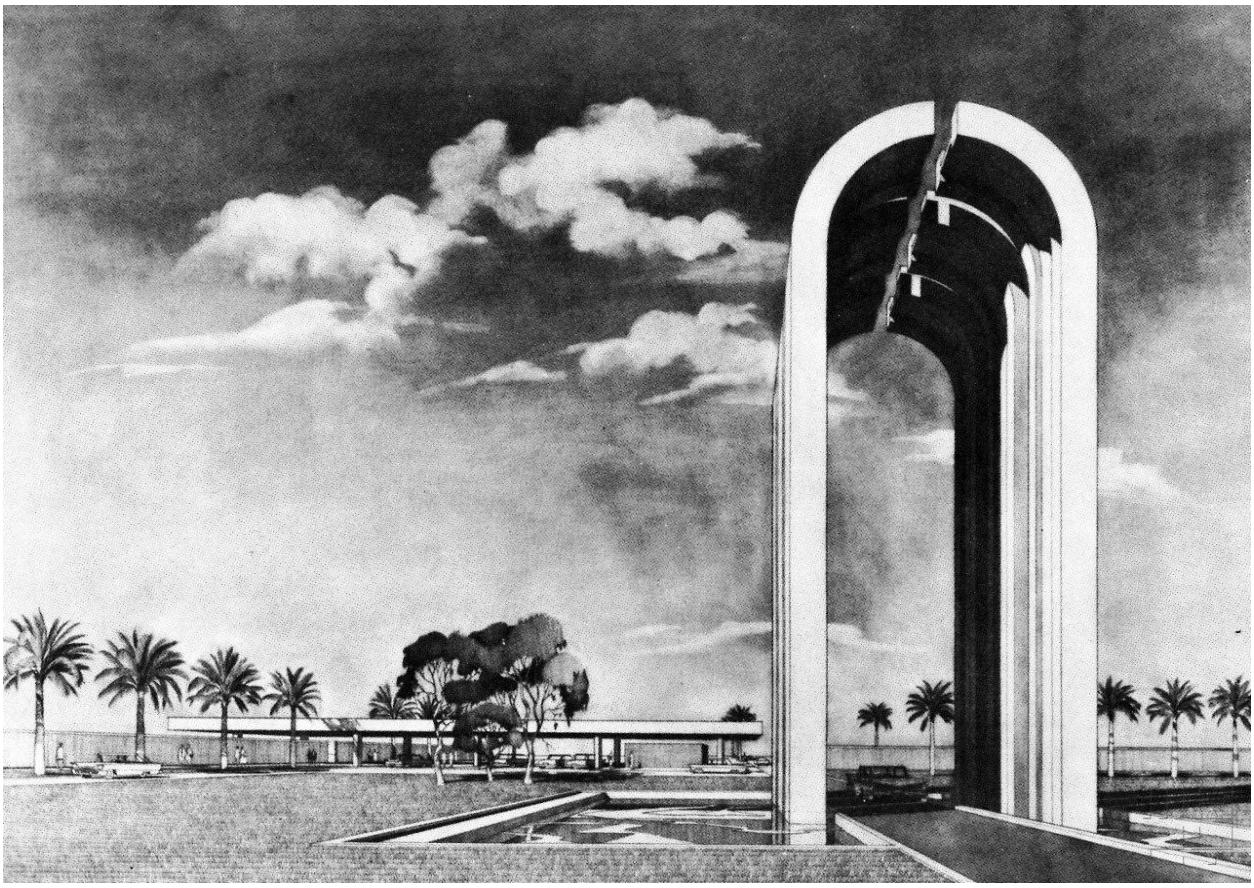
UNIVERSITY of BAGHDAD
جامعة بغداد

Bachelor of Science Honours (B.Sc. Honours) – Astronomy and space

بكالوريوس علوم - فلك وفضاء



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1. Mission & Vision Statement

Vision Statement

Our vision is to establish a world-class Astronomy and Space Department that inspires curiosity, advances scientific knowledge, and empowers future leaders in the exploration and understanding of the universe. We strive to be at the forefront of astronomical research, fostering innovation, and driving technological advancements that revolutionize our understanding of space.

Through our comprehensive educational programs, we try to cultivate a community of passionate astronomers and space scientists who are equipped with the skills and knowledge to tackle the most pressing questions about our cosmic environment. Our department is dedicated to promoting interdisciplinary collaboration, fostering a vibrant environment where students and researchers from diverse backgrounds can come together to explore the wonders of the universe.

We envision a department that actively contributes to space exploration missions, pioneering breakthrough discoveries and cutting-edge technologies. By fostering strong partnerships with national and international space agencies, observatories, and research institutions, we aim to play a pivotal role in shaping the future of space exploration.

We are committed to engaging the public and promoting scientific literacy through innovative outreach programs, public lectures, and immersive experiences. By sharing our passion for astronomy and space sciences, we strive to inspire the next generation of scientists, astronauts, and space enthusiasts.

Our vision for the Astronomy and Space Department is to serve as a beacon of excellence, pushing the boundaries of human knowledge and exploring the mysteries of the universe.

Through our research, education, and outreach efforts, we aim to make significant contributions to the field, inspire wonder, and foster a deeper understanding of our place in the cosmos.

Mission Statement

2. Our mission is to advance the frontiers of astronomical research, foster a culture of scientific exploration, and provide exceptional education and training in the field of astronomy and space sciences. We are committed to creating a dynamic and inclusive environment that nurtures the intellectual and professional growth of our students, faculty, and researchers.
3. Research: Our primary mission is to conduct groundbreaking research in astronomy and space sciences, pushing the boundaries of human knowledge. We actively engage in cutting-edge observational and theoretical studies, exploring diverse phenomena from distant galaxies and stellar evolution to planetary systems and the origins of the universe. Our department is dedicated to making significant contributions to the global scientific community and driving innovations that shape the future of space exploration.
4. Education: We are passionate about providing exceptional education and training opportunities in astronomy and space sciences. Our mission is to equip students with a deep understanding of the fundamental principles, methodologies, and technologies in the field. We offer comprehensive undergraduate and graduate programs that foster critical thinking, problem-solving skills, and a strong foundation in scientific research. Through hands-on experiences and mentorship from renowned faculty, we empower our students to become future leaders in academia, industry, and space exploration.
5. Collaboration: We believe in the power of collaboration and interdisciplinary approaches to advance scientific knowledge. Our department actively promotes collaboration within the university and seeks partnerships with national and international institutions, observatories, and space agencies. By fostering diverse collaborations, we aim to tackle complex research questions, share expertise, and accelerate scientific progress in the field of astronomy and space sciences.
6. Outreach: We are dedicated to inspiring and engaging the public in the wonders of astronomy and space exploration. Our mission is to promote scientific literacy and cultivate a sense of awe and curiosity about the universe. Through engaging outreach programs, public lectures, and interactive experiences, we aim to make astronomy accessible to all, fostering a deeper appreciation for the beauty and significance of our cosmic environment.
7. Ethics and Integrity: We are committed to conducting our research and educational activities with the highest standards of ethics, integrity, and respect for diversity. We value inclusivity, transparency, and the responsible use of resources in our pursuit of knowledge and understanding.
8. Through our mission, the Astronomy and Space Department at our university endeavors to be a leading force in advancing scientific knowledge, training the next generation of astronomers and space scientists, and inspiring the world with the wonders of the universe.

9. Program Specification

Programme code:	BSc-AST	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

1. Program Overview:
    - Name: Astronomy and Space Department Program
    - Duration: Typically 4 years for undergraduate program, 2 years for master's program, and 3-5 years for doctoral program
    - Degree Offered: Bachelor of Astronomy and Space Science (B.Sc.), Master of Astronomy Science (M.Sc.), Doctor of Philosophy in Astronomy Science (Ph.D.)
    - Program Type: Full-time, on-campus
2. Program Objectives:
    - Provide students with a comprehensive understanding of the principles, theories, and methodologies in astronomy and space sciences.
    - Equip students with practical skills in observational techniques, data analysis, and computational modeling relevant to the field.
    - Foster critical thinking, problem-solving abilities, and analytical reasoning in the context of astronomical research.
    - Prepare students for careers in academia, research institutions, space agencies, observatories, and related industries.
    - Encourage interdisciplinary collaboration and promote the integration of astronomy and space sciences with other scientific disciplines.
3. Curriculum Structure:
    - The program consists of a combination of core courses, elective courses, research projects, and practical experiences.
    - Core courses cover foundational topics such as celestial mechanics, astrophysics, planetary science, cosmology, and observational techniques.
    - Elective courses allow students to specialize in specific areas of interest, such as stellar astrophysics, extragalactic astronomy, planetary exploration, or space instrumentation.
    - Research projects provide opportunities for students to engage in original research, under the guidance of faculty mentors, and contribute to the advancement of scientific knowledge.
    - Practical experiences include observational sessions at local and remote observatories, data analysis workshops, and participation in collaborative research projects.
4. Admission Requirements:
    - High school diploma or equivalent for undergraduate program; bachelor's degree in a related field for master's program; master's degree in a related field for doctoral program.
    - Satisfactory scores in standardized tests (e.g., SAT, ACT, GRE) as required by the university.
    - Submission of application materials, including transcripts, letters of recommendation, statement of purpose, and possibly a personal interview.

5. Facilities and Resources:
    - Access to state-of-the-art observatories, telescopes, and astronomical instrumentation for observational and research purposes.
    - Dedicated laboratories for data analysis, computational modeling, and astronomical simulations.
    - Collaboration spaces for interdisciplinary research and student projects.
    - Libraries with extensive collections of astronomical literature, journals, and online resources.
    - Access to advanced computing resources for data processing and analysis.
6. Faculty and Mentoring:
    - Highly qualified and experienced faculty members with expertise in various areas of astronomy and space sciences.
    - Faculty mentors assigned to students to provide guidance and support throughout their academic journey.
    - Opportunities for students to collaborate with faculty on research projects and publications.
    - Regular faculty-led seminars, workshops, and discussions to facilitate intellectual growth and scientific discourse.
7. Career Opportunities:
    - Academic positions in universities and research institutions as professors, researchers, and postdoctoral fellows.
    - Research and development roles in space agencies, observatories, and private companies.
    - Careers in astronomical instrumentation, data analysis, and computational modeling.
    - Opportunities in science communication, outreach, and public education.
    - Consulting roles in the aerospace industry and related fields.

10. Program Goals

The goal of the Astronomy and Space Department program is to provide students with a comprehensive education in astronomy and space sciences, equipping them with the knowledge, skills, and research experience necessary for successful careers in the field. The program aims to foster a deep understanding of the universe, promote scientific inquiry, and contribute to the advancement of astronomical research and space exploration.

The program's specific goals include:

1. Knowledge and Understanding: To ensure that students develop a solid foundation in the principles, theories, and methodologies of astronomy and space sciences. Students will acquire a broad knowledge of celestial objects, stellar evolution, cosmology, planetary systems, observational techniques, and data analysis methods.

2. Research and Scientific Skills: To cultivate students' research abilities, critical thinking, and problem-solving skills in the context of astronomical research. Students will gain hands-on experience in conducting independent research, analyzing astronomical data, interpreting results, and contributing to scientific knowledge.
3. Interdisciplinary Collaboration: To encourage interdisciplinary collaboration and the integration of astronomy and space sciences with other scientific disciplines. Students will have opportunities to collaborate with researchers from diverse backgrounds, fostering a holistic approach to scientific inquiry and the exploration of complex scientific questions.
4. Technological Proficiency: To develop students' proficiency in utilizing advanced technologies, computational tools, and astronomical instrumentation. Students will gain practical skills in data analysis, computer programming, numerical simulations, and the use of telescopes and observatories.
5. Communication and Outreach: To enhance students' communication skills and promote effective dissemination of scientific knowledge to both scientific and non-scientific audiences. Students will have opportunities to participate in science communication and outreach activities, engaging the public and inspiring interest in astronomy and space sciences.
6. Ethical and Professional Conduct: To instill a strong sense of ethical and professional conduct in students. They will develop an understanding of responsible research practices, scientific integrity, and the ethical implications of astronomical research and space exploration.
7. Career Readiness: To prepare students for diverse career pathways in academia, research institutions, space agencies, observatories, private industry, and science communication. Students will acquire the necessary skills, research experience, and network connections to pursue successful careers in their chosen field of specialization.

11. Student Learning Outcomes

Student Learning Outcomes (SLOs) are specific measurable statements that describe what students should know, understand, and be able to demonstrate upon completing the Astronomy and Space Department program. Here are some examples of student learning outcomes for an Astronomy and Space Department program:

1. Knowledge Base:
    - SLO 1: Students will demonstrate a comprehensive understanding of the fundamental concepts and theories in astronomy and space sciences.
    - SLO 2: Students will exhibit knowledge of celestial objects, including stars, galaxies, planets, and their properties, as well as the structure and evolution of the universe.
2. Scientific Inquiry and Research Skills:

- SLO 3: Students will apply scientific methodologies to conduct independent research projects in astronomy and space sciences, including formulating research questions, designing experiments, and analyzing data.
- SLO 4: Students will critically evaluate scientific literature and effectively communicate research findings through written reports, oral presentations, and scientific posters.

3. Observational Techniques and Instrumentation:
   - SLO 5: Students will demonstrate proficiency in utilizing observational techniques and astronomical instrumentation, including telescopes, spectrographs, and detectors, to collect and analyze astronomical data.
   - SLO 6: Students will apply data reduction and analysis techniques to interpret astronomical observations and draw meaningful conclusions.
4. Computational Skills:
   - SLO 7: Students will demonstrate proficiency in using computational tools, software, and programming languages to model astronomical phenomena, simulate celestial processes, and analyze complex datasets.
   - SLO 8: Students will employ numerical methods and algorithms to solve astronomical problems and perform statistical analyses.
5. Interdisciplinary Collaboration:
   - SLO 9: Students will actively participate in interdisciplinary collaborations, effectively communicate and collaborate with scientists from diverse backgrounds, and integrate knowledge from different scientific disciplines to address complex research questions.
6. Ethical and Professional Conduct:
   - SLO 10: Students will demonstrate ethical and professional conduct in their research practices, including proper handling and documentation of data, adherence to scientific integrity, and consideration of ethical implications in astronomical research.
7. Science Communication and Outreach:
   - SLO 11: Students will effectively communicate scientific concepts and research findings to both scientific and non-scientific audiences through oral presentations, written reports, public talks, and outreach activities.
   - SLO 12: Students will engage in science outreach programs and activities to promote public understanding and appreciation of astronomy and space sciences.

These student learning outcomes provide a framework for assessing students' progress and ensuring that they have acquired the necessary knowledge, skills, and competencies upon completion of the Astronomy and Space Department program.

12. Academic Staff

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13. Credits, Grading and GPA

Credits

Koya University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Grade Point Average (GPA)

1. The GPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   GPA of a 4-year B.Sc. degrees:

   GPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

14. Curriculum/Modules

15. Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AST1101	Fundamentals of Astronomy	91	109	8.00	C	
AST1102	General physics	109	66	7.00	C	
AST1103	Differentiation and Integration	48	77	5.00	S	
AST1104	Geophysics	48	77	5.00	S	
UoB1105	English language	33	17	2.00	B	
UoB1106	Computer Skills I	62	13	3.00	B	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AST1207	Astrophysics	94	81	7.00	C	
AST1208	Atmospheric Sciences	94	106	8.00	C	
AST1209	Applied Mathematics	63	87	6.00	S	
CoS12010	General Chemistry	79	46	5.00	S	
UoB12011	Arabic language	33	17	2.00	B	
UoB12012	Human Rights and Democracy	33	17	2.00	B	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
AST23013	Celestial Mechanics	64	86	6.00	C	
AST23014	Atomic Physics	79	71	6.00	C	
AST23015	Numerical and Complex Analysis	79	56	6.00	C	
AST23016	Thermodynamics	63	62	5.00	C	
AST23017	Stellar physics	79	46	5.00	C	
UoB23018	English Language	33	17	2.00	B	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs						
Code	**Module**	**SSWL**	**USSWL**	**ECTS**	**Type**	**Pre-request**
AST24019	Orbital Dynamic	79	71	6.00	C	
AST24020	Modern Physics	79	46	5.00	C	
AST24021	Planetary Physics	63	62	5.00	C	
AST24022	Space Weather	63	62	5.00	C	
AST24023	Mathematical Physics	63	87	6.00	S	
UoB24024	Computer Skills II	62	13	3.00	B	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs						
Code	**Module**	**SSWL**	**USSWL**	**ECTS**	**Type**	**Pre-request**
AST35025	Astronomical Applications	79	46	5.00	C	
AST35026	Optics	109	66	7.00	C	
AST35027	Cosmic Plasma	64	61	5.00	C	
AST35028	Galaxies	63	37	4.00	C	
AST35029	Statistical Mechanics	63	37	4.00	C	
AST35030	Satellites	63	62	5.00	C	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs						
Code	**Module**	**SSWL**	**USSWL**	**ECTS**	**Type**	**Pre-request**
AST36031	Astronomical Observation Techniques	79	71	6.00	C	
AST36032	Renewable Energies	63	112	7.00	C	
AST36033	Computational Fourier Optics	109	91	8.00	C	
AST36034	Quantum Mechanics	48	77	5.00	S	
UoB36035	English Language	33	17	2.00	B	
UoB36036	Scientific Research Methodology	33	17	2.00	B	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs						
Code	**Module**	**SSWL**	**USSWL**	**ECTS**	**Type**	**Pre-request**
AST47037	Digital Image Processing	109	66	7.00	C	
AST47038	Radio Astronomy	109	66	7.00	C	
AST47039	Radiation Astronomy	63	62	5.00	C	
AST47040	Nuclear Physics	79	46	5.00	C	
UoB47041	English Language	33	17	2.00	B	
AST 47042	Graduation Project	62	38	4.00	C	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs						
Code	**Module**	**SSWL**	**USSWL**	**ECTS**	**Type**	**Pre-request**
AST48043	Weather Instruments and Observations	94	56	6.00	C	
AST48044	Rocket Physics	48	52	4.00	C	
AST48045	Spectroscopy and photometry	63	87	6.00	C	
AST48046	Laser Physics	63	62	5.00	C	
AST48047	Cosmology	63	62	5.00	C	
AST48048	Graduation Project	62	38	4.00	C	

16. Contact