



ACG193/3: Aprobación de la solicitud de verificación de la siguiente titulación de Máster Universitario: Master in International Cybersecurity and Cyberintelligence of the University of Granada, University of Minho, University of Padova and Vilnius University.

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Master in International Cybersecurity and Cyberintelligence

**University of Granada
University of Minho
University of Padova
Vilnius University**

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GLOSSARY

Levels: represent a series of sequential steps (a developmental continuum), expressed in terms of a range of generic outcomes, against which typical qualifications can be positioned.

Profile: either the specific (subject) field(s) of learning of a qualification or the broader aggregation of clusters of qualifications or programmes from different fields that share a common emphasis or purpose (e.g. an applied vocational as opposed to more theoretical academic studies).

Cycle: the three sequential levels identified by the Bologna Process (first cycle, second cycle and third cycle) within which all European higher education qualifications are located.

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1. GENERAL OVERVIEW

1.1 INTRODUCTION

The European Universities Initiative

The model of higher education in Europe is changing. At the 2017 Gothenburg Summit, European Union (EU) leaders outlined a vision for education and culture. In its December 2017 conclusions, the European Council urged EU Member States, the Council and the Commission to push forward a number of initiatives, including:

"...Strengthen strategic partnerships across the EU between higher education institutions and encourage the emergence, by 2024, of around twenty "European universities", consisting of networks of universities across the EU that will enable students to obtain a degree by combining studies in several EU countries and contribute to the international competitiveness of these universities."

The Council Conclusions on European Universities (May 2021) reiterated the support for this initiative to achieve:

"...the ambitious vision of an innovative, globally competitive and attractive European Education Area and European Research Area, in full synergy with the European Higher Education Area, contributing to boosting the excellence dimension of higher education, research and innovation, while promoting gender equality, inclusion and equity, enabling smooth and ambitious transnational cooperation between higher education institutions in Europe, and inspiring the transformation of higher education."

The European Universities initiative responds to this need and, based on this call, the initiative is now an integral part of the Erasmus+ 2021-2027 programme. European Universities is also a flagship initiative of the European University Strategy, which sets the ambition to support 60 European universities with more than 500 higher education institutions by mid-2025.

The Arqus European University

The Arqus European University Alliance was formally established in Brussels on 27 November 2018, when the rectors and presidents of the member institutions signed a Memorandum of Understanding¹ in order to strengthen the already existing cooperation links between them.

¹ [Memorandum-understanding signature ceremony in Brussels](#)

Led by the University of Granada, the Arqus Alliance was selected in the Erasmus 2019 call for "European Universities" to receive funding for three years (2019-2022). **Grant agreement for an action with multiple beneficiaries under Erasmus +: European Universities Agreement number 612247** is provided in Annex 3. In the new 2022 call, Arqus has received 14.4 M€ of funding to implement the second phase of its work plan over the next 4 years (2022-2026). The Alliance brings together the universities of Granada, Wroclaw, Graz, Leipzig, Lyon 1, Minho, Padova and Vilnius; eight universities with extensive research experience and deep regional engagement, located in medium-sized cities. Arqus presents itself as a unique inter-university alliance with a presence in almost the entire European geographical area, with more than 330,000 students and 43,000 academics and administrative and service professionals. The Arqus Alliance has also been listed as one of the 5 major transformative projects of the new Strategic Plan 2031 of the coordinating University of Granada.

In addition to responding to the objectives set by the European Commission for University Alliances, Arqus aims specifically to transform European higher education, research and innovation through deep cooperation and progressive integration among its member universities, in pursuit of an equitable and sustainable future for all:

- Educating critical and socially engaged European citizens, prepared for lifelong learning, leaving no one behind.
- Generating excellent, open, challenge-driven, innovative and reflective knowledge.
- Acting as an engaged social and global actor at various levels.
- Breaking down barriers to effective cooperation.

A consortium for the Master in Cybersecurity and Cyberintelligence

In this context, four of the Universities within Arqus: Granada (coordinating University), Minho, Padova and Vilnius, all of them with a wide experience both in research and teaching in the field of cybersecurity, have signed an agreement with the aim of developing a joint degree programme in the field of cybersecurity. The cooperation agreement of the programme consortium is provided in Annex 2.

The study programme aims at qualifying students for a professional career in the cybersecurity field with emphasis in international relations and the cyberintelligence domain. Based on an interdisciplinary and international range of courses, students will acquire capabilities to understand global cybersecurity and cyberintelligence mechanisms and leverage cooperation among international actors.

1.2 BASIC INFORMATION

Full name of the programme:	Master in International Cybersecurity and Cyberintelligence
EQF level:	7 (Master degree)
Degrees awarded:	Master in International Cybersecurity and Cyberintelligence ²
Number of ECTS points:	120 ECTS
ISCED field(s) of study:	0421: Law 0541: Mathematics 0618: Information and Communication Technologies (ICTs) (interdisciplinary) 1039: Security Services

List of the institutions delivering the programme:

Name of the institution	Higher education institution (yes/no)	Degree awarding institution (yes/no)	Role in the consortium (i.e. coordinator etc.)
University of Granada	yes	yes	coordinator
University of Minho	yes	yes	member
University of Padova	yes	yes	member
Vilnius University	yes	yes	member

Legal status of each partner university is provided in their internal documents (see Annex 1).

Accreditation status per institution:

Name of the institution	Relevant External Quality Assurance Agency (if any)	European Approach allowed (yes/no)
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² The awarded degree is set under the coordinating university rules. Name of the degree might be assimilated to another one in partner universities.

University of Granada	ANECA	yes
University of Minho	A3ES	yes
University of Padova	ANVUR	no
Vilnius University	SKVC	yes

1.3. JOINT DESIGN AND DELIVERY

The Master's programme comprises 120 ECTS credits usually taught in English, which corresponds to a regular study period of four semesters or two years, as per the respective regulations governing the partner institutions.

The University of Padova and the University of Minho are in charge of the teaching during the first semester; Vilnius University during the second semester; University of Granada during the third semester; and the last semester is designated for the Master's Thesis, with tutoring from all partners of the consortium, and a Graduation Week, all of these activities organised by the University of Minho.

Mobility

The students will be organised in a cohort that will jointly move around the four universities in the consortium. This way, they will stay:

- at the University of Padova for the first semester (face-to-face classes), and online classes for a single course taught online from the University of Minho.
- at Vilnius university for the second semester (face-to-face classes);
- at the University of Granada for the third semester.

Finally, the fourth semester will be dedicated to Master's Thesis (with remote or local tutoring, as preferred by students), ending with the graduation week to be held face-to-face at the University of Minho.

The master Thesis

The Master Thesis (30 ECTS) is designed as a final exercise capable of evaluating the competences acquired by students over their evolution on the programme. It includes three different activities:

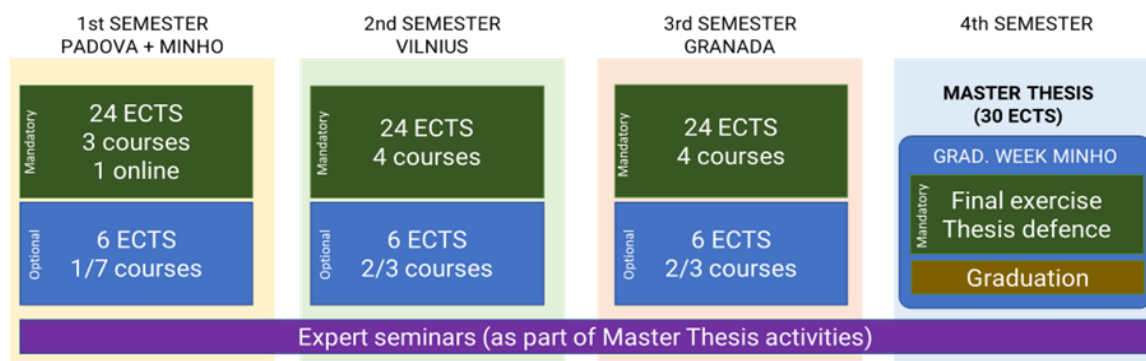
- a) Attendance of (online) seminars held by academic or professional experts in

cybersecurity, cyberintelligence and international relations for cybersecurity. It is expected that these will complement the students' knowledge on recent trends and technologies.

- b) Final practical exercise. This will consist of an *attack - defence* exercise (CTF-like - Capture the Flag exercise) carried out by groups of students competing amongst each other. It will be held during the graduation week in Minho (4th semester).
- c) Thesis work. The thesis is aimed at evaluating students' competence acquisition. Advisors will guide students remotely during the 4th semester.

Overall programme structure

The following diagram presents the overall structure of the programme:



2. LEARNING OUTCOMES

2.1 LEVEL

With the adoption of the so-called Bologna process, European countries adopted a set of common references for the higher education system. Among these references, the Framework for Qualifications in the European Higher Education Area (FQ-EHEA) has made it possible to standardise the organisation of higher education study cycles in Europe. After a period dedicated to the necessary adaptation, the countries that signed the treaty in question committed themselves to adopt and adapt this framework to their national reality, which happened roughly in 2010.

According to that framework, the pedagogical project considered here clearly fits into the **second cycle** (concerning duration and content), requiring that candidates have already obtained the qualifications inherent to the first cycle and leveraging the competencies necessary to support a possible continuation to the third level. Still following the rationale of the framework, in this project, there is a concern to stimulate knowledge and understanding of the fundamentals and main concepts within Cybersecurity, especially in the first semester, where the vast majority of curricular units show learning results aligned with this objective.

From the second semester onwards, a higher level of outcomes becomes evident that promote the application of acquired knowledge in emerging domains. The Cybersecurity body of knowledge is recognized for being quite extensive and based on previous knowledge in several areas, such as Computer Science, Computer Engineering, Management, Sociology and Psychology, and even Law. Therefore, it is common to end up with limited continuum in the level of learning outcomes, not so homogeneous as in more traditional areas. Even so, in the third semester, we tried to concentrate the curricular units addressing topics or application areas of greater complexity, demanding integration of previous knowledge. This strategy fully satisfies the continuum expected on the level of learning outcomes throughout a second cycle project.

List of intended Learning outcomes is provided in Annex 4.

2.2 DISCIPLINARY FIELD

With the widespread use of ICT³ in all human activities, Cybersecurity problems have been increasing. Especially over the last two decades, there has been an evident concern in the strategies to increase the qualified workforce to face these challenges at a national

³ ICT - Information and communications technology

and international level. This effort is also reflected in the study and investigation of the underlying body of knowledge. However, the discipline is new, and there are still many uncertainties regarding the most appropriate model.

In recent years, several initiatives have sought to respond to this need. Due to their consistency, maturity and scope, some deserve special mention: NICE - coordinated by NIST in the USA -, the Joint Task Force (JTF) on Cybersecurity - involving ACM, IEEE, Association for Information Systems Special Interest Group on Security (AIS SIGSEC), and International Federation for Information Processing Technical Committee on Information Security Education (IFIP WG 11.8) Education -, and CyBOK - an initiative led by universities and companies in the UK. All these initiatives developed frameworks that contribute a lot to the curricula coming up worldwide.

Those frameworks are different in focus. NICE's National Cybersecurity Workforce Framework (NCWF) proposes decomposing the cybersecurity field into seven categories, thirty-two functionalities and skill sets, focusing more on technical professional competencies. The JTF on Cybersecurity Education has developed guidelines for undergraduate curricula in Cybersecurity, providing eight principal knowledge areas based on the entities to be protected (data, software, components, connections, systems, humans, organisations, and society), and crosscutting them with fundamental security properties. This proposal can be used to design particular disciplines to integrate into well-established study programs, like Computer Science, or Software Engineering. The Cyber Security Body of Knowledge (CyBOK) project takes a similar approach. However, it aims to design cybersecurity education and training programs at various levels, from secondary and undergraduate to postgraduate and continuing professional development. All frameworks agree on the multidisciplinary nature of the Cybersecurity discipline and the necessity to complement education and training to accomplish the target of preparing an adequate workforce.

The set of courses proposed in this education project clearly covers the areas of knowledge listed in the references briefly mentioned above. Additionally, the descriptions of the learning outcomes highlight the concern for a balance between knowing and understanding the fundamental concepts and knowing how to apply these concepts in practice, stimulating training in Cybersecurity. As such, the program fulfils the current best-known references for curricula development at a post-graduate level.

2.3 ACHIEVEMENT

Looking at the generic skills promoted in this proposal, they are based on knowledge of Cybersecurity fundamentals and application contexts (in particular, ICT) and the provision of Cybersecurity architectures, handling of security events and incidents, operation and

maintenance of controls of security, cybersecurity governance, and protection and defence of threats on Information Systems. All these aspects are approached according to the expected development for a second-level cycle. Given the range of skills, especially in terms of training and its dependence on the student's background, the students may achieve the results differently. For example, one student may explore the operation and maintenance aspect of Cybersecurity in more depth, while another may do it more in Cybersecurity Management. It is essential to distinguish these options and, above all, to support students in their curricular development throughout the course.

Traditionally, knowledge in a given area is effectively assessed by written exams, which are widely used in most subjects in the program. Most of the remaining skills require training, whose assessment is based on performance observation associated with carrying out practical work. This method is also widely used in disciplines that promote cybersecurity technologies and methods training. It is mainly in this dimension that assessment feedback will help students to understand their orientation better.

Cybersecurity is also known for being an area where communication and group work skills are essential. In the first case, especially with professionals whose role is to manage Cybersecurity. In the second case, since the solutions to be adopted are very complex and require the cooperation of teams (a clear example is the network of CSIRTs - Cybersecurity Incidents Response Teams). The assessment of competencies of this nature usually requires participation in projects and activities, classroom discussion, teamwork, and leadership, among other activities. Assessment methods should be flexible, pay attention to the combination of assessment of practical ability and acquired knowledge, at the same time in hands-on off-campus tasks (such as research, technology self-learning, and other operations) and exercises performed inside the classroom. In the characterization of the courses in the proposed program, this concern is expressed in the evaluation methods chosen and which are perfectly adequate. Thus, it sought to ensure the feasibility of the learning results (in an adjusted way) and their evaluation through adjusted methods.

2.4 REGULATED PROFESSIONS

According to some authors, professionalisation occurs when “an occupation” evolves through a formal qualification process (education, training and evaluation) until a supporting social-professional organisation emerges. Other authors defend that there is a profession when there is:

- a well-established BoK (Body of Knowledge);
- a code of ethics; and

- some type of professional organisation that disciplines, regulates or controls professional acts and competencies.

In any of the cases, and despite multiple efforts, under those views we cannot state that there are already well-defined professions related to Cybersecurity. It is also possible to identify some professionalisation evolution models. Those based on knowledge evolution, frequently referred to as attribute-based, follow a more academic development style using public accreditation mechanisms. By its nature, this model usually is not able to respond to fast-development areas like Cybersecurity. The process-based model follows a more holistic approach evolving from an occupation to a profession. Usually, professionals from related areas start to auto-develop new skills that are valued by the labour market. The main concern with this model is the lack of regulation. One last alternative, usually referred to as the dominance-based model, results from the business opportunity exploration of education and training and typically results in professional certifications provided by private companies. In recent years, in the Cybersecurity area, several professional certifications of this type have emerged (e.g., the Certified Information Systems Security Professional - CISSP - provided by ISC2, or the Certified Information Security Manager - CISM - provided by ISACA). Finally, as might be expected, the development of professions can also follow hybrid models partially inspired by any of the above.

In an attempt to standardise the characterization of professions within Europe and, in this way, promote mobility, CE has long sought to create references for professions that involve not only the designation but, above all, the identification of competencies and professional acts. The Professional Qualifications Directive (2005/36/EC) is evidence of these efforts. Adapting this type of reference to the different national realities has proved to be a very complex task. On the other hand, given the scope of the previous directive and the specificity and dynamics of the Cybersecurity area, the strategy associated with directive 2005/36/EC naturally reveals many limitations.

To respond to this emerging need, ENISA, the EU agency for Cybersecurity, has very recently published a document known as the European Cybersecurity Skills Framework Role Profiles. This document describes twelve professions, including, among other characteristics, alternative designations, the necessary knowledge, associated professional acts and basic skills - in this case, linking to another initiative that seeks to categorise skills in the area of ICT, known as European e-Competence Framework (e-CF). Although more focused on recognized professions, the reference produced is not far from similar ones, such as the framework developed by NICE known as NCWF (NICE Cybersecurity Workforce Framework) and based on areas of expertise linked to skills and professions typically associated.

The development of this European-wide pedagogical project succeeded in seeking guidance in the framework developed by ENISA. Mapping this framework to the curricular structure proposed, the learning outcomes and the skills identified show this course aligns quite well with the requirements of the following professions, covering in large the main tasks and the skill set of (generic designations):

- Chief Information Security Officer (CISO)
- Cyber Incident Responder
- Cyber Legal, Policy & Compliance Officer
- Cyber Threat Intelligence Specialist
- Cybersecurity Architect
- Cybersecurity Auditor
- Cybersecurity Educator
- Cybersecurity Implementer
- Cybersecurity Researcher
- Cybersecurity Implementer
- Cybersecurity Risk Manager
- Digital Forensics Investigator
- Penetration Tester

Thus, although each instance requires profiles more or less aligned with the reality of organisations, this master's course contributes to developing professionals whose functions fit the required competencies of the general professionals' tasks listed above.

3. STUDY PROGRAMME

3.1 CURRICULUM

The curriculum is structured into four semesters, for **a total of 12 mandatory classes and 4 optional classes to be chosen among 12. All the course syllabi are provided in Annex 5.**

The core of the curriculum consists of the following **mandatory classes**:

1. Fundamentals of cryptography (I semester, Padova)
2. Digital Forensics (I semester, Padova)
3. Secure software development (I semester, Padova)
4. Fundamentals on international cybersecurity (I semester, Minho)
5. Operating systems security (II semester, Vilnius)
6. Security of applications (II semester, Vilnius)
7. International management of cybersecurity (II semester, Vilnius)
8. Research projects (II semester, Vilnius)
9. Ethical hacking (III semester, Granada)
10. Cyberprotection systems (III semester, Granada)
11. Network security (III semester, Granada)
12. International cyberintelligence (III semester, Granada)

The students will then choose one class among the following **electives in the I semester (Padova)**:

1. Mobile security
2. Cyberphysical and IoT security
3. Machine Learning techniques for event correlation
4. Formal methods for cyberphysical systems
5. Quantum cryptography and security
6. Privacy preserving information access
7. Law and data

one among the following **electives in the II semester (Vilnius)**:

1. Malware
2. Rapid reaction and first response

and finally, two classes among the **electives in the III semester (Granada)**:

1. International cooperation in cyberspace

2. Cyberwarfare
3. Post-quantum cryptography

The **IV semester will be mainly devoted to the thesis work, and writing**. It will be spent by the students as an internship either in a company, or in a research institution.

The programme conclusion will be held at University of Minho with the thesis defence by all students which will be preceded by a team attack-defence practical laboratory exercise.

In the following we will instantiate how the above listed classes will lead the students to achieve the intended learning outcomes.

Clear specific technical skills will be the learning outcome of a series of technical classes, each focused on a specific security context:

1. Digital Forensics
2. Secure software development
3. Operating systems security
4. Security of applications
5. Network security
6. Mobile security
7. Cyberphysical and IoT security

The following classes give the program a strong characterization on the technical, legal, economic, social and international political aspects of cybersecurity and cyberintelligence:

1. Fundamentals on international cybersecurity
2. Law and data
3. Privacy preserving information access
4. International management of cybersecurity
5. International cyberintelligence
6. International cooperation in cyberspace
7. Cyberwarfare

A set of classes will provide specific knowledge and capacity in managing and keeping information security systems and infrastructures, a task which is everyday more strongly welcome by companies:

1. International management of cybersecurity
2. Cyberprotection systems
3. Rapid reaction and first response
4. Ethical hacking
5. Malware

A specific focus on the scientific aspects of cryptography from a rigorous fundamental ground to the more innovative and state of the art solutions is given by the classes:

1. Fundamentals of cryptography
2. Machine learning for event correlation
3. Formal methods for cyberphysical systems
4. Research projects
5. Quantum cryptography and security
6. Post-quantum cryptography

Other classes and activities will provide students with knowledge on the adversarial techniques and give them the abilities to perform consistent assessment of existing security systems and structures:

1. Ethical hacking
2. Malware
3. Practical attack-defence exercise

Finally, all activities will help in building the soft skills that are expected of the program graduates (writing and speaking fluency in technical English, continuous learning and knowledge update, autonomous and group work ethics, leading and decision making capacity, communication abilities), yet some activities will push the students more explicitly along this direction, such as:

1. Research projects
2. Final practical exercise (*attack - defence* teams)
3. Professional seminars

Overview of the curriculum is provided in the Annex 6.

3.2 CREDITS

Each activity is listed in the curriculum with its workload in ECTS. The exact correspondence between ECTS units and classwork or homework hours varies among the partner universities, as follows:

- at Universidad de Granada: 1 ECTS credit corresponds to 25 hours coursework, typically 7 ½ hours classwork + 17 ½ hours homework
- at Università degli Studi di Padova: 1 ECTS credit corresponds to 30 hours coursework, typically 8 hours classwork + 22 hours homework

- at Vilniaus universitetas: 1 ECTS credit corresponds to 26 hours coursework, typically 9,6 hours classwork + 16,4 hours homework
- at Universidade do Minho: 1 ECTS credit corresponds to 28 hours coursework, typically 5 hours classwork + 23 hours homework

For this reason, activities are combined based on their ECTS units. All classes are of 6 ECTS credits, apart from *International cooperation in cyberspace*, *Cyberwarfare*, *Post-quantum cryptography*, each bringing 3 ECTS credits.

The distribution of ECTS credits among the different disciplines is as follows:

- Computer Science and Engineering: at least 42 ECTS
- Telecommunications: at least 9 ECTS
- Economics: at least 9 ECTS
- Mathematics: at least 6 ECTS
- Law: at least 3 ECTS

3.3 WORKLOAD

The total work load for graduation amounts to 120 ECTS credits, divided as follows

- In each of the semesters I, II and III: 24 ECTS of mandatory classes + 6 ECTS of elective classes
- In the IV semester, 6 ECTS will be awarded for the professional and expert seminars that the students have attended during the program, 3 ECTS for the final team exercise, 21 ECTS for the thesis and final defence.

Because all the students in the same year will complete their program at the same time (end of semester IV) it is of paramount importance that they have completed their classes in advance. Students that were not able to pass a class final exam in the corresponding semester, will need to retake the exam in a supplementary session, to be held before graduation. The number of exams taken in the supplementary session as well as the number of students involved will be closely monitored since the first year, as it represents a serious indicator of the program's teaching quality and organisational effectiveness.

4. ADMISSION AND RECOGNITION

4.1. ADMISSION

The programme admission procedures are set and described in detail in the programme consortium agreement (see Annex 2). It is agreed that the programme board will appoint a selection committee with one member per partner university. The minimum and maximum number of students to be accepted into the programme will be agreed annually and confirmed by the programme board. This number will be published on the programme website, which will be developed in presence of the programme under the responsibility of Granada University⁴, where all general information and advice for applicants and current students will be provided.

Students who are willing to study in the programme will apply online. They will be asked to provide the required documents in English by a publicly announced deadline. This deadline will be confirmed by the programme board at the latest in December each year (together with the numbers of students to be accepted). Application procedure will be administered by the coordinating institution (University of Granada). The **University of Granada** will also be responsible for informing applicants of their selection within 12 weeks before the application deadline, with the study program to begin at the start of the following academic year.

Whereas an early schedule is foreseen for the application, students are not required to have finished their Bachelor's degree at the time of application, but it will be mandatory to have a Bachelor's degree at the beginning of the programme at the latest. Graduates willing to apply for the “**International Cybersecurity and Cyberintelligence**” programme should provide consortium with such documents:

- Completed application form
- Copy of ID card / passport
- Bachelor's degree certificate or equivalent (+ English translation). If not available at the time of application, a signed statement with the commitment to submit it before the beginning of the programme will be required.
- Transcript of records / Previous academic performance (containing where possible the average grade obtained).
- Proof of prior (academic or professional) experience (CV), where applicable.
- Motivation letter
- At least 2 recommendation letters from university or employer
- Proof of B2 in English.

⁴ [Master in cybersecurity and cyberintelligence](#)

- Additional information (additional diploma related to the programme, etc.), where appropriate.
- A document that summarises (3 pages maximum) a previous work or a project carried out by the applicant in the field of technology.

Information about required application documents will be publicly available on the programme website⁵.

After the application period, there is a 2-step procedure foreseen for student admission. Applicants should first fulfil the following criteria:

- Minimum accredited level of proficiency in English: B2.
- Bachelor's degree or equivalent
- Accredited Technology Competence, given by any of the following criteria:
 - degree in an IT related programme (e.g., Computer Science, Computer Engineering, Information Systems, Telecommunications, Informatics, Software Engineering) or
 - 2 years of professional experience in an IT related field or
 - equivalence to 3 years of training on IT topics.

It is agreed that the selection committee will collect all applications and will check them in a first step against the minimum criteria described above. After this procedure, successful applicants will be notified about the second phase with an interview.

The details and the schedule for the selection procedure and student interviewing will be agreed by the programme in coordination with the selection committee and will be published on the programme webpage. However, the consortium agreed upon the following criteria to be considered for the second step of the student selection procedure:

- Communication skills
- Expertise in technology
- Motivation for the programme
- Group work ability
- Academic achievements

Selected students will be informed individually about their admission results together with further information regarding their beginning of studies and mobility periods in partner universities.

⁵ [Master in cybersecurity and cyberintelligence](#)

4.2. RECOGNITION

Recognition of student qualifications, periods of study and prior learning, including the recognition of non-formal and informal learning, are essential components for ensuring the students' progress in their studies, while promoting mobility.

The recognition of study performances rendered at the universities of the Arqus Alliance as well as the conversion of the respective grades is carried out by means of the integrated study programme based on the principle of equivalence and in accordance with the Cooperation Agreement for the implementation of the Arqus Joint Masters programme "**International Cybersecurity and Cyberintelligence**".

The recognition of qualifications and of periods of study outside the consortium universities, including recognition of prior learning is in line with the Lisbon Recognition Convention and the respective subsidiary documents. The recognition is based on the learning outcomes, the procedures are described in the examination regulation (5.2 Assessment of students). Regarding the recognition of language skills, it is important to emphasise that English language skills should respond at least to level B2 of the Common European Framework of Reference for Languages (CEFR) or equivalent. This has to be proven in accordance with the institutional regulations and the *Agreement for the automatic recognition of language certificates and language competence assessment at partner universities within the Arqus alliance* (see Annex 12). The latter agreement has been signed by all Arqus partner universities in order to simplify the accreditation of language skills.

Overall, the recognition procedure is coordinated and documented by **the University of Granada**⁶ as a coordinating institution (see Annex 7). The final decision concerning the recognition is, however, taken by the programme board.

⁶ [Recognition of credits | University of Granada](#)

5.LEARNING, TEACHING AND ASSESSMENT

5.1 LEARNING AND TEACHING

There are about 20 differently called study methods used in the courses of study programmes. Some of these methods could be grouped because of similar meaning. Mostly used study methods are: literature reading, information search and analysis, case studies, consultations, discussions, group work, inclusive lectures, laboratory tasks with examples and exercises, preparation and writing of report or some special kind of document, presentation preparation and delivery, problem-based learning, project work, self-assessment and self-study, virtual learning environment.

A variety of methods is used for quality of studies: to present, explain the material in the best way, and to provide students the opportunity to develop competences in simulated real-world situations. First of all, different methods are useful for development of particular generic competences. For example, information search and literature reading improves abilities in abstract thinking. Laboratory tasks with examples enable getting experience in communication and IT technologies. Project work helps to get used to time planning.

Almost all courses are organised in the form of lectures + practice or lectures + laboratory work, and some seminars. In order to increase quality and flexibility of some courses it is implemented joint theoretical lessons with practical work. Such methods enlarge possibilities to better use various study methods, to increase practical learning and learning by doing principles. Also, courses are designed to harbour invited lecturers from public and industry companies.

5.2 ASSESSMENT OF STUDENTS

Assessment of students varies depending on the country/university regulation (all the regulations are provided as Annex 8). Such a view provides an international view for students, ensures diversity and adaptability.

The assessment strategies are presented in all course syllabuses. Lecturers also present the assessment strategies during their first semester lectures and remind the exam assessment strategy during the last lecture. All subjects except the final thesis and the professional practice have an accumulative assessment. Each assessment strategy is worth a particular amount of points in the final evaluation. This assessment policy makes students feel relatively confident and less stressed. The Virtual Learning Environment and online teaching resources that provide technical environments developed by individual university partners enable feedback from the mid-term tasks. The feedback can be provided for each task and each student.

The quality of studies is increased by using an electronic plagiarism detection system. Currently there is no centralised plagiarism detection system for partners to be used, but it is expected that each university partner is capable of detecting and evaluating plagiarism options. All final theses and student reports of the scientific research will be uploaded into the partner university systems and shared over library systems (online).

There are several procedures during the examination to ensure the honest assessment that maintain professors and members of the university community. First of all, all students can enter the examination area only with the student card and the examiner must check the IDs. Then the examiner observes the audience during the exam time and ensures silence (unless the exam is oral and public) and honest work. Students, who are not following the rules, are asked to leave the area. The corresponding Student Unions of each university actively collaborates with professors and their representatives help the examiners to watch the audience in case it is needed.

The exams at the computer (if applicable) require the user name and password for student identification at the university. The student accesses only her own account unless she breaks the rule not to share the personal information. Since student rotation lists are important for student competition, they do not tolerate unfair behaviour between each other.

Also, during some exams the printed material (or notes) is allowed to be used. This strategy helps to avoid cheating too, because students can use their materials and have to prepare the exam tasks based on the information they have. The evaluation marks for students are provided in the information system of each partner university.

After completing all the courses offered by partner universities and defending the final thesis, students will receive a joint diploma (see Annex 11), which will be issued by Granada University.

6. STUDENT SUPPORT

Students admitted to the programme will be informed, consulted and all the necessary support is guaranteed in all levels and forms.

For the questions related to study process, financial support, internship placements, visa and residence permit support, etc. students' queries will be consulted at each partner university. The administrative staff members at each partner university will assure information provision for students via phone, e-mail and live consultations during their working hours.

Career counselling

Students will also have the opportunity to receive advice and support from career consultants such as counselling regarding their priorities and career options, as well as from student buddies (peer-to-peer support). Self-awareness tests and questionnaires, job interview simulations, review of CVs and career seminars will be organised according to student needs. Also, in some partner universities students will be able to find internships and job offers, establish and maintain relationships with future employers, and contact the career specialists by using virtual platforms of the universities (e.g. <https://karjera.lt/> at **Vilnius University**, the Employment and Work Placement Office (CPEP, <https://empleo.ugr.es/>) at the **University of Granada**, Alumni **University of Minho** (<https://alumni.uminho.pt/en>) at University of Minho) or the Career Service at the **University of Padua** (<https://careers.unipd.it/en/>). Furthermore, students will be introduced with the idea to have a mentor (a teacher, an alumni, an organisation or a student), who will be able to advise on career questions.

Alumni network

Also, after graduation, the Alumni Office keeps former students and the University in touch. After leaving university, students are invited to return and (re)experience its vibrant pulse. For example, with the enhancement of its graduates in mind, **Minho University** offers its alumni both information and a variety of services, some of which you can discover through this site.

Upon graduation, students are able to access the Portal Alumni using their current login and password, thus continuing to be part of the UMinho Community. Through the Alumni Office UMinho will: closely follow the professional careers of graduates, in order to optimise the relationship between academic qualifications and the labour market; promote the employability of UMinho graduates by bringing employers into closer contact with recent graduates; foster a sense of identifying with and belonging to the University community, through the involvement of the alumni.

Similar experience is implemented in **Vilnius University**, which has established VU Alumni platform⁷ and is regularly sending the most important news and entertaining information for University graduates. University is offering privileges for all the Alumni related to library, botanical garden, museum and publishing services, also health and sports centre activities and cultural events. Also, in the platform Alumni are encouraged to communicate and share professional knowledge and ideas with other graduates of the University all over the world.

Psychological support

Partner universities will provide students with psychological support in case they have some difficulties related to their studies and/ or life.

- **Vilnius University.** Counselling and training centre⁸ will provide students with the first four individual consultations and the first eight meetings of group counselling free of charge. The centre has its premises in three different parts of Vilnius: VU Faculty of Philosophy (Universiteto St. 9/1), Faculty of Physics (Saulėtekis St. 9) and Faculty of Medicine (M. K. Čiurlionis St. 21). Other forms of counselling (e.g. family counselling and subsequent individual and group counselling) have lower rates (annually approved by the Rector). In case of an urgent consultation need at risk of suicide students will get free consultations (up to 3 times).
- **University of Granada.** The Educational Psychology Office (GPP) and the Unit for Academic Guidance serve the entire academic community and offer information, advice and training about personal, academic and/or vocational-professional dimensions especially to undergraduate and postgraduate students. The latter includes personal counselling, training in study techniques and time planning, help with problems in coping adequately with demanding academic tasks, etc. They also pay attention to the different areas of students' lives that may be affecting their academic performance and personal performance due to problems such as depression, anxiety, stress and personal relationships, among others.
- **University of Padua.** It provides students with Psychological Assistance for Students. They organise free of charge counselling sessions to all the students of the University. A Psychological Assistance Service dedicated to International students is also active, thus counselling and support is possible both: in English and Spanish.⁹

⁷ [VU alumni platform](#)

⁸ [Counseling and training center Vilnius](#)

⁹ [Psychological Assistance for Students | Padova](#)

- **University of Minho.** The University of Minho has a set of services, student support programmes, such as Mentoring UMinho and Peer Tutoring, scholarships and school prizes, as well as various learning support infrastructures.

Students with disabilities

All partner universities implement practices to help students with disabilities. All partners carry out regular analysis and monitoring of the disabled student needs, inclusion policy implementation, also, appropriate study and working conditions assurance:

- **The University of Granada** runs a specific Social Intervention Programme for Students with Disabilities in order to facilitate their integration in academic programmes and the whole university environment and later on the subsequent transition to the labour market. The programme consists mainly of providing human and technical support to students with hearing, visual, physical and/or mobility difficulties, or with Special Educational Needs (SEN), such as parking space in the city centre, adapted transport, adapted furniture, financial assistance for transport, adapted exams (braille, magnified text, alternative formats, time extensions), reserved class-room/exam space, financial assistance for learning/teaching materials, adapted learning materials and other services to ensure fully inclusive education.
- **The University of Minho** has a strong policy for student inclusion and support for disabled students. Thus, besides regular help with study conditions adaptation and financial support, University recently has implemented the project “Helping Students with Learning Disabilities - Dyslexia”¹⁰ in their faculty for Education to equip teachers, tutors and others, who have a duty of care towards dyslexic students, with the ability to teach and support them efficiently, also to create a network of stakeholders at local and regional level for raising awareness about dyslexia and other learning disorders and developing an active attitude in teachers and managers supporting dyslexic individuals as regards access to knowledge and the labour market. At University of Minho, the Nucleus for the Promotion of Inclusion, Student Development and Success aims to support teachers and pedagogical management structures in the definition, monitoring and evaluation of solutions that enhance the development and full success of students, and promote the inclusion of students aiming at equal opportunities.
- **University of Padova** has a great pool of different types of support provided for students:
 - Reception and admissions tests
 - Financial benefits and accommodation

¹⁰ [Students with Learning Disabilities | Minho](#)

- Leisure, sport and volunteering
- International mobility
- Support network
- Support for lesson attendance, individual study and examinations
- Accessibility resources

The University of Padova offers services to encourage the participation of students with disabilities¹¹, such as Buddy service and LIS interpreting and Stenotype service. Also, there is regular support provided for individual students: Inclusion Tutors, Technological aids, Quiet Rooms, Support for exams. By the way, as stated in national laws 17/1999 and 170/2010, University students with disabilities or learning difficulties may request examinations adapted to their needs.

- In order to properly integrate students with various disabilities **Vilnius University** Senate approved the strategy Open University for People with Disabilities in 2017. This strategy represented the long-term commitment of systematic work on equal opportunities for people with disabilities. Vilnius University implements it and puts effort to provide appropriate study opportunities for students with a disability¹² by:
 - providing flexible examination conditions;
 - improving the physical accessibility of the University campus;
 - providing various assistive technologies and equipment, allowing to adjust the study process to individual needs;
 - counselling students and lecturers;
 - if needed, organising seminars and other events on disability for the University community.

In order to ensure proper coordination and implementation of all these activities in the Community Development Department of Vilnius University there is a position of Disability affairs coordinator, who is responsible for the disabled students needs.

Information provision and local coordination

At each partner institution there will be a local coordinator who will be responsible for the implementation and execution of the study programme. They will be students' first contact and ensure timely and adequate support. If required, they will connect the students with the specialised services at their respective universities (from language centres to career services, from mental and psychological support structures to all other health-related institutions as well as services regarding housing, etc.). The students of the “**International Cybersecurity and Cyberintelligence**” programme will also be in continuous contact

¹¹ [Support for lesson attendance, individual study and examinations | Padova](#)

¹² [Studies and Disability_Vilnius](#)

with and be consulted by the programme board and other relevant bodies at the partner universities such as student authorities, professors and teachers of the programme, study offices, departments, etc.

- **The programme board** will consult them regarding study objectives and contents, the choice of electives, individual study plans, etc.
- **Teaching staff members** will consult the students about the study subjects, the corresponding contents and assessment. The teachers will counsel the students individually not only during the face-to-face meetings, but also remotely by e-mail or other tools (e.g. MS Teams, Zoom, etc.). The professors will assist the students with assignments and help to solve other arising difficulties whenever they occur.
- **Departments and study offices** will assist the students mainly with questions related to the study process: exam schedule, tuition and administration fees (if any), elective modules, study regulations, financial support, etc.
- **The local student authorities** will support the students with respect to any academic and social problems that may arise during their stay at the corresponding partner university. They will help them with the administrative procedures, defend their interests and organise social and other events.

Grants

In addition to academic, social, personal and psychological support, all students of the “**International Cybersecurity and Cyberintelligence**” program will be eligible for grants and social benefits just like any other student of the respective partner university. This holds also for state loans and dedicated financial support for students with disabilities. Students will be informed about opportunities for financial support during their very first lectures of the programme at each partner university.

- **At Vilnius University**, students can obtain a one-time grant of up to 630 Euro as well as grants for good academic performance that are around 100 Euro per month¹³.
- **In Padova**, students can receive different types of grants. Some of them are subject related and offered by departments, others are funded by ministries and are available also for international students. The Italian Ministry of Foreign Affairs and International Cooperation, e.g., awards scholarships for studying in Italy to both, International and Italian students who are permanent residents in countries other than Italy). Additionally, the University of Padua offers grants for excellent students. Finally, Regione Veneto offers a limited number of scholarships to socio-economic disadvantaged students (based on family-income). Students studying in Padua can

¹³ [Scholarships_Vilnius](#)

also benefit from mobility scholarships (Erasmus+ and locally-sponsored mobility scholarships) to cover their stay at partner institutions.

- Like in Italy, **students coming to Spain** are eligible for state funding and grants offered by the national and regional governments. The University of Granada uses its own funds for complementary or additional support in order to prevent, attend or cover personal, family and social needs of the students, helping them to achieve or improve their academic performance and personal development. The latter grants are managed and offered through the Studente Social Welfare Office (GASE¹⁴). They can be provided as grants for meals at the university canteens, free or subsidised housing at students residences, etc.
- In accordance with the Regulation for the Attribution of Scholarships by Merit of the **University of Minho**, every year the list of eligible students awarded the Scholarships by Merit and the distribution by Organic Unit of the University of Minho, for the year school in question.

Students enrolled in the academic year of reference in Bachelor's, Integrated Master's and Master's courses, in all academic years including the last academic year, are eligible for scholarships, e.g. in the academic year 2020/2021, by indication of the General Directorate of Higher Education, 37 Merit Scholarships were awarded to the University of Minho.

Accommodation

All partner universities agreed to help the “**International Cybersecurity and Cyberintelligence**” programme students to find suitable accommodation either at their student dormitories or on the private market.

- **The University of Granada** has a dedicated accommodation office for students and staff that developed an online portal in order to bundle existing resources, such as public and private student dormitories, rooms in shared flats, individual apartments, shared accommodation with the elderly, hostels, guesthouses, etc.
- **Vilnius University** has many accommodation options for international students in Vilnius¹⁵. Vilnius University dormitories are situated as close to the academic campuses as possible and charge modest fees. Accommodation in Vilnius University dormitories is available only for Vilnius University students during the academic year (i.e. from 1 September until 30 June). Applications for Accommodation must be submitted via online enrolment procedure (for exchange students), or via online admission procedure (for degree students). Students

¹⁴ [Studente Social Welfare Office Granada](#)

¹⁵ [Accommodation_Vilnius](#)

coming to Vilnius for the Spring semester can move in the dormitory from the 31st January.

- The Halls of Residence of **University of Minho** have a global capacity of 1 399 beds, 845 in Braga, 30 of which are dormitories, and 554 in Guimarães, 72 of which are dormitories. There are single and double rooms.
- At the **University of Padua**, students enrolled in international joint programmes have priority in obtaining a place in one of the university hall of residence. Should there not be any availability within the halls of residence, students can contact the Housing Service¹⁶ of the University (an external provider) for further support.

As mentioned above, students can also find accommodation themselves, if for some reason they will not want to live in dormitories offered by partner universities.

¹⁶ [Housing_Padova](#)

7. RESOURCES

7.1 STAFF

The programme will be staffed by qualified researchers recognized in their fields of research, whose diversity of subject interests will allow for a coherent and varied teaching approach. All lecturers are proficient in English (language skills are B2 or superior) (see curriculum vitae of the core professors in Annex 9) and profit from the various courses providing up to date training for further skills needed in international programmes both in didactic and subject-professional areas. The leading academics of the joint study programme have many years of experience in teaching and research as well as in the management of study programmes.

- **Vilnius University** teaching staff are employed in accordance with the Vilnius University Procedure for the Selection and Evaluation of Vilnius University Teaching and Research (Art) Staff¹⁷. Teaching and research staff (except for visiting teaching and research staff) are appointed to primary or higher positions after winning a public competition for a position at the University. The duration of a teaching contract is five years. For the teaching or research staff who have a primary position and win a competition for the same position at the University for the second time in a row, an indefinite employment contract for this position is concluded.

In order to determine whether the qualification of research and teaching staff corresponds to their current position, staff must undergo attestation every five years. When evaluating teaching staff, the following criteria are considered: the number of published research articles, conference attendance, research supervision, teaching, published teaching materials, participation in the doctoral studies process, student research supervision, expert, organisational, and other research activity. Student feedback on the work of the attested teacher is also considered. The course unit (module) satisfaction survey allows taking student feedback into account more objectively.

For this programme **Vilnius University** will be represented by two associate professors, one assistant professor, who are professionals in the field of cybersecurity, as well as experts in the field. The module of the program will be guided by the cybersecurity laboratory who are involved in national and international cyberdefence exercises such as Amber Mist (“Gintarinė migla”) and

¹⁷[Regulations of Vilnius university for teaching staff position and attestation](#)

Cyber Shield. These professors have very high scientific qualifications in research and R&D project management.

The high qualification of the teachers is also confirmed by their published scientific journal articles in the field.

- From the **University of Granada** side, there will be 10 professors with a comprehensive research work on cybersecurity and teaching specialisation in these different knowledge areas: Networking, Artificial Intelligence, Programming, Algebra and Law.

The Spanish University Act (Ley Orgánica 6/2001, de 21 de diciembre, de Universidades) establishes the nature and organisational structure of the Spanish University system. Together with the Andalusian Law on Universities (Decreto Legislativo 1/2013, de 8 de enero) and the Statutes of the University of Granada (Decreto 231/2011, de 12 de julio), it defines the different types and levels of academic and non-academic staff and in particular, the accreditation procedures and the basic principles governing the recruitment of staff for permanent and temporary positions at the University of Granada. In 2016, the University of Granada received the HR Excellence in Research Award from the European Commission in recognition of its continued commitment to aligning its human resource policies with the principles set out in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. General assessment criteria for the open and transparent recruitment of non-permanent teaching staff were adopted in 2018.

According to the statistical annex to the Academic Report 2021/2022¹⁸, more than 90% of the teaching staff at the University of Granada hold a PhD. Their teaching and research performance is regularly evaluated in five and six-year periods, respectively. According to the 2022 Academic Ranking of World Universities (ARWU)¹⁹, also known as Shanghai Ranking, the University of Granada is ranked among the top 300 universities in the world and among the top 150 universities in the field of Computer Science and Engineering. This means that it holds the top position in Computer Science and the fourth position in the general ranking on a national scale in Spain. The School of Computer and Telecommunication Engineering obtained the EURO-INF and EURO-ACE accreditations by the European Quality Assurance Network for Informatics Education (EQANIE) and

¹⁸ [Academic Report 2021/2022](#)

¹⁹ [Academic Ranking of World Universities](#)

European Network for the Accreditation of Engineering Education (ENAE) respectively.

- In the part of the study program carried out by the **University of Minho** will work 5 teaching staff members, who are well-known specialists of Cybersecurity, Informatics, and Information Systems. With particular relevance in the context of this study program, two of the teachers were involved with the IEEE/ACM task force involved in the preparation of the computing curricula and cybersecurity curricula reports. Besides the long experience lecturing topics related to cybersecurity, this group also reveals a relevant participation in research projects, both at national and European levels and some pedagogical instruments published.

The University of Minho also promotes a formal teachers evaluation mechanism. The evaluation of teaching staff aims to enhance their performance and improve their activity. The system is regulated at two levels: at the UMinho level, known as the Regulation for the Evaluation of Teachers' Performance of the University of Minho (RAD-UM) and approved by Order RT-58/2010; at the level of each Organic Unit, where the specificities of the disciplinary areas must be considered. Performance evaluation is based on the teacher's activity report, prepared according to the model approved by the Scientific or Technical-Scientific Council of the Organic Unit for Teaching and Research, which must include an indication of the results of the Internal Quality Assurance System (SIGAQ) questionnaires, as well as the degrees and academic titles obtained in the period under analysis. The assessment focuses on: teaching; scientific research, cultural creation or technological development; university extension, scientific dissemination and economic and social valorization of knowledge; university management.

University of Minho has several central services supporting all courses:

- Academic Management Services Unit: 3 managers, 10 senior technicians, 1 informatic technical and 18 technical assistants;
- Internationalisation Support Services Unit: 1 manager, 3 senior technicians, 1 technical assistant;
- Teaching Activities Support Service Unit: 1 manager, 5 senior technicians, 2 computer specialists, 9 technical assistants, 16 operational assistants;
- Nucleus for the Promotion of Inclusion, Development and Student Success: 1 senior technician and 2 technical assistants;
- Documentation and Library Services Unit: 3 managers; 11 senior technicians, 2 computer technicians, 27 technical assistants and 1 operational assistant;
- Course Accreditation and Cataloguing Center: 1 manager, 1 senior technician, 1 computer specialist and 1 technical assistant;
- Doctoral College: 1 senior technician;

- Quality Management and Accreditation Services Unit: 1 manager, 4 senior technicians and 1 technical assistant.

All are in exclusive dedication.

Qualification of technical, administrative and management staff (TAG) to support the teaching of the study cycle:

- Academic Management Services Unit: 4 masters, 18 graduates, 9 collaborators with 12th grade;
- Internationalisation Support Services Unit: 3 masters, 1 graduate and 1 collaborator with 12th grade;
- Teaching Activities Support Service Unit: 3 masters, 5 graduates, 6 collaborators with 12th grade and 18 collaborators with 11th grade or lower;
- Nucleus for the Promotion of Inclusion, Development and Student Success: 2 graduates and 1 collaborator with the 12th grade;
- Documentation and Library Services Unit: 5 masters, 12 graduates, 20 collaborators with the 12th grade and 5 collaborators with the 11th grade;
- Course Accreditation and Cataloguing Nucleus: 3 graduates and 1 collaborator with 12th grade;
- Doctoral College: 1 doctorate;
- Quality Management and Accreditation Services Unit: 4 masters and 2 graduates.

The assessment of the performance of the TAG staff and of the heads of Service Units with a public service contract occurs within the scope of the General Public Administration regulation, the Portuguese Integrated System for Management and Evaluation of the Performance in Public Administration.

Under the Foundation regime of the University, the assessment of performance under private law contracts is governed by a separate regulation. In both schemes, the performance assessment aims, in general, to identify the personal and professional potential of the collaborator, the diagnosis of training needs and the promotion of career progression.

- Not forgetting the **University of Padua**, whose professors will start the programme by providing students with core Cybersecurity knowledge, and a wide choice of elective classes. In fact, Padua will offer 3 mandatory classes and 7 electives, involving a total of 14 professors, including 4 Full Professors, 5 Associate Professors, 5 Assistant Professors, and 2 temporary teaching staff. All the teaching staff for this program have earned a PhD. All classes and professors will be shared with the existing Master program in Cybersecurity at Padova, one of only six such programs in Italy, that has been running for 3 years with significant success.

University of Padua has been ranked top-250 in the World and Italy's top-ranked University for teaching and research quality, according to the most important international rankings²⁰. It participates in a wide number of leading international networks and we are committed to promoting sustainable development in growth, welfare and fair sharing of economic resources, inclusion and gender equality, environmental protection.

Partner universities will ensure opportunities for teaching staff members to continuously develop their teaching competences and research through academic mobility possibilities. Teaching visits are possible within the framework of the Erasmus+ programme and using internal funds of each partner university. Teachers of the programme will be encouraged not only to use these funds for mobility visits, but also try possibilities offered by the Arqus Alliance (e.g. **Arqus Twinning** initiative²¹ for short term mobilities between partner universities). Teaching staff members will be encouraged to invite visiting professors to the programme not only from partner universities, but also from other European universities to expand student knowledge in the field of cybersecurity.

Personnel Departments, working in each university, are responsible for the development of employees' general competencies, thus regular events and training sessions are organised for both non-academic and academic staff.

The teachers' competences improvement system is developed in each partner university and works on several levels.

- **Vilnius University**, in order to organise the didactic teachers' competences development, established the Educational Competence Centre. This Centre periodically organises:
 - basic pedagogical competence development program (e.g. "Active learning methods training - workshop", "Integration of information communication technologies into teaching processes", "Challenges and advantages of student group work from the perspective of teachers", "Working with culturally mixed student groups"), as well as an introductory program for new VU teachers;
 - pedagogical competence development program (e.g. "Communication skills", "Management of final (written) theses", "Application of blended learning in university studies", "Case Clinic-case study", "Using visual material in lectures", "Student motivation: decoding methodology").
- The Centre IDEA-UMinho is a structure that emerges to promote and value Innovation and Development of Teaching and Learning at the **University of Minho**.

²⁰ [Academic Ranking of World Universities](#)

²¹ [Arqus Twinning initiative](#)

It is a structure conceived in the line of centres of excellence and development of teaching and learning, common in international institutions of reference in higher education.

In interaction with the Academy, the Centre IDEA-UMinho seeks to stimulate innovation in teaching and learning practices in its multiple contexts, inside and outside the classroom.

Supporting the teaching staff, the Centre IDEA-UMinho focuses on the valorisation of teaching as a key part of the University of Minho's mission. The Centre IDEA-UMinho is intended for all teachers interested in developing teaching and learning at the University of Minho. As such, it aims to involve the Organic Units and the University's teaching staff in the development of innovative teaching and learning practices. The Centre IDEA-UMinho team is multidisciplinary. Such multidisciplinary mirrors the purpose of the Centre: the interdisciplinary sharing of teaching-learning ideas and practices among teachers, regardless of their area of origin. Thus, all teachers, regardless of their subject area, who employ or intend to implement innovative teaching practices, will find in IDEA-UMinho a centre of sharing, discussion of ideas and dissemination of teaching and learning experiences.

The Centre IDEA-UMinho has the support of the Teaching Support Office (GAE), namely in disseminating and supporting its activities.

- **The University of Padua** promotes a tradition of innovation by identifying new and effective strategies to stimulate interaction with its students. University professors have been updating teaching techniques through the *Teaching4Learning@Unipd* Project. Pioneered in Italy, this innovative teaching tool follows the development lines of the European Union.

The use of this training path enables University of Padua educators to use technological innovation to open the doors of their classrooms and to create a community where they can share their teaching methods and best practices. The project uses observation and comparison of peers by offering a classroom experience with constructive feedback.

University of Padua offers high quality teaching and rapid digital transformation because, for some time now, it has been working to this end. For years, Unipd professors have been instructed on how to teach with innovative methods, which are not only restricted to the use of technology, but also include a more engaging, direct and empathic relationship with students, in line with EU guidelines

- A dedicated *Plan for Teacher Training and Innovative Teaching Practice* (FIDO) provides a wide range of opportunities for training and retraining of all teachers working at the **University of Granada**.

Novel academic staff, for example, are invited to participate in an annual *Junior Faculty Programme for Training, Monitoring and Mentoring* that supports, among other activities, the creation of area-specific teaching teams for exchange of knowledge and knowhow among novel and senior staff.

Retraining and upskilling of experienced faculty is guaranteed, for example, through a *Continuous Teacher Training Programme* that comprises seminars, workshops and other activities regarding all aspects of contemporary higher education such as competence and research-based teaching and learning, assessment of learning outcomes and soft skills, legal aspects of teaching (copyright, data protection, academic integrity, etc.), communication and dissemination, creative thinking, career guidance, employability and entrepreneurial culture, sustainable development, gender equality and inclusiveness, etc.

During the last academic year, more than 200 novel teachers participated in the programmes for junior faculty and about 1900 experienced staff in training and retraining activities²². Such a high level of participation shows that the provided measures are effective and proves that achieving and maintaining high levels and standards in teaching and learning are one of the major concerns of the entire academic community of the University of Granada.

To improve teaching staff language skills, each university is offering additional language courses. In addition to that, some universities are offering specialised lecture preparation and public speaking modules:

- At the **University of Padua**, as part of the *ACLAIM - Academic Language for Internationalization and Multilingualism project*²³, recently launched by the University, the Language Centre organises several activities in English for academics, including language courses, lecturers support services, etc. Participation is free of charge of UNIPD academics.
- The Department of Lithuanian Studies at **Vilnius University** runs Lithuanian language courses for foreign students. Not only members of the Vilnius University community can take the courses but also any individual 16 years of age and above. Students study in the beginner, intermediate, and advanced groups. The language

²² [Training and retraining activities Granada](#)

²³ [Internationalization and Multilingualism project Padua](#)

of instruction is Lithuanian except for explanations in English for beginner students. After finishing the course, students will receive a course certificate. Also, students can choose from different languages: English, German, Spanish, French and Russian. Students need to register online, lectures are usually held twice a week²⁴.

- The **University of Granada** developed and implemented a specific *Protocol for Teaching in English and Other Languages*²⁵ that makes sure that only staff with a proven high level teaching competence in a foreign language will be authorised to hold lectures and guide students in courses and seminars not taught in Spanish. Dedicated programmes for language and teacher training, such as the *Internationalisation Fund* or the *Plan for Teacher Training and Innovative Teaching Practice (FIDO)* support staff members who do not yet meet the required standards to reach the requested level in a reasonable time.
- *BabeliUM* – the name of the Language Center of the Institute of Letters and Human Sciences of the **University of Minho** (UMinho) alludes to the myth of the tower of Babel. However, instead of understanding the confusion of languages as a divine punishment, he adopts another interpretation, which emerged from the Enlightenment, according to which linguistic and cultural plurality is seen as a gift and wealth of this planet. It is in the spirit of this vision that BabeliUM proposes to contribute to making the University of Minho a multilingual university open to the world.

The multilingualism policy is an important vector of its internal institutional policy and interaction with BabeliUM 's partners, in line with the policies of the Council of Europe and the European Union and with the recommendations of the EUA (European University Association), in favour of the dynamization of the University of Minho as an internationalised university, open to the plurality of languages and cultures and as a driving force in a region of knowledge and culture.

However, development of subject knowledge and skills is also based on the personal initiative of each lecturer: they are invited to participate in professional events, internships and projects of various kinds in both, national and international, levels (activities of each lecturer are detailed in their curriculum vitae (see Annex 9).

²⁴ [Vilnius university language school courses](#)

²⁵ [Protocol for Teaching in English and Other Languages_Granada](#)

7.2 FACILITIES

Lecture halls, well-equipped seminar rooms, teaching and learning platforms and central libraries are available to students at all study locations (see Annex 14). In general, it can be said that the material resources by participating institutions in terms of teaching rooms, technical equipment for digital teaching, and facilities for self-study periods are sufficient to carry out the study programme in high quality and the desired internationality of the students. More detailed information about facilities in each partner university is provided below.

Physical, informational and financial resources of the field studies

- **Vilnius University** Faculty of Mathematics and Informatics consists of four buildings in three places in Vilnius: two buildings are next to each other, Naugarduko str. 24 (auditoriums and teachers' offices) and Šaltinių str. 1A (computer labs on the other side of the street), the other building is in Didlaukio str. 47 (auditoriums, computer labs and teachers' offices), the fourth one in Akademijos str. 4 (researchers' offices). All faculty places can be accessed by public transport. Classes of “**International Cybersecurity and Cyberintelligence**” study programme would mainly take place in Didlaukio str. 47.

Most auditoriums for lectures have 22-25 seats. Several larger auditoriums have 200, 150, 100 or 80 seats. Computer laboratories have from 8 to 20 seats with stationary computers/terminals, and additional 4-8 places as mobile work places. Most of the auditorium has stationary projectors and screens. There are also portable laptops and projectors for use at each building. The average occupation of laboratories is 80%. When laboratories are not used for practice classes, students can use them for self-study.

Students can individually study the subject material in the Faculty library located in the building in Naugarduko Str. The library has 92 seats. Students can also use the library reading rooms, resources and self-study places located in the Central VU building or the new modern Scholarly Communication and Information Center (SCIC) which was opened in Saulėtekio str. 5 in 2013. SCIC is open 24/7 and is close to the dormitories. There are also lounges and self-study rooms at Naugarduko str. and Didlaukio st. buildings where students can study, relax, play table tennis, chess, foosball or use the buffet café.

The laboratories enable students to work on two different operating systems (Windows and Linux, Apple iOS). There are several open access computer work places in each building. Both hardware and software are being upgraded or installed as needed. Information Technology Open Access Center is currently

working on a resource upgrade project, scheduling and internship systems are being improved, and student workspaces are being upgraded as needed. It is planned to build a new modern faculties facilities in Saulėtekis av.

High-speed and wireless internet access is available in all faculty buildings. University students and staff can use the Eduroam or MIF open wireless connection. Each student of the Faculty of Mathematics and Informatics receives additional electronic resources: the student receives 500 MB of space for study purposes and can create and configure their own websites.

Students and academic staff can also use the most powerful supercomputer (acquired in 2012) in Lithuania, located in the Faculty of Mathematics and Informatics for scientific research purposes or educational activities. They can use Cloud services, get direct access to some super computer resources or use GRID computing capabilities.

Faculty has various laboratories working on different tasks in the Computer Science area: Mobile Application Development Laboratory, Robotics Laboratory, Networking Laboratory, Science and Business Communication Laboratory, Cybersecurity Laboratory etc. Cybersecurity laboratory was established in 2018, with the purpose to create and develop technological and virtual environments that would enable research and education in defence actions of cyber security breaches and attacks.

Each year, the faculty allocates a budget for hardware and software upgrades. During that period, servers and network equipment were upgraded for approximately EUR 2.5 million. EU Structural Funds support was also used for this purpose.

- The School of Computer and Telecommunication Engineering (ETSITT) of the **University of Granada** is the main academic unit dealing with teaching and research in the field of cybersecurity and cyberintelligence. Its premises consist of two interconnected buildings: The first one hosts on its lower floors all management and support facilities such as the directorate and the administrative services (secretariat), the library, the aula magna, a cafeteria and university canteen, and on its upper floors the offices, meeting rooms and research labs of several departments. The second building is mainly dedicated to teaching and learning. Hence, it contains larger lecture halls in the basement and seminar rooms and teaching labs on the upper floors. The research activities carried out at the ETSITT correspond to a huge variety of fields related to Computer Science and Telecommunication such as Artificial Intelligence, Bioinformatics, Computational Biology, Computer Vision,

Cybersecurity, Cyberintelligence, Data Mining, Decision Support Systems, e-Health, High Performance Computer Architectures, Image Recognition, Mobile and Sensor Networks, Monitoring and Control Systems, Nanoelectronics, Neural Engineering, Optimization, Planning, Signal Processing, Soft Computing, Software Engineering & Virtual Reality, etc. These activities are supported by two related centres located nearby: the Research Centre for Information and Communications Technologies (CITIC-UGR) and the ICT Business Centre (CETIC-UGR). Both have built up a strong international reputation. The research groups working at the CITIC-UGR deal with relevant scientific and technological challenges, transfer knowledge to the productive sector and train researchers to become engines of socio-economic growth thanks to new technologies. The outcomes of these cutting-edge research activities may then be transferred to spin-off companies that are directly supported by the nearby ICT Business Centre. Needless to say that these centres are equipped with the necessary infrastructure such as high-speed internet access and have access to the supercomputer facilities hosted at the Network and IT Services Centre (CSIRC).

- The **University of Padua** is a city-based university: 8 Schools and 32 Departments are spread throughout the city centre, with the exception of the 4 Departments of the School of Agriculture and Veterinary Medicine. Other research and teaching facilities are situated in various cities of the Veneto region, such as Vicenza, Treviso, Rovigo, Chioggia-Venice etc.

There is a centralised information system that allows to efficiently manage all the spaces available for organising educational activities, and to make all the information available to students and teachers for their day-to-day life in the University. In particular for the students community an app has been developed: the OrariUniPD app allows students to view and manage lectures and exam session timetables. They can quickly create a personalised profile of courses, classroom timetables and other interests right at their fingertips, register lecture and classroom attendance, and check study space availability at any time.

The University of Padua has invested more than 3 million in renting large, new classrooms and installing live streaming systems in the teaching rooms. They can be used from morning to evening, during the week and on Saturday mornings, to deliver the lectures of all the 199 programmes at the same time.

In addition to the classrooms used for theoretical lessons, there are laboratories dedicated to the various disciplines in the departmental structures, and a series of computer rooms²⁶.

Furthermore, the University offers study rooms and quiet rooms. Study rooms with different capacities are available to all students, as well as consultation rooms strategically located throughout the city. Quiet rooms are dedicated to students with specific needs, including single study use, and tutoring support for students with disabilities and/or learning difficulties. Most rooms offer access to the Wi-Fi network (*Eduroam*).

- **Minho University** will provide students with Pedagogical spaces common to all courses: rooms, amphitheatres, auditoriums, computer labs and an active learning room. The students and professors of the University of Minho have, on the Gualtar, Azurém and Couros campi and in the Congregados Buildings and Teatro Jordão/Garagem Avenida, resources to support educational activities developed or gathered by the Educational Activities Support Services Unit. (USAAE).
 - At Azurém Campus, students have Cantina de Azurém, three bars, Library of the University of Minho, one-stop shop for students, computer rooms of the Support Service Unit Education Activities (USAAE), BOSCH/DONE LAB - Advanced Manufacturing of Products and Tools laboratory.
 - At the Campus of Gualtar of the University of Minho, students have Cantina de Gualtar, six bars, Library of the University of Minho, classrooms and computer rooms of the Education Activities Support Service Unit (USAAE).

USAAE is responsible for the management of the spaces indicated below:

- classrooms and amphitheatres – these are pedagogical spaces found on campus that are equipped with appropriate furniture for the space, lockers with teaching materials to support the class and equipment for teaching the different types of teaching. Some of the amphitheatres are equipped with a fixed computer, camera, digitising table, pulpit with headset for video conferencing;
- computer labs - work with a pre-configured environment that provides a virtual machine with applications previously requested by the professors. In total, there are 4 laboratories on the Gualtar Campus and 1 on the Azurém Campus, which are also equipped with adequate infrastructure for carrying out computer tests, as well as software and physical conditions in the

²⁶ [Computer rooms Padova](#)

- classroom, with surveillance, to minimise fraud situations and guarantee the evaluation equity;
- active learning room – the equipment and furniture in this room create a flexible, interactive environment, centred on students and their learning. It encourages students to carry out activities and critically reflect through interactivity between students and between students and teachers, through varied teaching strategies, including collaborative learning. The connection to the devices (POD) in the room can be carried out through devices such as laptops, smartphones and tablets. The room is made up of island-shaped tables, glass boards for collaborative writing, and shared screens that invite students to dialogue and move independently. Multidirectional communication (students-students-teacher) is thus encouraged;
 - One Button Click Studio (OBS) – this studio is intended for the autonomous production of multimedia content. This space allows the user to independently produce videos, which can be used in the production of administrative support tutorials, production of multimedia training content (in the context of continuing education, curricular units of degree-granting study plans and open and distance courses), as well as by students who want to test, for example, their oral presentation techniques.;
 - Blackboard - Blackboard is the platform used by the University of Minho where all the curricular units (UC) of the courses taught at UMinho are updated in 2 different moments (1st and 2nd semester). The Curricular Unit Dossier (DUC) is also included in Blackboard. It is a platform for managing and distributing information, teaching resources (documents, articles, graphics, maps), assessment tools (delivery of assignments, tests, peer assessment) and communication (forums, working groups, videoconferencing, chat).

The University of Minho offers such software for the students:

- Microsoft Office 365 in the cloud;
- IBM SPSS (Statistical Package for Social Sciences) for some courses;
- Blackboard as an e-learning platform;
- Institutional email service for students;
- Access to the eduroam wi-fi network, which represents an international mobility service developed for the teaching and research community.

It also provides some collaborative tools used in the study cycles:

- Microsoft teams;
- Moodle;
- FCCN's ZOOM Colibri.

Last, but not least, all universities are providing students with *Eduroam* (www.eduroam.org), which is a safe wireless network developed for the university's and research's community, widespread worldwide in more than 70 countries. *Eduroam* allows students and employees of the participating entities to participate in the initiative to connect to the internet at any institution where this network is present.

Methodological resources

Each partner university will allow students to have access to all necessary methodological resources:

- **Vilnius University** has a collection of printed publications of Mathematics and Informatics, which consists of over 59,000 copies. The collection of printed publications of the Mathematics and Informatics Reading Room was replenished in 2019 by 197 publications, in 2018 by 991 publications, in 2017 by 337 publications. Many relevant, best-rated (indexed in the Web of Science database) journals in this field of science are available to VU students and teachers in the collections of subscribed scientific publications databases.

The VU Library performs most of its database subscriptions through membership in the Lithuanian Association of Research Libraries (LMBA), which professionally represents research and study institutions in coordinating prices and contract terms with suppliers, seeking state and project funding. Depending on the part financed by the state (according to the conditions of the project eMoDB.LT), VU contributes the remaining amount (in 2014–2015 - 20%; in 2016–2019 - 40% of the database value). In total, Vilnius University currently subscribes to 92 e-resource databases.

Subscription of special or universal purpose databases relevant to study programmes in programme field:

- Cambridge Journals on Cambridge Core
- Computers & Applied Sciences Complete
- Emerald Management eJournals Collection
- IEEE Xplore Digital Library
- MasterFILE Premier
- MathSciNet
- Oxford Journals Collection
- Passport (Euromonitor International)
- SAGE Journals Online
- Springer LINK
- Springer LINK eBooks
- Wiley Online Library

- Wiley Online Library Books

The EBSCO database platform provides access to relevant journal articles.

Over the past three years, the Library has significantly expanded its supply of e-books. In spite of e-books in shared databases, it is subscribed to the following prestigious, high-quality book collections:

- **eBooks on Cambridge Core** (Cambridge University Press). Since 2016 a subscribed database giving access to the entire collection (more than 37,000 titles of e-books on a variety of topics published by Cambridge University Press and their partners). The collection is constantly updated, at the end of the year the use is analysed in VU and the publications with the highest use are purchased for permanent access.
- **Oxford Scholarship Online**. A subscription to an e-book collection published by Oxford University Press running on the same model as eBooks on Cambridge Core.
- **Academic Complete Collection on Proquest Ebook Central**. In addition to the existing permanent collection of books with more than 180,000 different titles, it is possible to purchase permanent access or short-term borrow e-publications from a 1 million list of book titles on various topics.

VU students and teachers can connect to subscribed databases in the VU territory, and using the VU VPN service, they can connect to services from home. All electronic resources can be accessed through the VU library website. All the most relevant information for students about electronic resources is provided in the subject librarian section. Teachers also share their course material on their websites, on the MS Teams platform, or through the VLE. Currently available methodological resources are sufficient.

- The Library of the **University of Granada** is in charge of managing the information resources for the entire academic community. Its main purpose is to provide and maintain the necessary infrastructure that allows reliable and up-to-date information to be accessed easily by all its students and staff. The library system comprises the central library at the Rectorate (Hospital Real) with its historic collections and support units for the technical management and coordination. Specialised research and teaching libraries are available at faculties, schools, departments, and other centres and service units. The library's printed collection consists of 1.4 million books and about 13,400 journals. Electronic resources provide access to more than 62,000 journals, about 650,000 e-books and 176 scientific databases. The university libraries offer training

courses for an efficient use of all types of available resources. They provide desks for consultations and self-study as well as rooms for team and group work. Its *Bibliomaker Space*, located at the library of the Faculty of Science, offers a wide range of technological tools (plotters, 3D-printers, laser cutters, ...) that allow anything imaginable to be designed and built in order to promote innovation and creativity.

The library offers all types of services that students and staff can expect at a higher education institution, such as interuniversity lending, service points for users with specific needs and difficulties (sensory, physical etc.), plagiarism detection software, reference management tools (ENDNOTE, REFWORKS, ..), etc.

- The **University of Minho** has the Documentation and Library Services Unit (USDB). It is an active participant in the teaching, research and service missions of the University of Minho. In fulfilling this mission, the Documentation service selects, acquires, organises, preserves, and provides intellectual and physical access to collections in a wide range of formats. The intervention of the Documentation and Libraries Service materialises in several areas. Some figures illustrate part of the activities undertaken by USDB: 459.294 monographs, 354.909 periodicals and 20.854 audiovisual documents available in the libraries of the University of Minho, corresponding to 355.829 different titles accessible through the Library catalogue in 2021.

The General Library offers 622 seated places and the UMinho Library in Guimarães offers a seating capacity of 400 seated places. It offers 7 study rooms for group work, under pre-reservation, in Gualtar, and 11 group study rooms, under pre-reservation, in Guimarães.

The libraries of the **University of Minho** possess bibliographical reference research zones equipped with computer terminals which grant the users access to the library OPAC, to a number of online databases, e-journals and e-books:

- Portal Discover;
- Portal b-on;
- Databases;
- A-to-Z eJournals/eBooks.

Online databases:

- ABI/Inform Collection - specializing in economics and management;
- Academic Search Complete - multidisciplinary database;
- Business Search Complete - specializing in economics and management;
- Center for Economic Policy Research (CEPR) - specializing in economics;

- Communication Abstracts - reference database, specializing in communication;
- EconLit Full text - specializing in economics;
- EMBASE - specializing in biomedical literature;
- ERIC - reference database, specializing in education;
- HeinOnline Core Collection - brings together millions of digital pages about the legal history - Temporarily unavailable;
- IBFD Tax Research Platform - resource in the field of international and comparative taxation - law, finances;
- Web of Science;
- Mathscinet - reference database in mathematics, produced by the American Mathematics Society (AMS);
- Political Science Complete - specializing in politics;
- PressReader - online access to more than 7000 international newspapers and magazines;
- Proquest One Business (former ABI/INFORM) - specializing in management;
- Regional Business News - Database that provides access to the full text of more than 50 magazines and newspapers from all metropolitan and rural areas of the U.S.;
- Scopus - reference database. It enables users to search current and retrospective multidisciplinary information from high impact research journals in the world;
- Teacher Reference Center - reference database, specializing in education;
- Worth Global Style NetWork - information service in design and fashion industry.

E-Journals Collections:

- ACM (American Computer Machinery) - 145 journals, magazines, transactions, proceedings of the ACM Digital Library.
- ACS (American Chemical Society) - 35 journals, with temporal coverage variable.
- AIP (American Institute of Physics) - 13 journals, since 2000.
- Annual Reviews - 38 journals of review articles, since 1996.
- AA PsyArticles - specializing in psychology.
- Elsevier - 2422 journals (via ScienceDirect), since 1995.
- Emerald - 200 journals in the fields of management and engineering, with temporal coverage variable.
- IEEE (Institute of Electrical and Electronics Engineers) – 2422 Journals & Magazines and Conference Proceedings, since 2005.

- IOP (Institute of Physics Journals) - 70 journals, since 1995.
- JSTOR - journal archive including access to the collections Business I (46 titles) and Arts & Science III (152 titles), with temporal coverage variable.
- Nature – access to the most recent 4 years.
- RSC (Royal Society of Chemistry) - 34 journals, with temporal coverage variable.
- Sage Premier - 876 journals, since 1982.
- SIAM (Society for Industrial and Applied Mathematics) - 14 journals, since 1997.
- Springer Nature - around 2280 journals, since 1997; backfiles collection “Historical Journal Archives (OJA)”, 1832-1996; ADIS journals (over 30 medical journals).
- Taylor & Francis - 2007 journals, with temporal coverage variable.
- Wiley - 837 journals, since 1997.

E-Books Collections and Reference:

- APA Handbook of Research Methods in Psychology - Vol.1: Foundations, planning, measures, and psychometrics; Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological; Vol 3: Data analysis and research publication.
 - EBSCO ebook Academic Collections - more than 210.000 titles from different academic publishers.
 - EBSCO eBook Psychology Collection - more than 670 ebooks in the area of psychology.
 - EBSCO eBook University Press Collection - more than 37.000 ebooks from different university press services.
 - Infopédia - 29 dictionaries;
 - Wiley InterScience OnlineBooks - 75 handbooks (chemistry);
 - Springer.
- As for libraries, the **University of Padova** provides its students and staff with a University Library System, which includes a vast bibliographic and informative heritage (volumes, magazines, electronic scientific journals, e-books, sector-specific databases, and other multimedia products) accessible from both university libraries and through a digital library. Students can use any University study and computer rooms, in addition to library reference rooms. The offered Library System²⁷ includes the library resources and services of the University of Padua. The mission of the University Library System is:

²⁷ [Library System_Padova](#)

- to preserve, update and promote the use of the University bibliographic and documentary collections
- to guarantee the widest possible e-access to scientific information through the University Digital Library
- to support University research and teaching activities
- to support the Users of the Library System

The University Library System includes: The University Library Centre - ULC; The Digital library; Library clusters and libraries (ITA).

Although the main sources of programme funding are participating universities public funds and funding from Arqus Alliance, additional funding is expected from the European Commission through the grants related to Cybersecurity study field development.

To sum up, all partner universities are sufficiently equipped with the necessary resources to run the Cybersecurity field study programme, also, they seek to build on top of that with additional funding and further development of programme quality and research capacities.

8. TRANSPARENCY AND DOCUMENTATION

Student admission requirements and procedures, course catalogue, examination and assessment procedures of the programme are discussed and well documented and during the programme preparation process. Most of the information about the “**International Cybersecurity and Cyberintelligence**” programme, including the admission conditions and procedures, course catalogue, the examination and assessment procedures, are defined in study programme agreement and, according to it, will be published on the programme website. Additionally, practical information on all study places is published in the student guides (see Annex 15).

9. QUALITY ASSURANCE

The Arqus Alliance has committed to develop Arqus structures and procedures to assure quality of the Alliance as a whole and, focusing into individual parts of the Network.

Internal quality assurance

In the context of this study programme, programme quality will be ensured through carrying out periodic internal evaluation of the programme, collecting and analysing student opinion, consistently monitoring and evaluating feedback from other interested parties, ensuring the adequacy and sufficiency of the material resources, raising the qualifications of teachers and developing their competencies, improving the study programme management, administration, support for students, regularly updating study subjects, promoting innovative teaching and evaluation methods.

The “**International Cybersecurity and Cyberintelligence**” study programme at the very beginning will implement local quality assurance mechanisms in accordance with the Standards and Guidelines for Quality Assurance in the EHEA²⁸. At all partner universities, courses will regularly be evaluated using mostly online evaluation tools (sample survey questionnaires are used (see Annex 13)). Furthermore, meetings of the local study programme coordination teams will be held regularly to guarantee common standards of teaching, supervision, and examination between partner universities. Also, each partner university will discuss results of the surveys internally in the meetings assigned for survey results analysis and setting aims for improvement with all stakeholders (lecturers, coordinators, and students).

In addition, annually, the Coordinating university will request quality reports from the participating universities, which will contain:

- student performance indicators and their examination results;
- teaching content and its relation to programme objectives;
- quality assessment of the modules and student supervision;
- local student survey results.

It's especially important to mention, that in addition to the joint QA system (see Annex 10) each partner university has internal policy and procedures for carrying their internal QA of the coordinated part of the programme:

- **Vilnius University** has a well-established system of Study Programme Committees (SPC), which are mainly responsible for the quality assurance and continuous improvement of study programs. VU Study Program Regulation

²⁸ [ESG, 2015](#)

stipulates that SPC is responsible for assuring the quality and constant improvement of the study programme. The SPC bases its activity on the Regulations of the Study Program Committee of Vilnius University²⁹. The SPC consists of the academic staff members implementing the program, the representatives from students and social partners communities. The SPC reports to the faculty council, and has to report about the implementation of the programme at least once a year. The reports present information about the numbers of admitted students, the distribution of admittance grades, study internationalisation, student satisfaction of the study program and its subjects/modules (survey results), the material resources of the programme, programme operation expenses, the subject and teaching competences of the program's teaching staff, student workload, and other data about the study process: performance monitoring (academic debts, debts, academic leave, study suspension, termination, graduation, continuing studies in a higher cycle, employability, etc.) and other relevant qualitative and quantitative data related to quality assurance.

One of the main objectives of the SPC is to improve the programme by seeking to ensure coherence between its aims, developed competences, content, methods, and outcome assessment. The SPC also works to keep the programme relevant and competitive. The committee analyses academic unit, student, graduate, teaching staff and social partner feedback about the programme and its implementation and discusses how to improve the programme and solve problems relevant to students with the aforementioned parties (examples provided in the following paragraphs). Members of the SPC discuss these problems with the senior management of their faculties and with the teaching staff, and try to find solutions for them. Furthermore, the SPC analyses the resources necessary to implement the programme and discusses it with the management of a Faculty. The management, with regard to the University's strategic goals, initiates a dialogue to establish the aims of the Faculty's activity that would contribute to the general goals of the University, and discusses them with the chairs of SPC during a meeting of the College of Studies. The chairs of SPCs then work with the committees to establish areas for programme improvement.

Information about changes in the programme is primarily publicised within the Faculty community (Faculty council, Teaching staff members, Students' Representation), also, all relevant information about the programme is published on the Vilnius University and VU MIF (Faculty of Mathematics and Informatics) websites for prospective and current students and other stakeholders: admissions requirements, the programme's purpose and learning outcomes, the qualification

²⁹ [Study programme committee regulations_Vilnius](#)

awarded, study procedures, graduate employability indicators, external evaluation results, etc.

- The backbone of the quality assurance policy³⁰ of the **University of Granada** is a clear commitment to excellence in all its functions and to a culture of quality that ensures accountability, trust, transparency, control and continuous improvement in research, teaching and outreach. In terms of its educational offer, the measures in place follow the European Standard and Guidelines for Quality Assurance in the European Higher Education Area and the corresponding national and regional regulations. The quality assurance systems implemented at degree level aim not only at providing excellent training opportunities that respond to social demands but also at ensuring the personal and professional development of all students and staff involved.

For this purpose, all official degree programmes have a dedicated Committee for Internal Quality Assurance that, among other duties, is in charge of

- the continuous and systematic improvement of the curriculum,
- an active participation of all relevant groups for evaluation and improvement of the programme,
- collection and analysis of all Quality Assurance related data and information,
- reporting to all relevant bodies at institutional level and
- the development and implementation of proposals for improvement.

According to the internal regulations of the University of Granada, the main tools and instruments for quality assurance at degree level are³¹:

- Programme descriptions
 - Accreditation reports
 - Course guides and syllabi
 - Coordination meetings and self-evaluation reports
 - Questionnaires for students and staff
 - Performance indicators (assessment, mobility, internships, employability, ...)
 - Complaints and proposals for improvement
 - Improvement and programme development plans
 - etc.
- **The University of Minho** has unequivocally assumed the principle that quality and its guarantee are a fundamental element for its functioning and development. This principle is enshrined in the statutes of the University's commitment to develop its

³⁰ [Granada QA policy](#)

³¹ [Granada QA system tools](#)

activity infused with a culture of quality, based on responsibility, efficiency of action and the prevalence of the general interest. In order to achieve this aim, UMinho specified an institutional strategy for quality, as explicitly expressed in its Quality Policy and embodied in an internal system of quality assurance, the SIGAQ-UM³², based on a structuring document - the Quality Manual, seeking to respond to the challenges raised by European standards and guidelines for quality assurance in Higher Educational Institutions (HEI).

In line with UMinho's mission and strategic objectives, the following documents should be considered as structuring elements for the development and implementation of quality policy:

- the medium-term strategic plan;
 - the action plan for the four-year mandate of the Rector;
 - UMinho's annual plan of activities;
 - UMinho's annual assessment and accountability framework (QUAR-UMinho);
 - UMinho's activities and accounts report (RAC);
 - the Quality Manual.
- At the **University of Padua**, Quality Assurance covers the planning, introduction, monitoring and inspection of University business and encompasses the action needed to instil sufficient confidence in its interlocutors so that the processes and activities meet the University's own self-set goals efficiently and transparently.

Today, the University's QA system covers three domains: Teaching, Research, and Third Mission. It is based on the European Standard and Guidelines for Quality Assurance (ESG 2015) in the European Higher Education Area (EHEA) and comprises the processes of Self-assessment, Assessment and Accreditation (AVA) established by Italy's National Agency for the Assessment of the University System and Research (ANVUR). The system is organised in a series of entities, one for each level of the University's academic structure and it is designed to encourage the various levels to interact and to provide the competences required to ensure the smooth implementation of Quality Assurance policy³³.

The goals of quality assurance at the University of Padua are pursued in the following ways:

- the determination of criteria and indicators for the quality and sustainability of the annual teaching offer;
- as regards new courses, an assessment on their compliance with the

³² [Quality Minho SIGAQ-UM](#)

³³ [Padova_QA system](#)

University's Strategic Development Plan and the integration in the whole offer;

- the integration of the offer with the productive world at local, national and International level;
- efficiency in the use of internal and external teaching resources;
- consultation with stakeholders from the productive world every two years;
- support for initiatives to encourage students to engage in the career world.

In order to ensure the sufficient educational offer, the University of Padua annually verifies the sustainability of its courses through continuous talks with social partners.

There are other actors in the quality assurance process at various levels:

- Schools and related Joint Student-Professor Commissions (CPDS);
- Degree Courses (CdS);
- Self-assessment and Accreditation Groups (GAV) in every CdS.

The **CPDS** carries out monitoring activities of the academic offer, the quality of teaching, and services provided by teachers to students. The CPDS can also identify additional quality assurance indicators (to be then approved by the University Governance). The Joint Commission also formulates, even on its own initiative, opinions on the development, activation and suppression of study programmes. The CPDS moreover prepares an annual report of each Degree Course, with particular reference to the results of the student survey, identifying key challenges and recommendations.

The **Degree Course Council** is responsible for the day-to-day management of teaching, as organised by the Departments and coordinated by the University Schools, and provides feedback and recommendations on the degree programme.

The **GAV** is responsible for guiding and supervising the management of the SUA Form, the annual monitoring form and cyclical Review Report. Moreover, together with the CPDS and with the CPQD, it identifies and implements improvements and innovation interventions evaluating the actual consequences on the quality of training, teaching and services provided.

Every year, students are required to evaluate the educational activity and teachers must promote teachers and Degree Course Councils to make some considerations. For each teaching activity a questionnaire³⁴ is given to all students before enrolling in the exam. The questionnaire is addressed to all students and it relates to every

³⁴ [Student opinion questionnaire Padova](#)

educational activity and every teacher involved in each educational activity. The results of the survey are published on the website every year and also transmitted to teachers (they will receive the results related to their own course unit) and University Governance (complete results).

The complete results are viewed and discussed by the Assessment boards of the Degree Courses and by the Joint Committees of the Schools in the presence of their students' Representatives during the annual week dedicated to the improvement of teaching that is organised in November.

The discussion at Degree Course level (Assessment boards) and School level (Joint Committees) lead to concrete organisational actions (e.g. change of class schedule and/or semester, or the revision of syllabus, planning, number of ECTS and canalization of the course unit) and actions that affect the educational structure (e.g. activation of supplementary educational activities)³⁵.

External quality assurance procedures

Moving to external QA procedures for the programme, it's important to say that QA agencies will be reviewing the programme regularly basing it on the peer review principle: the assessment will be conducted by a panel of qualified and experienced experts from inside and outside academic field. Based on the self-assessment report of the programme and the outcomes of a site visit, the experts will regularly generate an evaluation report including a final vote.

As stated in the Programme consortium agreement, all partner universities will ensure that the Programme meets, in all respects, the requirements of the respective institutional, federal, national and European quality assurance authorities. And, the consortium aims at an accreditation that follows the European approach as defined by the European Higher Education Area. The only exception to this kind of evaluation - University of Padua, who will run their national evaluation and accreditation procedure additionally because the European Approach mechanism is not recognized in Italy.

To summarise, the “**International Cybersecurity and Cyberintelligence**” programme quality will be ensured not only separately in each partner university, but also mutually at programme board level (by summarising separate surveys results and additional information about social stakeholders' opinion, student performance, their employability rates, teaching quality and overall programme execution) and at both (national & international) levels through external evaluation procedures.

³⁵ [Padova_QA system](#)

ANNEXES

MANDATORY ANNEXES

- 1) *Documents supporting the legal status of the partner institutions*
- 2) *Cooperation agreement*
- 3) *Documents supporting each partner's legal basis for:*
 - a) *Participating in the joint programme*
 - b) *(Joint) degree awarding rights*

Grant agreement for an action with multiple beneficiaries under Erasmus +: European Universities

- 4) *List of intended learning outcomes and matrix.*
- 5) *Course syllabi of all partners*
- 6) *Structure of the curriculum / study plan*
- 7) *Official documents outlining procedure for recognition of qualifications*
- 8) *Students' assessments regulations*
- 9) *Academic staff CVs (all partners)*
- 10) *Relevant documents constituting internal quality assurance system*
- 11) *Diploma supplement (sample)*

ADDITIONAL ANNEXES

- 12) *Agreement for the automatic recognition of language*
- 13) *Student survey questionnaires*
- 14) *Facilities overview*
- 15) *Student life guides*