Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2025

Academic Program Description Form

Department of Astronomy and Space

University Name: University of Baghdad

Faculty/Institute: College of Science

Scientific Department: Astronomy and Space

Academic or Professional Program Name: Program of Astronomy and Space

Final Certificate Name: Bachelor of Astronomy and Space Sciences

Academic System: Semester

Description Preparation Date: 1/10/2024

File Completion Date: 15/10/2024

الاستاذ المساعد الدكتور
محمد ناجي عبد الحسين
رئيس قسم الفلك والفضاء

Signature:
Assis. Prof. Dr. Mohammed Naji Abdul-Hussien
Head of Department Name:
Date:

Signature:
Prof. Dr. Namir Ibrahim Abbas
Scientific Associate Name:
Date:

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Prof. Dr. Israa Ali Zidan
Date:
Signature:

Approval of the Dean

1. Program Vision

Study and understand the scientific facts related to astronomy and space science, both theoretical and practical, and keep pace with rapid scientific developments in the field of astronomy and space, and work to prepare students who possess solid scientific and practical skills for the purpose of supplying institutions, scientific departments, and various ministries with graduates to work in the fields of scientific research and education in order to play an active role in Leading society and effectively contributing to building and serving development in our dear country.

2. Program Mission

Establishing a distinguished scientific base in the fields related to astronomy and space, and prepares and implements plans aimed at developing study tools to ensure that the requirements of quality standards are met. The department is keen to provide distinguished, capable graduates and keep pace with the amazing development in the field of astronomy and space technology. The department seeks to prepare scientific generations armed with professional scientific and ethical knowledge to continue research, innovation and innovation in this specialty in the service of the scientific movement in the world in general and Iraq in particular.

3. Program Objectives

1. Preparing the student for life as an active citizen in a conscious and responsible society.
2. Developing various personal skills.
3. Improving educational transparency and quality of education.
4. Preparing graduates specialized in the field of astronomy and space sciences who possess theoretical and practical scientific skills for the purpose of meeting the needs of ministries and other scientific institutions with highly qualified cadres who contribute to serving and building the country.
5. Conducting specialized scientific research, whether in the department or through participation with ministries and other scientific institutions for the purpose of contributing to the advancement of astronomy and space sciences and keeping pace with scientific development in this field.
6. Providing scientific consultations to various scientific departments and institutions, including, for example, the Ministry of Higher Education, Universities, Science, Technology and Environment, the Ministry of Youth, and the Civil and Military Aviation Authority.
7. Encouraging distinguished students in this field to become teaching assistants in the department and faculty members in the future
8. Working to achieve educational quality and academic accreditation by developing and updating curricula to suit modern scientific development

9. Providing a practical course parallel to the theoretical course helps students understand the educational outcomes during theoretical education, as well as helping the student how to use the electronic calculator and keep up with global progress in the field of electronic computers, information technology, networks and their applications, and software used in the field of astronomy.
10. Preparing qualified scientific staff to develop integrated plans for the organizations they supervise that help in making the right decisions.
11. Studying modern astronomy from new theories and facts to understand the development taking place in astronomy and space, the emergence of the universe, its nature, origin and future, and the physical properties related to various astronomical aspects, and to realize the ability of the Almighty Creator to create the universe.
12. The student acquires thinking and problem-solving skills by developing systematic skills for dealing with problems, which includes the student's ability to approach the problem, divide it into various parts, recognize the knowledge he has, find the missing knowledge, and apply it to solve the problem.
13. Develop the student's transferable personal skills such as oral and written communication, making tables, handling and analyzing data, leading group work, etc.
14. Providing all facilities and possibilities available for the student's academic study, which in turn encourages the student to persevere and compete.
15. Demonstrating the improvement in the student's critical and quantitative thinking by applying the scientific method in reality and theory in classroom learning, astronomical, physical, mathematical, and computer scientific activities.
16. Encouraging doctoral graduates to join the International Astronomical Union (IAU) through the Department of Astronomy and Space, the only official representative of the Union from Iraq.

4. Program Accreditation
There is not

5. Other external influences
There is not

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	4	5		
College Requirements	--	--		
Department Requirements	35	77		
Summer Training	1	--		After the third stage
Other	--	--	--	--

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
Third Stage (First Semester)			theoretical	practical
	AS 301	Astronomical Applications	2	2
	AS 303	Galaxies I	2	-
	AS 307	Fundamentals of Remote Sensing	1	2
	AS 311	Mathematical Modeling I	1	2
	AS 313	Optics I	2	2
	AS 305	Statistical Mechanics	2	-
	AS 315	Cosmic Plasma	1	2
	AS 309	Elective Subject -Extra Galactic Astronomy I	2	-
	--	Extracurricular activity (physical education)	2	-

Year/Level	Course Code	Course Name	Credit Hours	
Third Stage (Second Semester)			theoretical	practical
	AS 302	Astronomical Techniques	2	2
	AS 304	Quantum Mechanics	2	–
	AS 306	Galaxies II	2	–
	AS 308	Mathematical modeling II	1	2
	AS 312	Optics II	2	2
	AS 310	Geographic Information System	1	2
	AS 314	Elective Subject –Extra Galactic Astronomy II	2	–
	AS 316	English language	2	–
	UOB309	Research Methodology	1	–
Year/Level	Course Code	Course Name	Credit Hours	
Fourth Stage (First Semester)			theoretical	practical
	AS 401	Digital Image Processing I	2	2
	AS 403	Radio Astronomy I	2	2
	AS 407	Nuclear Physics I	2	2
	AS 413	Satellites I	2	–
	AS 409	Cosmology I	2	–
	AS 411	Spectroscopy	2	–
	AS 415	Observational Techniques	1	2
	AS 405	Elective Subject –Radiation Astronomy I	2	–
	AS 417	English language	2	–

Year/Level	Course Code	Course Name	Credit Hours	
Fourth Stage (Second Semester)			theoretical	practical
	AS 410	Digital Image Processing II	2	2
	AS 404	Radio Astronomy II	2	2
	AS 402	Nuclear Physics II	2	2
	AS 412	Satellites II	2	–
	AS 408	Cosmology II	2	–
	AS 414	Photometry	2	–
	AS 406	Elective Subject –Radiation Astronomy II	2	–
	AS 416	Research Project	2	–

8. Expected learning outcomes of the program

Knowledge

1. Enabling students to obtain knowledge and understanding of the principles, scientific foundations and theories of astronomy and space.
2. Enabling students to gain an understanding of modern and advanced scientific topics in the field of astronomy and space.
3. Enabling students to gain an understanding of the basic principles of the operation of astronomical telescopes of various types and to build the image of our universe emerging from the Earth to the solar system to the galaxy to cosmology.
4. Enable students to gain an understanding of how to use optical and radio astronomical telescopes for astronomical observation purposes.
5. Enable students to gain an understanding of mathematical foundations, calculus exercises, differential equations, advanced mathematics, and equations for the study of astronomy and space.
6. Giving students a solid scientific curriculum that qualifies students for professional practical astronomical photography and monitoring the movement and orbits of satellites.
7. Introducing students to processing space images, space and frequency imaging systems, the method of representing digital images, remote sensing techniques, geographic information system, and remote sensing.
8. That the student will be able to learn about cosmology, the emergence and development of galaxies, stars, interstellar matter, gases, cosmic dust, high-energy radiation astronomy, radio astronomy, atomic, modern and nuclear physics, nuclear interactions and cosmic plasma in the

basic structure of the universe, and to know and understand the theories and laws that were developed on this unique scientific basis.
9. Introducing the student to how to find the coordinates of a celestial body and determine its distance, speed, and momentum, as well as converting the known celestial coordinates between them.
10. Enabling the student to find many important astronomical values in determining prayer times and the new moon, monitoring the movement of planets, dwarf planets, asteroids, comets, the moon, and stars, and drawing some maps in this regard.
11. Study of classical, quantitative and statistical mechanics and the theory of relativity, which are considered the basic basis for understanding any system in the universe, whether it is a microscopic system. Without it, it is not possible to understand and study any system, including complex cosmic systems.
12. The study of the layers of the atmosphere, the physics of the atmosphere and space, and terrestrial and solar magnetism is one of its broadest scientific branches.
13. Enabling the student to know the basics of computers and software, understanding the art of printing, and developing the students' skills in dealing with computers through applying various programs such as MATLAB, BASIC, and Microsoft, and knowing the factors affecting mathematical functions and equations and the way they are represented.
14. Enabling the student to understand modern and advanced scientific topics related to astronomy and space sciences that rely on the English language.

Skills

1. Giving students specialized theoretical and practical scientific skills
2. Giving students thinking and analysis skills in both theoretical and practical aspects
3. Giving students skills related to developing the programming aspect and specialized mathematical calculations
4. Enabling students to obtain theoretical experiences and develop educational skills in the field of astronomy and space.
5. Training students on mathematical operations skills related to calculating some of the astronomical and physical coefficients and parameters necessary for study
6. Teaching the student the skills of typing and writing, making and organizing tables, dealing with and analyzing data, and presenting lectures and seminars in a simple, clear and productive manner.
7. Developing the student's skills and linguistic capabilities that help raise the student's level of dealing with and understanding the study materials given in the English language.
8. Developing the student's ability to deal with any computer system in general, including Windows...etc.
9. Practical experiments and the software used give students some experience and skills, and accustom them to deducing and analyzing scientific results.
10. Practical experiences help students think, discover, and research by training them in the method of scientific research.

Ethics
1. Urging students to commit, persevere, and make every effort to obtain academic knowledge 2. Positive and constructive interaction with students for the purpose of motivating them to accept the scientific material 3. Encouraging students to develop thinking and purposeful scientific research and moving away from the traditional memorization approach 4. Developing Internet research skills to expand students' cognitive horizons 5. Developing the creative ideas of gifted students through the use of brainstorming 6. Refine the student's personality by acquiring university values and exemplary good behavior 7. Developing the student's ability and his relationships with his colleagues for the better so that he always behaves honestly and ethically in all his dealings while at the university and after it. 8. Introducing the student to the importance of the scientific material given to him during his studies in relation to his specialty and the extent of benefiting from it for the post-graduation stage. 9. Teach the student the importance of simulation in understanding cosmic phenomena in an accurate scientific manner. 10.Giving the leadership of the discussion management to the hands of a single work team and enabling them to lead and manage the dialogue, exchange opinions, intellectual and personal knowledge, and refine the information necessary to prepare the student for the labor market after graduation.

9. Teaching and Learning Strategies
1. Clarifying and explaining study materials through electronic classes or any approved in-person or electronic learning media through blended learning. It is possible to use whiteboard media and use Power Point via LCD screens and Data (Show) for this purpose. 2. Providing students with knowledge through homework assignments related to the theoretical and practical curriculum 3. Asking students to visit scientific libraries to obtain academic knowledge 4. Improving, guiding and supporting students' scientific knowledge by encouraging them to visit various websites 5. Supporting students' practical laboratory studies by providing astronomical observation evenings throughout the academic year 6. A simplified and sequential explanation of the topic theoretically and detailing the topics in terms of difficulty and applying them practically to convey the idea clearly, including, for example, making appropriate videos for this purpose. 7. Translating topics and theoretical vocabulary related to the department's various educational materials and how some processors can be converted into computer programs of great scientific and educational benefit. 8. Discuss the information and concepts covered in the lecture with students by providing "advisory" assistance or receiving "advisory" assistance from these students. 9. Students are required to carry out research projects on various topics in astronomy and space sciences. 10. Encourage teamwork in analyzing and interpreting astronomical data. 11.Design questions that stimulate critical thinking and scientific problem solving.

10. Evaluation methods

1. Asking direct oral questions
2. Scientific reports and daily assignments
3. Short daily exams (Quiz) in the theoretical and practical aspects
4. Assigning students to make reports on the completed experiment, discuss the results, and set grades for homework assignments and scientific reports
5. Placing various problems at the end of each chapter to strengthen the student on the correct scientific solution and how to derive the mathematical and physical equations related to the topic.
6. Monthly exams (with various questions and multiple options) in the theoretical and practical aspects
7. Talking or discussing with students is not allowed during tests, which may lead to failure of the test and evaluation
8. Final semester exams.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
professor	8				8	
Assistant Professor	12				12	
Instructor	16				16	
Assistant Instructor	4				4	

Professional Development

Mentoring new faculty members

Participating in courses on teaching methods, Arabic and English language proficiency, passing the teaching aptitude exam, and other professional teaching courses.

Professional development of faculty members

1. Training in evaluating teaching performance of all kinds and giving it importance in teaching and development courses
2. Attending training courses
3. Attending continuing education courses and seminars

4. Online learning.
5. Discussions inside and outside the work environment, which helps in career development

12. Acceptance Criterion

Central - scientific specialization

According to the instructions of the Ministry of Higher Education and Scientific Research, so that it matches the latest admission requirements in Iraqi universities, while setting standards for accepting students into the department, including (the general average of the baccalaureate degree)

13. The most important sources of information about the program

1. University requirements
2. Local scientific trends
3. Global scientific trends
4. Studies and questionnaires
5. Internet information network
6. Academic curricula
7. Experiences of Arab and international universities
8. Adoption of the European Credit Transfer and Accumulation System (ECTS)

14. Program Development Plan

1. Modernizing the educational system by adopting modern educational systems in the field of teaching and learning.
2. Adopting a system for managing and monitoring quality to ensure raising the level of performance at all levels (educational, research, and community service).
3. Developing the levels of educational services provided, including: faculty members, courses, teaching methods, training, and available educational resources. This development should be compatible with the progress made in the field of astronomy, to the extent that it ensures the graduation of cadres capable of keeping pace with cultural development in this field.
4. Providing a curriculum that gives students the opportunity to choose between multiple specializations, to be able to prepare graduates with diverse and disparate specialized scientific backgrounds.
5. Contributing with ideas, projects and research for the benefit of community development.
6. Providing the appropriate climate to support students' cultural, social, and sporting activities to ensure the preparation of a generation capable of interacting positively with the movement of societal development.
7. The department seeks to obtain local or international program accreditation

8. Forming a technical committee for quality assurance to follow up on the department's efforts in preparing evaluation reports against institutional standards as part of the college's efforts to obtain institutional accreditation.

Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2024-2025/Third Stage	AS 301	Astronomical Applications	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 303	Galaxies I	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 307	Fundamentals of Remote Sensing	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 311	Mathematical Modeling I	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 313	Optics I	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 305	Statistical Mechanics	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 315	Cosmic Plasma	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 309	Extra Galactic Astronomy I	optional	*	*	*	*	*	*	*	*	*	*	*	*
	AS 302	Astronomical Techniques	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 304	Quantum Mechanics	Basic	*	*	*	*	*	*	*	*	*	*	*	*

	AS 306	Galaxies II	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 308	Mathematical modeling II	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 312	Optics II	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 310	Geographic Information System	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 314	Extra Galactic Astronomy II	optional	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 316	English language	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	UOB309	Research Methodology	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
2024-2025/Fourth Stage	AS 401	Digital Image Processing I	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 403	Radio Astronomy I	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 407	Nuclear Physics I	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 413	Satellites I	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 409	Cosmology I	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*
	AS 411	Spectroscopy	Basic	*	*	*	*	*	*	*	*	*	*	*	*	*

	AS 415	Observational Techniques	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 405	Radiation Astronomy I	optional	*	*	*	*	*	*	*	*	*	*	*	*
	AS 417	English language	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 410	Digital Image Processing II	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 404	Radio Astronomy II	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 402	Nuclear Physics II	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 412	Satellites II	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 408	Cosmology II	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 414	Photometry	Basic	*	*	*	*	*	*	*	*	*	*	*	*
	AS 406	Radiation Astronomy II	optional	*	*	*	*	*	*	*	*	*	*	*	*
	AS 416	Research Project	Basic	*	*	*	*	*	*	*	*	*	*	*	*

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**