Ref. Ares(2023)5773450 - 24/08/2023
Co-funded by the Horizon 2020 programme
of the European Union

EMME-CARE

EASTERN MEDITERRANEAN MIDDLE EAST – CLIMATE & ATMOSPHERE RESEARCH CENTRE

HORIZON 2020 – WIDESPREAD-2018-01-TEAMINGPHASE2
EMME-CARE | GRANT NO. 856612

Deliverable 3.3
Report on the curriculum of the new/upgraded educational programmes

August 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 856612 and the Cyprus Government

Deliverable Number	Deliverable Title	Lead Beneficiary	Type	Dissemination Level	Due Date (in months)
D3.3	Report on the curriculum of the new/upgraded educational programmes	4 – UHEL	Report	Public	M48

Version	Date	Changed page(s)	Cause of change	Partner
V1	22/06/2023	Initial version		UHEL
V2	August 2023	Final version	Final review by EMME-CARE coordination	CyI

Disclaimer: The information in this document is subject to change without notice. Company or product names mentioned in this document may be trademarks or registered trademarks of their respective companies.

Contents

Introduction

The CARE-C Centre of Excellence established on 1st of January 2020 under the Grant Agreement of the **"Eastern Mediterranean Middle East – Climate and Atmosphere Research"** Project (*EMME-CARE, H2020 GA no.856612*) provides scientific, technological and policy solutions through the establishment of a world-class Center of Excellence focusing on environmental challenges.

The **Deliverable D3.3**. at hand, as per the GA, represents the ***"Report on the curriculum of the new/upgraded educational programmes"***, outlining the status of the CARE-C CoE activities in regards to **Task 3.2** led by UH, as detailed below which summarizes the structure of **WP3**.

Task 3.1. Efficient Support from the Education & Training Office (Lead: CyI) (M6 to M24)
This Task was completed with the submission of **Deliverable D3.1** "***Report on the functions of the Education and Training Office***" (submitted in **M12**)

Task 3.2. Upgraded Master and Doctoral Programmes in Environmental Sciences (Lead: UH) (M6 to M48)
The Advanced Partners in collaboration with the CyI Graduate School will:
a. Design courses in relation to the new R&D activities of the CoE's departments (**M18**).
b. Launch a highly attractive regional master programme focusing on UN Sustainable Development Goals relevant for the region (**M48**).

Task 3.3. Leverage Mobility Programmes to engage regional talents (Lead: UH) (M6 to M84)
The first part of this **Task 3.3** was reported in **Deliverable D3.2** "***Mid-term Report on the scholarship and mobility programmes***" (submitted in **M42**).
he second and final report on this Task will be on M84 as **Deliverable D3.5** "***Final Report on the scholarship and mobility programmes***".

Task 3.4. New Open Education Resources for Cyprus and the EMME (Lead: CyI) (M24 to M84)
This last Task of WP3 will be reported in **Deliverable D3.4** "***Report on the content of the open education and training courses***" on M60.

In the following **Deliverable D3.3.** is structured as and reports on the achievement of **Task 3.2a** and **Task 3.2b.**

1. Courses designed in relation to the new R&D activities of the CoE's departments (Task 3.2.a)

1.1. Upgrades in the EAS doctoral program

The Doctoral Program in Energy, Environment and Atmospheric Sciences (EAS; https://www.cyi.ac.cy/index.php/education/phd-programs/energy-environment-and-atmospheric-sciences/phd-eas-program-overview.html) of the CyI Graduate School was **successfully re-accredited by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CYQAA) in October 2020 (M12).**

The re-accreditation process offered the opportunity to enrich the PhD program with more courses on climate and atmospheric sciences (from the Environmental Sciences Master's program) and to update the current courses in order to make the whole curriculum better aligned with the R&D activities of the CARE-C. Courses that were added are:

- Fundamentals of Atmospheric Physics and Meteorology
- Climatology, Atmospheric Chemistry and Biology
- Atmospheric Measurement Techniques
- Dynamic Meteorology
- Synoptic Meteorology
- Atmospheric Modelling
- Hydrology and the Atmosphere-Water Cycle
- Aerosol Physics and Chemistry
- Climate Change: Concepts and Perspectives.

A full description of the curriculum of the re-accredited EAS doctoral program is reported in **Annex 3**.

Another major upgrade of the EAS doctoral program is an **integrated curriculum**; doctoral students have the opportunity to select elective courses from an exciting interdisciplinary pool of advanced and specific courses which are part of both the PhD and the Master's curricula and span across all thematic areas of the programs offered by the school. Namely

- MSc program in "*Environmental Sciences*" (https://www.cyi.ac.cy/index.php/education/masters-programs/environmental-sciences/masters-es-program-overview.html)
- MSc program in "*Simulation and Data Science*" (https://www.cyi.ac.cy/index.php/education/masters-programs/simulation-and-data-sciences/masters-sds-program-overview.html)
- MSc program in "*Digital Cultural Heritage*" (https://www.cyi.ac.cy/index.php/education/masters-programs/digital-cultural-heritage/masters-dch-program-overview.html)
- PhD program in "*Energy, Environment and Atmospheric Sciences*" (see above)
- PhD program in "*Computational Sciences*" (https://www.cyi.ac.cy/index.php/education/phd-programs/computational-sciences/phd-cos-program-overview.html)
- PhD program in *"Science & Technology in Cultural Heritage"* (https://www.cyi.ac.cy/index.php/education/phd-programs/science-and-technology-in-cultural-heritage/program-overview.html)

Allowing cross-registration between programs of studies provides students with the opportunity to access a wider variety of subjects and promotes interdisciplinarity. The re-accredited program has been offered at CyI since Spring Semester of 2020-2021.

The program received excellent feedback from the external evaluation committee. These courses were enriched in 2021 with additional scientific content taught by the recently recruited CARE-C Faculty to better cover

- the carbon cycle with a focus on GHG
- Reactive Gases (VOCs), and
- Remote Sensing techniques to probe the atmosphere.

1.2 Upgrades in the ES master's program

The current MSc/MPhil curriculum "Environmental Sciences" (ES) is detailed in **Annex 1**.
This MSc/MPhil was revised for the application for the program's re-accreditation, and submitted to the Cyprus Agency of Quality Assurance and Accreditation in Higher Education CYQAA in June 2022. As of today (August 2023), the evaluation of the application is still pending (i.e. under process by the CYQAA) and therefore will not be implemented before the Academic year 2024-2025.

The ES MSc/MPhil curriculum was revised to better align with the **UN Sustainable Development Goals relevant for the EMME region,** which is the objective of **Task 3.2.b** (see below **Section 2**)**.**

In addition, the inclusion of more fields in the program within the subject of environmental sciences is fully aligned with the mission of CyI to act as the scientific coordinator of the Cyprus Government's Climate Change Initiative, EMME-CCI (https://emme-cci.org/) (see more details in **Deliverable D7.6**) which aims at the development of a Regional Action Plan to address the specific needs and challenges countries are facing in the EMME region, to address and ameliorate the impact of climate change and advance mitigation actions in accordance with the Paris Agreement.

The establishment of the program is also in accordance with the EU's priorities and the Green Deal. Significant updates of the program include the addition of two more tracks to the already established Meteorology and Atmospheric Sciences Track: one in Water Sciences and one in Sustainable Energy.

2. A regional master programme focusing on UN Sustainable Development Goals relevant for the region (Task 3.2.b)

Instead of launching a new regional Master's programme focusing on UN SDGs relevant for the EMME region, it was decided that it would be simpler and more sustainable to further upgrade/develop the existing Environmental Sciences (ES) Master's programme of the CyI Graduate School towards the aims of the regional joint programme that was planned earlier.

This was achieved through the application for the re-accreditation of the programme, that was submitted to CYQAA in June 2022 (see **Section 1.2** above). The evaluation of the application is pending. More specifically, the ES MSc/MPhil curriculum was revised to better align with the UN Sustainable Development Goals relevant for the EMME region.

UN SDGs addressed in the new MSc/MPhil cover as much as **6 UN SDGs which are particularly relevant to the EMME region** (circled in **blue** in the Figure above)

1. Atmospheric & Climate Sciences (related to SDG #13)
2. Hydrology and Terrestrial Ecosystems (related to SDG #6 and #15)
3. Sustainable Built Environment (related to SDG#11)
4. Renewable Energy (related to SDG#7)
5. Multi-disciplinary / integrated curriculum (related to SDG #4)

A detailed and comprehensive description of this new Master is presented in **Annex 2**.

Annex 1: Current ES MSc/MPhil curriculum

Environmental Sciences MSc/MPhil Curriculum 2018-2023

Our environment is being challenged in numerous ways due to pollution, global warming, overpopulation, natural resource and ozone depletion. The Environmental Sciences program involves two specialization tracks, each dealing with important aspects of the field and aiming to shed light on and address the aforementioned challenges. Students who enrol in the program will select one of the following two tracks:

The **Atmospheric Sciences Track** addresses the basic physical processes involved in maintaining the global circulation of the atmosphere and the surface climate; weather and climate models to understand the governing physical principles and their use for climate and weather prediction purposes; the principles of atmospheric chemistry and biology; the factors controlling air quality and the techniques used for air pollution control; the major air pollution sources and methods for measurement, data collection and analysis of atmospheric samples.

The **Meteorology Track** addresses subjects in Meteorology and Climatology with the aim to equip students with the weather and climate knowledge and skills necessary in weather forecasting, agrometeorology, hydrometeorology, biometeorology, aviation meteorology, renewable energy resources, marine meteorology, climate change and its impacts assessment etc. Moreover, students complete a Basic Instruction Package as required by the World Meteorological Organization, including Physical Meteorology, Dynamic Meteorology, Synoptic and Mesoscale Meteorology and Climatology.

DEGREE OPTIONS

The program offers two degree options: an MSc and an MSc/MPhil. The MSc caters to students interested in pursuing a more professional focus, while the MSc/MPhil is intended for students that want to pursue a research career thus offering a more enhanced research component.

The program also offers two tracks (Atmospheric Sciences and Meteorology) and students who enrol in the program must select one of the two tracks. See section above for more information.

The program is accredited by The Cyprus Agency of Quality Assurance and Accreditation in Higher Education. The language of instruction and communication of The Cyprus Institute is English.

MSc in Environmental Sciences

The MSc is a 90 ECTS, 12-month program. During the first two terms, students take courses. Students are also required to complete a research project which is assessed through a report and viva at the end of the program.

MSc/MPhil in Environmental Sciences

The MSc/MPhil is a 120 ECTS, 18-month program. During the first two terms, students take courses. Students are also required to complete an extensive research project which is assessed through a Master's thesis and a viva at the end of the program.

Program Structure and Requirements

MSc Degree	MSc / MPhil Degree
Term 1 /Fall Semester 1 Mandatory Course, 1 Track Mandatory Course, 1 Elective Course: 30 ECTS	**Term 1 / Fall Semester** 1 Mandatory Course, 1 Track Mandatory Course, 1 Elective Course: 30 ECTS
Term 2 / Spring Semester 1 Mandatory Course, 1 Track Mandatory Course, 1 Elective Course: 30 ECTS	**Term 2 / Spring Semester** 1 Mandatory Course, 1 Track Mandatory Course, 1 Elective Course: 30 ECTS
Term 3 / Summer Period Research Project including submission of Research Project and Viva*	**Term 3 / Summer Period** Thesis Research
	Term 4 / Fall Semester Thesis Research
	Term 5 / Spring Semester Thesis Research including submission of Master's Thesis and Viva*
*The Research Project or Thesis can start earlier following a discussion and the approval of the Supervisor.	

Program Courses

Mandatory Courses		ECTS
ES 401	Fundamentals of Atmospheric Physics and Meteorology	10
ES 402	Climatology	10
Track Mandatory Courses		
ES 406	Atmospheric Chemistry and Biology (AST)	10
ES 407	Atmospheric Measurement Techniques (AST)	10
ES 408	Dynamic Meteorology (MT)	10
ES 409	Synoptic Meteorology (MT)	10
Elective Courses		
ES 416	Atmospheric Modelling	10
ES 417	Hydrology and the Atmospheric- Water Cycle	10
ES 418	Aerosol Physics and Chemistry	10
ES 419	Climate Change: Concepts and Perspectives	10

AST: Atmospheric Sciences Track, MT: Meteorology Track
Track option selection is defined by the selection of track mandatory courses at the beginning of the program.

Students who continue on to a PhD at The Cyprus Institute may have certain course requirements waived.
The Cyprus Institute Graduate School reserves the right to make any changes to the program upon approval of the Ministry of Education, Culture, Sport and Youth.

Annex 2: Revised ES MSc/MPhil curriculum submitted for the program's re-accreditation in June 2022 (evaluation pending)

MSc in Environmental Sciences / MPhil in Environmental Sciences

1. Program's purpose and objectives

The program promotes research excellence and educates students on the scientific frontiers and advanced methodologies at the vanguard of interconnected issues related to Meteorology and Atmospheric Sciences, Water Sciences, Energy and Sustainability. The challenging curricula includes core subjects aiming to build a common basis among students from different disciplines as well as a wide number of electives that provide insight into a variety of more specialized topics. The program is offered by The Cyprus Institute (CyI) Graduate School and it is centered around the Research and Innovation activities of two of its four Research Centres: the Climate and Atmosphere Research Centre (CARE-C), and the Energy, Environment and Water Research Centre (EEWRC), both of which are internationally recognized centres addressing important interdisciplinary scientific and technological issues on regional problems of global significance.

The Environmental Sciences program has three tracks: **"Meteorology and Atmospheric Sciences Track (MAT)**", "**Water Sciences Track (WST)**" and **"Sustainable Energy Track (SET)**".

The Meteorology and Atmospheric Sciences Track is a research-based interdisciplinary track intended to enable students to grow within their field throughout their scientific career, to recognize and understand new concepts, and to master new procedures as these emerge from the most recent and recognized literature. Achievement of this objective requires that students understand the basic principles of atmospheric physics and chemistry, meteorology, the factors controlling air quality and climate change, and the techniques used for air pollution control. The MPhil dissertation is intended for the students who wish to pursue a research career in the Atmospheric and Climate Sciences and students who wish to later pursue a PhD degree.

Specifically designed elective courses offered in the Meteorology and Atmospheric Sciences Track aim to train the next generation of scientists seeking a professional career in Meteorology; these courses cover all topics (not covered by the core courses) required for professionals employed in national departments of meteorology as prescribed by the World Meteorological Office (WMO). These are now fully aligned with the planned revised syllabus for the Basic Instruction Package in Meteorology (BIP-M) (http://library.wmo.int/opac/doc_num.php?explnum_id=3129; see pages 28-30). The WMO sets the recommended qualification requirements for professionals working in the Meteorological Services of its member countries. More specifically, the professional staff are encouraged to undergo an officially recognized academic level course of instruction in Meteorology that will include the "BIP-M as this is determined by the WMO. All countries are encouraged to implement this requirement both for their existing, and also for their future staff. Moreover, the WMO has made the BIP-M **compulsory** for the Aeronautical Meteorological Forecasters (AFM). Non-compliance of the AFM with the BIP-M implies certain penalties and sanctions, like stopping them for providing services to aviation. A great advantage of the MSc MAT is that it will satisfy the needs for qualified professional scientific personnel in the Department of Meteorology of Cyprus as well as the needs of other Meteorological Services in our region.

The Water Sciences Track aims to provide knowledge on the hydrologic cycle, hydrologic processes and water quality, nurturing the capacity to apply hydrologic field and laboratory equipment and models to measure and model hydrologic processes. It will also equip the students with the necessary tools to operate professionally in a rapidly changing world affected by water scarcity and climate change, with

increasing floods and droughts. The students will obtain theoretical and practical insights in integrated water resources, planning and management, hydrodiplomacy and the water-energy-food-ecosystems (WEFE) nexus. Students can learn to design hydraulic structures, apply environmental valuation techniques and cost-benefit analyses or obtain a solid understanding of terrestrial ecosystem processes and their interactions with the environment. The program uses interdisciplinary frameworks to build a new generation of water scientists and professionals, trained to work on sustainable water and natural resources management and the development of climate adaptation options.

The Sustainable Energy Track uses the concept of sustainability with a focus on built environment, energy systems and resource economics in order to (1) support the sustainable transition toward carbon-neutral energy systems and communities by acquiring knowledge, tools, and skills to assess the potential of energy use reduction and renewable energy integration to support the prosperity of thriving societies; (2) frame an understanding of the built environment at the community and individual building level by investigating the interaction between the urban and the natural systems and provide students with insights on the role of technical and non-technical matters (economic, social, ecological, ethical, philosophical, political, psychological, cultural) in shaping architectural, urban and engineering decisions; (3) introduce policies to manage energy resources in a world constrained by finite natural resources and global climate change and equips students with advanced knowledge of energy and environmental topics and calculation methods, in combination with knowledge of economic principles in order to address energy and environmental management issues at different scales – local, national and global level; (4) introduce students to the visualization of complex phenomena, such as the impact of natural and artificial agents to the built environment, in order to understand how the performance of the latter is the result of its integration in an emergent system of parameters.

2. Program Structure

The revised program is the comprehensive development, enrichment and enhancement of the successful MSc/MPhil in Environmental Sciences, which has been running for about 4 years. The aim of the re-accreditation application by The CyI Graduate School is the consolidation and optimization of the success and achievements of the already running Master's program, and, at the same time, the implementation of a number of updates to better align the program with the UN Sustainable Development Goals relevant for the EMME region.

Significant updates of the program include the addition of two more tracks to the already established Meteorology and Atmospheric Sciences Track: one in Water Sciences and one in Sustainable Energy.

Furthermore, the inclusion of more fields in the program within the subject of environmental sciences is fully aligned with the mission of CyI to act as the scientific coordinator of the Cyprus Government's Climate Change Initiative which aims at the development of a Regional Action Plan to address the specific needs and challenges countries are facing in the EMME region, to address and ameliorate the impact of climate change and advance mitigation actions in accordance with the Paris Agreement. Other than that, the establishment of the program is in accordance with the EU's priorities and the Green Deal.

Additionally, aligned with the research profile of the institute, the taught component of the program is reduced by 10 ECTS and a new scheme including a mandatory internship is used. The internship can be either internal in one of the institute's labs or external in the industry (private/public sector). External internships contribute to the educational portfolio of the program, since they help students in acquiring knowledge of the industry's operations and in developing the spirit of innovative and critical thinking. The internships are developed as leverage on already established partnerships of the institute and they contribute to the technological and industrial exposure of the students towards a well-rounded training. The external internships also contribute to the enhancement of the links between the program and the industry and through these, the opportunities for employment of the students in these organizations are

maximized. Internal internships offer students the opportunity to interact with more than one research group at CyI and experience research work in more than one lab. In cases where the internship will be carried out in the lab or with the research group directly connected with the students' research project, this will allow students more time to work and focus on their research project.

Apart from the introduction of the mandatory internship, in an effort towards enhancing the research component of the program, all the courses have an increased practical part with hands-on training.

The re-accredited program is additionally serving as the perfect lobby for students wishing to enroll to the PhD program in Energy, Environment and Atmospheric Sciences of the CyI Graduate School. Through the integrated curriculum which was achieved with the re-accreditation of the school's doctoral programs in 2020, doctoral students at the CyI Graduate School have the opportunity to select elective courses from an exciting interdisciplinary pool of advanced and specific courses which are part of the Master's curricula and span across all thematic areas of the programs offered by the school. Framed within the established Science and Technology focus of the CyI's Graduate School, this cross-registration approach is applied to all three doctoral programs offered. Therefore, all doctoral students have the opportunity to access and attend any of the courses offered in the three Master's programs as well as in the rest of the doctoral programs. Allowing cross-registration between programs of studies provides students with the opportunity to access a wider variety of subjects and promotes interdisciplinarity. Therefore, in practice, a student who completes the Environmental Sciences Master's program and continues to study for the EAS doctoral program would have to attend only the mandatory course, since the elective course requirements would be completed in the Master's studies.

The program offers two degree options: the MSc in Environmental Sciences (90 ECTS / 1 year) and the MPhil in Environmental Sciences (120 ECTS / 1.5 years). The MPhil offers a more enhanced research component.

The program also involves three specialization tracks, each dealing with important aspects of the field and aiming to shed light on and address the challenges our environment is dealing with. As stated above, students have the option to select one of the following three tracks: **"Meteorology and Atmospheric Sciences Track (MAT)**", "**Water Sciences Track (WST)**" and **"Sustainable Energy Track (SET)**".

The curriculum is structured in a way that allows students to attend courses from a selected track and at the same time attend courses from different domains, which enforces interdisciplinarity.

In order for a track to be assigned, the students have to earn a minimum of 24 ECTS from related courses and a related internship. If this requirement is not fulfilled, no track will be assigned. The selection of courses will be done by the students in consultation with their mentor, especially when the selection involves courses from different tracks. The internship's workplace (either internally or externally) must be chosen by the students upon consultation with their mentor and the allocation of each internship to a specific track is the responsibility of the mentor based on the profile of the host organization and the duties assigned to the student. The selected track will only appear on the diploma supplement and transcript.

Two of the courses offered in the curriculum do not belong to any of the tracks (ES 425 Innovation for Sustainable Development and ES 426 Environmental Economics). These courses will provide students with horizontal skills and knowledge on environmental sciences and a competitive advantage once entering the job market.

MSc Program (90 ECTS / 1 year)
The MSc program is a one-year program. During the first two semesters (Fall and Spring), students earn 50 ECTS through courses, and 10 ECTS through one mandatory internship.

First (Fall) Semester	Students select and attend three core courses (30 ECTS) which provide them with an overall overview in the field of Environmental Sciences, and familiarize them with the three tracks.
Second (Spring) Semester	Students take elective courses (20 ECTS) and one mandatory internship (10 ECTS) either internally in one of the institute's labs or externally in the industry (private/public sector), giving them the opportunity to design their study program in consultation with their mentor.
Summer term	Students earn an additional 15 ECTS while working on their Master's research project.
Final four-week Fall term	Students complete their program while working on their Master's research project which is submitted in the form of a written Master's thesis and is defended earning 15 ECTS.
MPhil Program (120 ECTS / 1.5 years)	
The MPhil is a one-and-a-half-year program. During the first two semesters (Fall and Spring), students earn 50 ECTS through courses and 10 ECTS through one mandatory internship.	
First (Fall) Semester	Students select and attend three core courses (30 ECTS) which provide them with an overall overview in the field of Environmental Sciences, and familiarize them with the three tracks.
Second (Spring) Semester	Students take elective courses (20 ECTS) and one mandatory internship (10 ECTS) either internally in one of the institute's labs or externally in the industry (private/public sector), giving them the opportunity to design their study program in consultation with their mentor.
Summer term	Students earn an additional 15 ECTS while working on their Master's research project
Final four-week Fall term	Students earn an additional 30 ECTS while working on their Master's research project.
Final eight-week Spring term	Students complete their program while working on their Master's research project which is submitted in the form of a written Master's dissertation and is defended earning 15 ECTS.

Transferrable Skills courses: A series of transferable skills courses (with small class size) is organized every year and is open to all students of the school. These courses are offered by CyI professionals and faculty with proven experience in specific fields. Professionals and faculty from abroad and the local community with relevant expertise may also be invited to offer courses. Topics include, but are not limited to, scientific writing, scientific communication, proposal writing, project management, research ethics, innovation and entrepreneurship, etc. Transferable skills courses offer the opportunity to students for further development and provide them with a broad education, well-rounded training and horizontal skills. They allow students to further acquire a variety of transferable skills enabling them to become more competitive for the job market as graduates. Students who attend and fulfill the requirements of the courses (attendance and assessment) earn ECTS over and above their degree requirements. A certificate is issued upon completion of the courses.

A particular strength of the program is the requirement for students to regularly participate in the seminars and colloquia series at CyI, exposing them to a wide range of in-depth scientific approaches within their wider field of research, and beyond https://www.cyi.ac.cy/index.php/cyi-events.html.

Colloquia: The institute offers colloquia provided by both its own staff as well as scientists from other institutions in Cyprus or abroad. The colloquia are generally broad in content. All CyI students are strongly encouraged to attend, regardless of your field of study, and may be asked to submit a report upon the completion of the colloquium. Colloquia are also open to the public.

Specialized Seminars: Specialized seminars are offered in specific fields and they are highly focused in content. Students are strongly encouraged to attend and may be asked to submit a report upon the completion of the seminar.

Students' Club: The students benefit from a bi-weekly scheme that incorporates both Research Updates and Journal Clubs provided by the PhD students of the school with the participation, as audience, of all Master's and doctoral students. The scheme offers an opportunity to the students to familiarize themselves with the research of fellow students and promote interdisciplinarity which is the core element of our school. Last but not least, this is an occasion for socializing since after the end of the presentations and the discussion, snacks and drinks are provided for all students attending.

Program Structure and Requirements		
	Course Requirements	**ECTS**
First (Fall) Semester	3 core courses	30 (10 per course)
Second (Spring) Semester	Elective courses	20
	1 Mandatory internship	10
Summer Term	Master's research project	15
Final four-week Fall term for MSc / Second (Fall) Semester for MPhil	Master's research project	15 for MSc 30 for MPhil
Final eight-week Spring term for MPhil	Master's research project	15
	Total	**90 for MSc** **120 for MPhil**

A/A	**Course type**	**Course title**	**Course code**	**Periods per week**	**Period duration**	**Number of weeks per semester**	**Total periods/ Semester**	**Number of ECTS**
1st Semester								
1.	C	Fundamentals of Atmosphere and Climate (Atmospheric Physics & Chemistry, Climatology)	ES 403	3	1 hour	14	42	10
2.	C	Environmental Hydrology	ES 404	3	1 hour	14	42	10
3.	C	Applied Physics for Sustainable Energy	ES 405	3	1 hour	14	42	10
4.	C	Dynamic Meteorology	ES 408	3	1 hour	14	42	10

2nd Semester								
1.	M/	Internship	ES 430	35	1 hour	2	70	10
2.	E	Weather Systems and Services	ES 409	3	1 hour	14	42	10
3.	E	Atmospheric Measurement Techniques for Gaseous Pollutants	ES 412	3	1 hour	7	21	5
4.	E	Atmospheric Measurement Techniques for Aerosols	ES 413	3	1 hour	7	21	5
5.	E	Atmospheric and Climate Modelling	ES 416	3	1 hour	14	42	10
6.	E	Aerosol Science and Technology	ES 420	3	1 hour	7	21	5
7.	E	Atmospheric Chemistry	ES 421	3	1 hour	7	21	5
8.	E	Integrated Water Resources Planning and Management	ES 422	3	1 hour	7	21	5
9.	E	Hydro-diplomacy and the Nexus	ES 423	3	1 hour	7	21	5
10.	E	Hydraulic Structures Design	ES 427	3	1 hour	7	21	5
11.	E	Terrestrial Ecosystems	EAS 513	3	1 hour	7	21	5
12.	E	Energy and the Built Environment	EAS 518	3	1 hour	7	21	5
13.	E	Energy and Environmental Policy	EAS 522	3	1 hour	7	21	5
14.	E	Interactive Visualisation of the Built Environment	EAS 523	3	1 hour	7	21	5
15.	E	Innovation for Sustainable Development	ES 425	3	1 hour	7	21	5
16.	E	Environmental Economics	ES 426	3	1 hour	7	21	5

Annex 3: EAS PhD curriculum re-accredited in 2020, offered for the first time in Spring Semester 2020-2021

PhD in Energy, Environment and Atmospheric Sciences

The program promotes research excellence and educates students on the scientific frontiers and advanced methodologies at the vanguard of interconnected issues related to Climate and Atmospheric Sciences, Energy, Hydrology, Sustainable Built Environment and Sustainable Policy.

The program encompasses both basic research and the development of technologies and innovations. Particular attention is given to the EMME (Eastern Mediterranean and Middle East) regional background in the context of global climate changes, addressing impacts and possible mitigation and adaptation strategies.

The curriculum includes a mandatory subject aiming to build a common basis among students from different disciplines as well as a number of electives that provide insight into a variety of more specialized important topics. The program is offered by the Institute as a whole but it is centred around the Research and Innovation activities of two of its five Research Centres: The Climate and Atmosphere Research Centre (CARE-C), and the Energy, Environment and Water Research Centre (EEWRC), both internationally recognized centres addressing important interdisciplinary scientific and technological issues on regional problems of global significance. As such, the program will benefit from the participation of EEWRC and CARE-C in large European Research Infrastructures such as EU-ACTRIS (on climate-related atmospheric observations) and EU-SOLARIS (on Concentrated Solar Thermal technologies). It offers international exposure through the active participation of leading world experts from collaborating top research institutions such as the Max Planck Institute for Chemistry (Germany), National Observatory of Athens (Greece), Atomic Energy Commission (CEA, France), and regional universities such as National and Kapodistrian University of Athens (Greece) and Saint Joseph University of Beirut (Lebanon).

A key priority of the program is to expose students to the concept of several United Nation Sustainable Development Goals (UNSDGs) relevant to the EMME region such as climate action, sustainable management of water, affordable and clean energy, sustainable cities and communities. It will also expose the students to a wide spectrum of vertical and transverse priorities of the Smart Specialisation Strategy of Cyprus (S3Cy) providing a unique cross-disciplinary approach to solve critical societal challenges. The cross-sectoral nature of the topics demands interdisciplinary research strategies, which enable particularly innovative PhD research and high-calibre publications.

This is a unique program in Cyprus and the region, which aims at providing students with new scientific knowledge to pursue a research and academic career as well as to equip them with a wide range of practical and transferable hands-on field/laboratory and numerical modelling skills that will offer them an advantage in the competitive job market of the future.

Learning Outcomes

The program is divided into specialized tracks related to the research thrusts of the CARE-C and EEWRC. The learning outcomes for each track include the following:

Climate and Atmospheric Sciences track
• Comprehensive understanding of the basic physical processes involved in maintaining the global circulation of the atmosphere, the working of the weather, and the surface climate. • A deep knowledge of advanced concepts of sustainability and sustainable built environment development using a wide range of methods to (i) identify and select appropriate sustainable solutions to enhance building design and operation; (ii) improve existing technical solutions; and (iii) stimulate critical reasoning. • Introduction to weather and climate models, understanding the governing physical principles and their use for climate and weather prediction purposes. • The principles of atmospheric physics, chemistry, and biology; The major air pollution sources and methods for measurement, data collection and analysis of atmospheric samples. • Familiarization with the history, causes, and perspectives of climate change science and the IPCC program.
Hydrology and Terrestrial Ecosystems track
• Understanding of the distribution and movement of water around the globe, and knowhow to measure and model hydrologic processes and manage water resources • Broad understanding of the interactions between ecosystems and the environment and practical skill in developing and applying equations to describe ecosystems processes.
Sustainable Built Environment track
• A deep knowledge of advanced concepts of sustainability and sustainable built environment development using a wide range of methods to (i) identify and select appropriate sustainable solutions to enhance building design and operation; (ii) improve existing technical solutions; and (iii) stimulate critical reasoning. Familiarization with computer simulation and analysis tools, interactive datavisualization modalities (including spatial and environmental data-driven descriptions), literature and computational resources in order to engage in interdisciplinary activities related to the built environment.
Energy track

- A comprehensive understanding of the fundamentals of Energy Systems Analysis and Modelling in Energy planning, practical knowledge on trend analysis, the use and optimization of various bottom-up and top-down models, and interconnections between energy, land and water.
- Advanced knowledge of energy and environmental topics and calculation methods, in combination with knowledge of economic principles in order to address energy and environmental management issues at different scales – corporate, national and global level.
- A good understanding of the status of the world energy system, the need to transition from the current system to a new world energy system that is much more environmentally friendly and sustainable, and the essential role that energy technologies based on the use of Renewable Energy Sources and particularly Solar Energy will play in this Energy Transition and in the world energy system of the future.
- A good understanding of the status of energy systems based on the use of Renewable Energy Sources and particularly on the status of Concentrating Solar Thermal technologies, which is expected to play a significant role in the Energy Transition of the EMME region.
- A comprehensive understanding of the overall process of designing, modelling and optimizing power plants and other systems based on renewable energy sources, and particularly CST (Concentrating Solar Thermal) systems.
- Practical expertise and know-how regarding the methodologies and computational tools to use in the design, modelling and optimization of CST systems and other renewable energy systems, such as PV power plants or Wind Turbine systems.

Program Structure and Requirements

The PhD in Energy, Environment and Atmospheric Sciences is a full-time, 3-year program, structured in six semesters. It is primarily based on research leading to a written thesis, with taught elements being restricted to the beginning of the program. Students can also apply for a part-time PhD program path which can accommodate students who are employed in a related field.

The language of instruction and communication of the program is English.

To satisfy the requirements of the program, students require a total of 180 ECTS, of which 160 ECTS derive from research and 20 ECTS derive from the taught component. Specifically, 20 ECTS are earned through a mandatory course worth 10 ECTS, taken during the first semester, and through elective course(s) worth 10 ECTS, taken during semesters 1-3. The mandatory course is general and covers the different research activities that are related to the program and the elective course(s) are selected out of a large interdisciplinary pool of advanced and specialized courses. Through the integrated curriculum, doctoral students have the opportunity to select elective courses from an exciting interdisciplinary pool of advanced and specific courses which are part of both the PhD and the Master's curricula and span across all thematic areas of the programs offered by the school. Framed within the established Science and Technology focus of the CyI's Graduate School, this cross-registration approach is applied to all three doctoral programs offered. Therefore, all doctoral students have the opportunity to access and attend any of the courses offered in the three Master's programs as well as in the rest of the doctoral programs. Allowing cross-registration between programs of studies provides students with the opportunity to access a wider variety of subjects and promotes interdisciplinarity.

At the end of the first year, the students need to successfully complete the Advancement to Candidacy Examination. Towards the end of their studies they need to submit their PhD thesis and successfully complete the PhD Defense Examination.

YEAR 1 Fall Semester	YEAR 1 Spring Semester	YEAR 2 Fall Semester	YEAR 2 Spring Semester	YEAR 3 Fall Semester	YEAR 3 Spring Semester
Course Requirements Component (20 ECTS)					
1 Mandatory Course (10 ECTS) taken during Semester 1					
1 or 2 Elective Courses (total 10 ECTS) taken during Semester 1-3					
Research Component (160 ECTS) Research conducted throughout program					
	At end of Year 1 students take **Comprehensive Examination**				At end of program students must pass their **Doctoral Examination***
* Before the student can defend their PhD thesis, they must have successfully completed their **coursework, completed the Comprehensive Examination** and have submitted **two scientific publications (one submitted, one accepted)** in appropriate for each doctoral program international journals.					

Program courses

The list of courses below is not exhaustive. Students will have the option to select elective courses from any one of the other five-degree programs offered by the Graduate School of The Cyprus Institute.

Course Code	Course Name	ECTS	Course Type
EAS 500	Fundamentals, Frontiers, and Methodologies in Environmental Sciences, Renewable Energy and Sustainable Built Environment	10	M
EAS 511	Monitoring and Modelling Terrestrial Ecosystems and Hydrologic Processes	5	E
EAS 513	Terrestrial Ecosystems	5	E

EAS 515	Renewable Energy Sources	5	E
EAS 518	Energy and the Built Environment	5	E
EAS 521	Energy Systems Analysis and Modeling	5	E
EAS 522	Energy and Environmental Policy	5	E
EAS 523	Interactive Visualisation of the Built Environment	5	E
EAS 524	Design, Modeling and Optimisation of CST Power Plants	5	E