|  |  |
| --- | --- |
| **Course Title:**  | **Telescopes and Accessories** |
| **Course Code:** | **ASTR 211** |
| **Program:** | **ASTR-MATH** |
| **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:** | **4th Level / 2nd Year** |
| **4. Pre-requisites for this course** (if any)**: ASTR 201 , PHYS 110** |
| **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** | **3** | **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** | **30** |
| **2** | **Laboratory/Studio** | **15** |
| **3** | **Tutorial**  |  |
| **4** | **Others** (specify) |  |
|  | **Total** | **45** |
| **Other Learning Hours\*** |
| **1** | **Study**  | **60 (minimum)** |
| **2** | **Assignments** |  |
| **3** | **Library** |  |
| **4** | **Projects/Research Essays/Theses**  |  |
| **5** | **Others** (Lab. report + experiments) | **30** |
|  | **Total** | **90** |

**\*** 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: studies of the optical telescopes (types, components, properties). Radio telescopes. Orbital telescopes. Solar telescopes, Infrared telescopes, Methods of construction of telescopes for various astronomical purposes. Types of astronomical detectors (Spectrographs, Photographic plates and their properties, photoelectric photometers, CCD Camera). |
| 2. Course Main ObjectiveThe aim of this course is to give the student the required knowledge regarding the different observational tools using in astronomy, such as: The types of optical telescopes, photometers, spectrometers, photographic plates, charged coupled devises (CCDs); The radio telescopes and interferometry techniques; observational detectors in ultraviolet, X-ray, and gamma rays.  |
|  |

##

## 3. Course Learning Outcomes

| **CLOs** | **Aligned****PLOs** |
| --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | Define the two main functions of the telescope.  | K1, K5 |
| 1.2 | List the advantages and disadvantages of reflecting and refractor telescopes. | K5 |
| 1.3 | List the advantages and disadvantages of radio telescope.  | K5 |
| 1.4 | Define the focal length and magnification power of the telescope. | K5, K9 |
| 1.5 | Define the tools astronomer use to detect the spectra and measure magnitudes of celestial objects. | K5, K8 |
| 1.6 | Define the function of charge coupled device (CCD). | K5 |
| 1.7 | List the advantages of CCDs compared to photographic plates. | K5 |
| **2** | **Skills :** |  |
| 2.1 | Compare between reflector and refractor telescope. | S10 |
| 2.2 | Show how the spectrograph and photometer work. | S10 |
| 2.3 | Explain the difference between the equatorial and alt-azimuth mounting | S10 |
| 2.4 | Adjust the telescope mounting to follow the celestial object motion.  | S2, S10 |
| 2.5 | Use the computer software to collect data and images from telescope.  | S1,S14 |
| **3** | **Competence:** |  |
| 3.1 | Work in a small group through the observation night. | C1, C2 |
| 3.2 | Initiate and arrange a deep sky observation plan. | C2, C4 |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | **Types, components of Optical Telescopes**Lab 1: Description of 8 inch – Meade telescope componentsLab 2: How to adjust the 8 inch telescope for night sky observation. | 9 |
| 2 | **Properties of Optical Telescopes**Lab 3: Using the telescope for observing the Moon features, Mars, Jupiter satellites and Saturn rings through changing the telescope magnification power. | 9 |
| 3 | **Modern Telescopes and mounting**Lab 4: Using the telescope for observing deep night sky objects. | 9 |
| 4 | **Astronomical Detectors (Photographic Plates, Photometers, Spectrometers,…)**Lab 5: How to adjust the CCD camera with the telescope. | 9 |
| 5 | **CCD camera**Lab 6: Using the CCD camera [for astrophotography](http://www.zapmeta.ws/ws?q=astrophotography%20ccd%20cameras&asid=ws_gc2_07&mt=b&nw=g&de=c&ap=none)Lab 7: Basic data reduction for raw images | 9 |
| **Total** | **45** |

# 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 | Define the two main functions of the telescope.  | Lecture & tutorials | Exams |
| 1.2 | List the advantages and disadvantages of reflecting and refractor telescopes. |
| 1.3 | List the advantages and disadvantages of radio telescope.  |
| 1.4 | Define the focal length and magnification power of the telescope. |
| 1.5 | Define the tools astronomer use to detect the spectra and measure magnitudes of celestial objects. |
| 1.6 | Define the function of charge coupled device (CCD). |
| 1.7 | List the advantages of CCDs compared to photographic plates. |
| **2.0** | **Skills** |
| 2.1 | Compare between reflector and refractor telescope. | Lecture, tutorials, lab. | Exams |
| 2.2 | Show how the spectrograph and photometer work. |
| 2.3 | Explain the difference between the equatorial and alt-azimuth mounting |
| 2.4 | Adjust the telescope mounting to follow the celestial object motion.  | Oral discussion, lab. | Report & Lab. exam & oral presentation |
| 2.5 | Use the computer software to collect data and images from telescope.  |
| **3.0** | **Competence** |
| 3.1 | Work in a small group through the observation night. | Group discussion, lab. | Report & Lab. exam |
| 3.2 | Initiate and arrange a deep sky observation plan. |

##

## 2. Assessment Tasks for Students

| **#** | **Assessment task\***  | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Exam 1 | 4th | 20% |
| **2** | Exam 2 | 10th | 20% |
| **4** | Lab Exam | 13th | 20% |
| **5** | Reports | 14th | 10% |
|  | Final Exam | 15th | 30% |

**\*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: 3 hours per week |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | Principles and practice by A.E. Roy and D. ClarkeReflecting Telescopes Optics by R.N. Wilson-Springer. |
| **Essential References Materials** | Observational astronomy by D. Scott Biney |
| **Electronic Materials** | * [www.skyandtelescope.com](http://www.skyandtelescope.com/)
* [www.scoperevios.com](http://www.scoperevios.com/)
 |
| **Other Learning Materials** |  |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**(Classrooms, laboratories, demonstration rooms/labs, etc.) | Class room with 15 seats |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | Data show |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | Telescopes, CCD, other telescope’s equipment |

# 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 |