| **2** | Exam 2 | 9th | 20% |
| **3** | Lab exam (Lab attendance + Lab experiment reports)  | 13th | 20% |
| **4** | Final exam | 15th | 40% |
| **5** |  |  |  |

**\*Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

# E. Student Academic Counseling and Support

|  |
| --- |
| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :** |
| Office hours: 4 hours per week |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | Sky stars: physics and observations  |
| **Essential References Materials** | Active learning site – Handouts & PowerPoint slides <https://sciences.kau.edu.sa/Pages-astr202-HOMEPAGE.aspx> |
| **Electronic Materials** | Active learning site – questions bank.https://sciences.kau.edu.sa/Pages-astr202-HOMEPAGE.aspx |
| **Other Learning Materials** | General Astronomy II - Laboratory exercise book |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**(Classrooms, laboratories, demonstration rooms/labs, etc.) | Class room with 35 seats, Computer Lab, Theodolite Lab. |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | Data show & Visual Astronomy Lab. software |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) |  |

# G. Course Quality Evaluation

| **Evaluation****Areas/Issues**  | **Evaluators**  | **Evaluation Methods** |
| --- | --- | --- |
| Course contents | Students | Course evaluation questionnaire (Direct) |
| Learning resources and equipment | Students | Student experience questionnaire (Direct) |
| Effectiveness of teaching and assessment | Students | Student experience questionnaire (Direct) |
| Course contents and materials  | Faculty members | By department council discussion (Indirect) |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

**Assessment Methods** (Direct, Indirect)

# H. Specification Approval Data

|  |  |
| --- | --- |
| **Council / Committee** |  |
| **Reference No.** |  |
| **Date** | September 2017 |