|  |  |
| --- | --- |
| **Course Title:**  | **Physics of Solar System** |
| **Course Code:** | **ASTR 371** |
| **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:** | **5th Level / 3th Year** |
| **4. Pre-requisites for this course** (if any)**: ASTR202** |
| **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** | **2** | **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** |  |
| **3** | **Tutorial**  |  |
| **4** | **Others** (specify) |  |
|  | **Total** | **30** |
| **Other Learning Hours\*** |
| **1** | **Study**  | **60 (minimum)** |
| **2** | **Assignments** |  |
| **3** | **Library** |  |
| **4** | **Projects/Research Essays/Theses**  |  |
| **5** | **Others**  |  |
|  | **Total** | **60** |

**\*** 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: Origin and evolution of the solar system. The Planets and their satellites (motions, masses, densities, atmospheres, compositions). The planetary medium. The effects of the solar phenomenon and, the Solar winds on Earth (Van Allen belts, Aurora, Geomagnetic disturbances, Zodiacal light).  |
| 2. Course Main ObjectiveThe students should be understand * Origin and evolution of the solar system.
* The theory of the formation of the solar system and use it to explain the properties of the solar system planets.
* The Planets and their satellites (motions, masses, densities, atmospheres, compositions).
* The planetary medium.
* The effects of the solar phenomenon and, the Solar winds on Earth (Van Allen belts, Aurora, Geomagnetic disturbances, Zodiacal light
 |
|  |

## 3. Course Learning Outcomes

| **CLOs** | **Aligned****PLOs** |
| --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | List the theories of the solar system origin. | K1 |
| 1.2 | List the main features of the solar system. | K3 |
| 1.3 | Outline the main characteristics of Terrestrial and Jovian planets. | K3 |
| 1.4 | Describe the effects of solar activities on the Earth. | K9 |
| 1.5 | State the importance of solar system debris. | K3 |
| 1.6 | Outline the atmospheric and internal structure of the Jovian planets. | K11 |
| 1.7 | Define the frost line, Asteroid belt, Kuiper belt, Trans-Neptunian objects, and Trojan and Apollo asteroids | K9 |
| **2** | **Skills :** |  |
| 2.1 | Compare between the surface characteristics of the Terrestrial planets. | S1, S7 |
| 2.2 | Compare between the atmospheric characteristics of the Jovian planets. | S3, S7 |
| 2.3 | Compare between the planets and dwarf planets. | S3, S7 |
| 2.4 | Explain the solar nebula theory for the solar system formation. | S3 |
| 2.5 | Differentiate between the Asteroid and Kuiper belts.  | S3, S7 |
| 2.6 | Explain presence of the aurora phenomenon around Jupiter and Saturn. | S3, S7 |
| 2.7 | Write a research project on one of the modern discoveries in the solar system | S12, S13 |
| **3** | **Competence:** |  |
| 3.1 | Work in group to prepare a research project | C1, C2 |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | A Planetary Overview | 3 |
| 2 | The Formation of the Solar System | 3 |
| 3 | The Terrestrial Planets | 5 |
| 4 | The Jovian Planets | 5 |
| 5 | Solar System Debris | 4 |
| 6 | The planetary medium.  | 5 |
| 7 | The effects of the solar phenomenon and Solar winds on Earth  | 5 |
| **Total** | **30** |

# 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 | List the theories of the solar system origin. | In class lectures | Exams & Homework  |
| 1.2 | List the main features of the solar system. |
| 1.3 | Outline the main characteristics of Terrestrial and Jovian planets. |
| 1.4 | Describe the effects of solar activities on the Earth. |
| 1.5 | State the importance of solar system debris. |
| 1.6 | Outline the atmospheric and internal structure of the Jovian planets. |
| 1.7 | Define the frost line, Asteroid belt, Kuiper belt, Trans-Neptunian objects, and Trojan and Apollo asteroids |
| **2.0** | **Skills** |
| 2.1 | Compare between the surface characteristics of the Terrestrial planets. | In class lectures  | Exams & Homework  |
| 2.2 | Compare between the atmospheric characteristics of the Jovian planets. |
| 2.3 | Compare between the planets and dwarf planets. |
| 2.4 | Explain the solar nebula theory for the solar system formation. |
| 2.5 | Differentiate between the Asteroid and Kuiper belts.  |
| 2.6 | Explain presence of the aurora phenomenon around Jupiter and Saturn. |
| 2.7 | Write a research project on one of the modern discoveries in the solar system | Oral discussion | Presentation |
| **3.0** | **Competence** |
| 3.1 | Work in group to prepare a research project | Oral discussion  | Report |

##

## 2. Assessment Tasks for Students

| **#** | **Assessment task\***  | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Exams I | 4th | 20% |
| **2** | Exams II | 10th | 20% |
| **4** | Homework  | Every two weeks | 10% |
| **5** | Research project +Report | 13th | 10% |
| **6** | Final Exam | 15th | 40% |

**\*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: 2 hours per week |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | * An Introduction to the Solar System, revised ed., 2011, Rothery, McBride & Gilmour (Cambridge University Press)
* Solar System Astrophysics, Milon and Wilson, 2014, 2nd eddition.
* New Solar System, Beaty and Chaikin , 1990, 2nd eddition.
* Dynamic Universe, Snow, 1987.
* Physics of Planetary Rings, A.M. Fridman, N.N. Gorkavyi. Springer (1999)
* Contemporary Astronomy, Pasachoff, 1984
 |
| **Essential References Materials** | Lecture notes |
| **Electronic Materials** | https://solarsystem.nasa.gov/ <http://www.nasa.gov/vision/universe/solarsystem/newplanet-072905-images.html>http://www.solarviews.com/eng/ |
| **Other Learning Materials** |  |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**(Classrooms, laboratories, demonstration rooms/labs, etc.) | * Lecture’s room with 10 seats
* Internet access
 |
| **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) |  |

# 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 |