



University of Bologna

Department of Physics and Astronomy

“Augusto Righi” (DIFA)

MASTER DEGREE

in

ASTROPHYSICS AND COSMOLOGY

What will you study?

- ❑ The physical processes underlying the formation, evolution and radiative emission of cosmic structures and the Universe, from both a theoretical and observational point of view
- ❑ The techniques, both observational and numerical, used by professional astrophysicists to interpret observational data and build interpretative and/or predictive models
- ❑ Consolidated knowledge and still open questions in modern astrophysical and cosmological research

FIRST YEAR
STELLAR DYNAMICS
STELLAR EVOLUTION
GALAXY FORMATION AND EVOLUTION
ACTIVE GALACTIC NUCLEI AND SUPERMASSIVE BLACK HOLES
COSMOLOGY
COMPUTATIONAL ASTROPHYSICS AND STATISTICS
(from 1 to 3) ELECTIVE COURSES

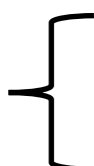
SECOND YEAR
MULTI-WAVELENGTH ASTROPHYSICS LABORATORY
PROFESSIONAL SKILLS/INTERNSHIP
(from 2 to 4) ELECTIVE COURSES
MASTER THESIS PROJECT

Total: 5 elective courses

Plan of the II Cycle Degree

5828 – ASTROPHYSICS AND COSMOLOGY (LM58) Bologna			
First year	SSD	CFU	Teacher
Active Galactic Nuclei and Supermassive Black Holes	FIS/05	6	C. Vignali
Stellar Dynamics	FIS/05	6	L. Ciotti
Stellar Evolution	FIS/05	8	F.R. Ferraro
Galaxy formation and evolution	FIS/05	8	A. Cimatti
Computational Astrophysics and Statistics	FIS/05	8	F. Brighenti/ R.B. Meltcalf
Cosmology	FIS/05	8	L. Moscardini
Elective course		6	
Free choice learning activities		12	

1+2



Second year	SSD	CFU	Teacher
Multiwavelength Astrophysics Laboratory	FIS/05	8	C. Vignali
Professional skill/internship		3	C. Vignali
Elective courses		12	
Preparation and final examination		15+20	

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Total: 120 CFU

Elective courses (6 CFU each)

96388 <u>ADVANCED COSMOLOGY</u>	1	C	FIS/05	6
96390 <u>ASTRONOMICAL INSTRUMENTATION</u>	1	C	FIS/05	6
96391 <u>ASTROPHYSICS OF GALAXIES</u>	1	C	FIS/05	6
B2138 <u>EXOPLANETS: FORMATION, POPULATIONS, AND ATMOSPHERES</u>	1	C	FIS/05	6
96392 <u>GRAVITATIONAL LENSING</u>	1	C	FIS/05	6
B1017 <u>GRAVITATIONAL WAVE ASTROPHYSICS AND COSMOLOGY</u>	1	C	FIS/05	6
77956 <u>SPACECRAFT SUBSYSTEMS AND SPACE MISSION DESIGN</u>	1	C	ING-IND/05	6
96398 <u>THE INTERSTELLAR MEDIUM</u>	1	C	FIS/05	6
96389 <u>Advanced Stellar Physics and Asteroseismology</u>	2	C	FIS/05	6
87966 <u>Astroparticle Physics</u>	2	C	FIS/05	6
94230 <u>Astrophysical Fluid Dynamics</u>	2	C	FIS/05	6
96454 <u>Galaxy Clusters</u>	2	C	FIS/05	6
96393 <u>High Energy Astrophysics</u>	2	C	FIS/05	6
90569 <u>High performance computing for Astrophysics and Cosmology</u>	2	C	FIS/05	6
96394 <u>Magnetic Fields in Astrophysics</u>	2	C	FIS/05	6
86840 <u>Practical Statistics for Physics and Astrophysics</u>	2	C	FIS/05	6
96395 <u>Radioastronomy</u>	2	C	FIS/05	6
96397 <u>Relativity</u>	2	C	FIS/02	6
96396 <u>Resolved Stellar Populations</u>	2	C	FIS/05	6

Preparing the study plan

In the period October/December and in March you can decide the elective courses you want to include in your plan for the current academic year. In the second year you can add other courses and/or change your choices.



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

SECOND CYCLE DEGREE/TWO YEAR MASTER IN ASTROPHYSICS AND COSMOLOGY

<https://corsi.unibo.it/2cycle/Astrophysics/course-structure-diagram>

First year

Free Choice Learning Activities (12 - 50 CFU) TAF D – student's choice

After the registration of the activities chosen in this group, you can not use or move them to other groups of choice

Group of Choice (6 CFU) TAF C – affini e integrative (similar and integrative)

Second year

Group of Choice (12 CFU) TAF C

Presentation of elective courses (I) Master in Astrophysics and Cosmology

Friday, October 13th, 9:12:30, seminar room “A. Sollima” (IV floor OAS)

- 9:00-9:15 Introduction – C. Vignali
- 9:15-9:30 ADVANCED COSMOLOGY – F. Marulli
- 9:30-9:45 GRAVITATIONAL LENSING – R.B. Metcalf
- 9:45-10:00 THE INTERSTELLAR MEDIUM – R. Decarli (in place of F. Pozzi)
- 10:00-10:15 ASTROPHYSICS OF GALAXIES – S. Pellegrini
- 10:15-10:30 ASTROPARTICLE PHYSICS – F. Vazza
- 10:30-10:45 *break*
- 10:45-11:00 ASTROPHYSICAL FLUID DYNAMICS – C. Nipoti
- 11:00-11:15 HIGH ENERGY ASTROPHYSICS – M. Brusa
- 11:15-11:30 RADIOASTRONOMY – D. Dallacasa
- 11:30-11:45 GALAXY CLUSTERS – F. Brighenti
- 11:45-12:00 MAGNETIC FIELDS IN ASTROPHYSICS – A. Bonafede
- 12:00-12:15 RELATIVITY – F. Bastianelli
- 12:15-12:30 HIGH PERFORMANCE COMPUTING FOR ASTROPHYSICS AND COSMOLOGY – M. Baldi

Presentation of elective courses (II) Master in Astrophysics and Cosmology

Friday, Nov 3rd, 9:11:00, seminar room “A. Sollima” (IV floor OAS)

- 9:00-9:15 Introduction – C. Vignali
- 9:15-9:30 ADVANCED STELLAR PHYSICS AND ASTEROSEISMOLOGY – A. Miglio
- 9:30-9:45 ASTRONOMICAL INSTRUMENTATION – L. Testi
- 9:45-10:00 EXOPLANETS: FORMATION, POPULATIONS, AND ATMOSPHERES – L. Testi
- 10:00-10:15 PRACTICAL STATISTICS FOR PHYSICS AND ASTROPHYSICS – R.B. Metcalf
- 10:15-10:30 GRAVITATIONAL WAVE ASTROPHYSICS AND COSMOLOGY – M. Moresco
- 10:30-10:45 RESOLVED STELLAR POPULATIONS – B. Lanzoni
- 10:45-11:00 SPACECRAFT SUBSYSTEMS AND SPACE MISSION DESIGN – P.P. Sundaramoorthy