



**Updating the lists of courses of annexes of the Double Master Degree Agreement Between the University of Palermo and the University of Turku**

Annexes 1.1-1.6 of the Double Master Degree Agreement Between the University of Palermo (UNIPA) and the University of Turku (UTU) contain lists of courses and other curricular activities that students enrolled in the double degree programme between the “Master degree in Physics” at UNIPA and the Master degree in “Physical and Chemical Sciences” at UTU can select to obtain at least the equivalent of 30 ECTS during the stay at the host university.

Updating these course lists is compared to modifications of the corresponding curricula at the University of Turku. Modifications of the curricula concerning the degrees offered by the Faculty of Science can be done with the approval of the vice-dean of the Faculty in charge of teaching.

With this decision the lists of courses of annexes 1.1 and 1.3 of the Double Master Degree Agreement Between the University of Palermo and the University of Turku can be updated as presented in the following lists.

Petriina Paturi, vice-dean of the Faculty of Science in charge of teaching

26.1.2023, Turku





**The original list of courses of Annex 1.1:**

**Annex 1.1 List of courses and other curricular activities that students enrolled in the double degree programme between the “Master degree in Physics” at UNIPA and the Master degree in “Physical and Chemical Sciences: Astronomy and Space Physics” at UTU can select to obtain at least the equivalent of 30 ECTS during the stay at host university, 21 October 2021.**

<p style="text-align: center;">UNIPA <b>Laurea Magistrale in Fisica</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>	<p style="text-align: center;">UTU <b>Master degree in “Physical and Chemical Sciences: Astronomy and Space Physics”</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>
<p style="text-align: center;">Thematic Courses</p> <p>22019 - THEORY OF GENERAL RELATIVITY (1 Semester - 6 ECTS)</p> <p>22020 - HIGH ENERGIES ASTROPHYSICS WITH LABORATORY (1 Semester - 6 ECTS)</p>	<p>Cosmology I (1 semester – 4 ECTS)</p> <p>Cosmology II (1 semester – 4 ECTS)</p> <p>Spectroscopic diagnostic in astrophysics (1 semester – 8 ECTS)</p>
<p style="text-align: center;">Elective Courses</p> <p>21961 - ASTROPHYSICS - LABORATORY (1 Semester - 6 ECTS)</p> <p>21963 - PHYSICS OF COMPLEX SYSTEMS (1 Semester - 6 ECTS)</p> <p>21960 - QUANTUM THERMODYNAMICS (1 Semester - 6 ECTS)</p> <p>21958 - COMPLEX NETWORKS (1 Semester - 6 ECTS)</p> <p>21957 - GAUGE THEORIES AND STANDARD MODEL (1 Semester - 6 ECTS)</p> <p>21951 - APPLIED PHYSICS TECHNIQUES AND EQUIPMENT (1 Semester - 6 ECTS)</p> <p>21956 - STELLAR EVOLUTION (1 Semester - 6 ECTS)</p>	<p>Stellar structure and evolution (1 semester – 8 ECTS)</p> <p>Observational techniques using the Nordic Optical telescope (1 semester – 7 ECTS)</p> <p>High energy astrophysics (1 semester – 8 ECTS)</p> <p>Space physics (1 semester – 5 ECTS)</p> <p>Observational astronomy (1 semester – 5 ECTS)</p> <p>Data analysis and knowledge discovery (1 semester – 5 ECTS)</p>



**The updated list of courses of Annex 1.1:**

**Annex 1.1 List of courses and other curricular activities that students enrolled in the double degree programme between the “Master degree in Physics” at UNIPA and the Master degree in “Physical and Chemical Sciences: Astronomy and Space Physics” at UTU can select to obtain at least the equivalent of 30 ECTS during the stay at host university, 21 October 2021.**

<p style="text-align: center;">UNIPA <b>Laurea Magistrale in Fisica</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>	<p style="text-align: center;">UTU <b>Master degree in “Physical and Chemical Sciences: Astronomy and Space Physics”</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>
<p style="text-align: center;">Thematic Courses</p> <p>22019 - THEORY OF GENERAL RELATIVITY (1 Semester - 6 ECTS)</p> <p>22020 - HIGH ENERGIES ASTROPHYSICS WITH LABORATORY (1 Semester - 6 ECTS)</p>	<p>Cosmology I (1 semester – 4 ECTS)</p> <p>Cosmology II (1 semester – 4 ECTS)</p> <p>Spectroscopic diagnostic in astrophysics (1 semester – 8 ECTS)</p>
<p style="text-align: center;">Elective Courses</p> <p>21961 - ASTROPHYSICS - LABORATORY (1 Semester - 6 ECTS)</p> <p>21963 - PHYSICS OF COMPLEX SYSTEMS (1 Semester - 6 ECTS)</p> <p>21960 - QUANTUM THERMODYNAMICS (1 Semester - 6 ECTS)</p> <p>21958 - COMPLEX NETWORKS (1 Semester - 6 ECTS)</p> <p>21957 - GAUGE THEORIES AND STANDARD MODEL (1 Semester - 6 ECTS)</p> <p>21951 - APPLIED PHYSICS TECHNIQUES AND EQUIPMENT (1 Semester - 6 ECTS)</p> <p>21956 - STELLAR EVOLUTION (1 Semester - 6 ECTS)</p> <p>21944 – LABORATORY OF NUCLEAR AND SUBNUCLEAR PHYSICS (1 Semester – 6 ECTS)</p>	<p>Stellar structure and evolution (1 semester – 7 ECTS)</p> <p>Observational techniques using the Nordic Optical telescope (1 semester – 7 ECTS)</p> <p>High energy astrophysics (1 semester – 8 ECTS)</p> <p>Space physics (1 semester – 5 ECTS)</p> <p>Observational astronomy (1 semester – 5 ECTS)</p> <p>Data analysis and knowledge discovery (1 semester – 5 ECTS)</p> <p>Hydrodynamics (1 semester – 5 ECTS)</p> <p>Statistical Methods (1 semester – 5 ECTS)</p>



**The original list of courses of Annex 1.3:**

**Annex 1.3 List of courses and other curricular activities that students enrolled in the double degree programme between the “Master degree in Physics” at UNIPA and the Master degree in “Physical and Chemical Sciences: Materials Physics” at UTU can select to obtain at least the equivalent of 30 ECTS during the stay at host university, 21 October 2021.**

<p style="text-align: center;">UNIPA <b>Laurea Magistrale in Fisica</b></p> <p>Academic Year 2022-2023 (cohort 2021-2022) Academic Year 2024-2025 (cohort 2023-2024) Academic Year 2026-2027 (cohort 2025-2026)</p>	<p style="text-align: center;">UTU <b>Master degree in “Physical and Chemical Sciences: Materials Physics”</b></p> <p>Academic Year 2022-2023 (cohort 2021-2022) Academic Year 2024-2025 (cohort 2023-2024) Academic Year 2026-2027 (cohort 2025-2026)</p>
<p style="text-align: center;">Thematic Courses</p> <p>22018 – COMPUTATIONAL PHYSICS WITH LABORATORY (1 Semester – 6 ECTS)</p> <p>22021 - STRUCTURE OF MATTER - ADVANCED COURSE (1 Semester - 6 ECTS)</p> <p>22022 - BIOPHYSICS (1 Semester - 6 ECTS)</p>	<p>Structural and thermal properties of solids (1 semester – 5 ECTS)</p> <p>Magnetism and spintronics (1 semester – 5 ECTS)</p> <p>Molecular electron structure theory (1 semester – 5 ECTS)</p>
<p style="text-align: center;">Elective Courses</p> <p>21960 - QUANTUM THERMODYNAMICS (1 Semester - 6 ECTS)</p> <p>21951 - APPLIED PHYSICS TECHNIQUES AND EQUIPMENT (1 Semester - 6 ECTS)</p> <p>21962 - NANO-PARTICLES AND NANO-STRUCTURES (1 Semester - 6 ECTS)</p> <p>21959 - BIOSYSTEMS PHYSICS WITH LABORATORY (1 Semester - 6 ECTS)</p>	<p>Physics of nanostructures (1 semester – 5 ECTS)</p> <p>Molecular symmetry and spectroscopy (1 semester – 5 ECTS)</p> <p>Acquisition and analysis of biosignals (1 semester – 5 ECTS)</p> <p>Data analysis and knowledge discovery (1 semester – 5 ECTS)</p>

**The updated list of courses of Annex 1.3:**

**Annex 1.3 List of courses and other curricular activities that students enrolled in the double degree programme between the “Master degree in Physics” at UNIPA and the Master degree in “Physical and Chemical Sciences: Materials Physics” at UTU can select to obtain at least the equivalent of 30 ECTS during the stay at host university, 21 October 2021.**

<p style="text-align: center;"><b>UNIPA</b> <b>Laurea Magistrale in Fisica</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>	<p style="text-align: center;"><b>UTU</b> <b>Master degree in “Physical and Chemical Sciences: Materials Physics”</b></p> <p><b>Academic Year 2022-2023 (cohort 2021-2022)</b> <b>Academic Year 2024-2025 (cohort 2023-2024)</b> <b>Academic Year 2026-2027 (cohort 2025-2026)</b></p>
<p style="text-align: center;">Thematic Courses</p> <p>22018 – COMPUTATIONAL PHYSICS WITH LABORATORY (1 Semester – 6 ECTS)</p> <p>22021 - STRUCTURE OF MATTER - ADVANCED COURSE (1 Semester - 6 ECTS)</p> <p>22022 - BIOPHYSICS (1 Semester - 6 ECTS)</p>	<p>Structural and thermal properties of solids (1 semester – 5 ECTS)</p> <p>Magnetism and spintronics (1 semester – 5 ECTS)</p> <p>Molecular electron structure theory (1 semester – 5 ECTS)</p>
<p style="text-align: center;">Elective Courses</p> <p>21960 - QUANTUM THERMODYNAMICS (1 Semester - 6 ECTS)</p> <p>21951 - APPLIED PHYSICS TECHNIQUES AND EQUIPMENT (1 Semester - 6 ECTS)</p> <p>21962 - NANO-PARTICLES AND NANO-STRUCTURES (1 Semester - 6 ECTS)</p> <p>21959 - BIOSYSTEMS PHYSICS WITH LABORATORY (1 Semester - 6 ECTS)</p>	<p>Physics of nanostructures (1 semester – 5 ECTS)</p> <p>Molecular symmetry and spectroscopy (1 semester – 5 ECTS)</p> <p>Acquisition and analysis of biosignals (1 semester – 5 ECTS)</p> <p>Data analysis and knowledge discovery (1 semester – 5 ECTS)</p> <p>Hydrodynamics (1 semester – 5 ECTS)</p>



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**Petriina Paturi**

professori

Turun yliopisto

Organisaation varmentama (UTU käyttäjätunnus)  
Certified by organization (UTU user account)

*Organisaation varmentama*