

INFORMATICS EDUCATION IN EUROPE: Institutions, degrees, students, positions, salaries.

Key Data 2013-2018



Svetlana Tikhonenko
Cristina Pereira

**Informatics Education in Europe:
Institutions, Degrees, Students,
Positions, Salaries. Key Data 2013-2018**

An Informatics Europe Report

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Key Data 2013-2018*

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administration@informatics-europe.org

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ABOUT THIS REPORT

The publication in 2013 of the first Key Data Report on Informatics Education in Europe, covering the 2008-2012 period, was a milestone event. For the first time, policy makers, education and research professionals and the general public could obtain precise information on the state of education in the area of highest importance for the future of Europe: Information Science and Technology. Instead of relying on rumours and guesses, discussions and decisions could now take advantage of verified data on the key parameters in various countries, beginning with the exhaustive list of institutions offering education in the field and continuing with a precise description of the degrees offered, the student and graduates numbers at every level, with distribution by gender, the maze of faculty and researcher positions and titles, and the most controversial topic of all: faculty and researcher salaries. Encouraged by the community's enthusiastic reception, we have continued, updated and improved the work, enlarging its scope and coverage, producing every year, since 2013, an annual edition of this report.

Like its predecessors, this report, the seventh edition of the series, emanates not from a government body or a group with a specific political agenda, but from academics in the field, represented by Informatics Europe (the association of academic and industrial research institutions in Informatics), with the sole purpose of furthering the understanding of the discipline's parameters through the provision of basic, factual data.

Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2013-2018 provides an impressive picture of the state of Informatics education in Europe today. Based on an enormous amount of information from representative countries, it presents a wealth of fundamental data, starting from a list of institutions awarding degrees in the field and continuing with student enrolments, degrees awarded, gender information, academic titles, as well as precise and much-needed data about academic salaries across European countries.

This seventh edition has added a number of countries to those already covered. Thanks to the active participation of many collaborators, acknowledged below, the report now covers Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Lithuania, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Switzerland, UK, and France for salaries.

The Informatics Key Data report series will continue to provide the community with the precise and objective information that is indispensable for understanding the field and making informed, effective policy decisions.

As a further step, Informatics Europe launched this year the **Informatics Europe Higher Education Data Portal: <https://www.informatics-europe.org/data/higher-education>**. Having a user-friendly format, it gives online access to the statistics presented in the Key Data report series from 2010/11 to 2017/18, the list of subjects identifying Informatics programs and the list of universities and academic units offering Informatics higher education in each country. Members of Informatics Europe have the added benefit of having privileged access and download rights of the whole dataset (<https://www.informatics-europe.org/data/higher-education/download.html>). The portal is one of the most useful and important services Informatics Europe can offer to its members, the community, industry and policy makers interested in the future of Computer Science and Technology in Europe. It provides plenty of opportunities for more in-depth analyses of key trends, issues, and aspects that need or could be improved with a better understanding of the higher education system in the field.

Disclaimer: *All facts and figures were obtained from publicly available sources. Although great care has been taken to ensure the data of interest was correctly extracted from these sources we give no warranty as to the accuracy or completeness of this information. The reader is solely responsible for any conclusions drawn from the information portrayed in this report as well as for the use of the data presented. Please report any incomplete or erroneous data to administration@informatics-europe.org.*

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Executive Summary

Informatics, the science behind Information Technology (IT), is a core enabler of Europe's future success. Crucial to that success is the availability of superb Informatics education throughout Europe.

In this report series, the first to attempt a general study of the state of the art in European Informatics higher education, the emphasis is on raw facts and figures rather than deep analysis; it provides the material for such analyses that others may wish to perform. Nevertheless, a number of salient points emerge:

- The field in Europe suffers from a **serious branding problem**. Even after an approximate translation to English, a good dozen terms are used to denote what is fundamentally the same discipline. In addition, there are numerous interdisciplinary study programs where Informatics is combined with **Business Administration** (e.g. Business Informatics, IT Management & Business, Business Information Systems), **Engineering** (Computer Science and Engineering, Electronics and Computer Engineering, Automation and Information Technology), **Mathematics** (e.g. Computing and Mathematics, Mathematical Informatics) or **Life Science** disciplines (e.g. Bioinformatics, Medical Informatics, E-health).
- The quantity and quality of available data varies considerably from country to country. In the interest of reliability, this report has mostly used data from countries where a solid and reasonably complete picture could be drawn from official sources. **Even when available, the data does not always allow direct comparisons, since definitions and methods of collection vary significantly from country to country.** It is very important for the field to ensure that **consistent, solid Informatics education data becomes available in all European countries.**
- Informatics is a well-developed academic field, with **hundreds of accredited institutions** training huge numbers of students for Bachelor's, Master's and PhD degrees.
- Extrapolating from more precise data in specific countries, we come to a rough estimate that:
 - more than **three hundred and fifty thousand new students enrol each year in Informatics Bachelor's programs in Europe.**
 - more than **a million students are enrolled in Informatics Bachelor's programs across Europe**; the corresponding **estimated figure for Master's students is more than two hundred thousand.**
 - around **hundred and sixty thousand students graduate each year in Informatics Bachelor's programs in Europe**; the corresponding **estimated figure for Master's graduates is more than sixty thousand.**
- **Female students are strongly underrepresented in Informatics studies in Europe. At the Bachelor's level**, in all countries included in this report, excluding Bulgaria, Estonia, Greece, and Romania, **80% or more of the students enrolled or graduating in Informatics Bachelor's programs are male.** At the Master's level, female participation increases in some countries, but decreases in others. In Bulgaria, Denmark, Estonia, Finland, Ireland, Greece, Latvia, Lithuania, Norway, Romania and UK, it exceeds 20%; in other countries it still remains low. Even if in some countries the female representation is slowly increasing along the last six years, the relative growth does not exceed 5% at the Bachelor's level and 7% at the Master's level.
- In the majority of the countries included in this report, excluding Denmark, Finland, Greece, Ireland, the Netherlands, Portugal, Switzerland and the UK, **the number of students graduating every year is less than half the number of new enrolled students.** Students in Informatics are either taking an unusually long time to conclude their studies successfully or not concluding them at all. We don't know how completion rates compare with other disciplines.
- The **status of faculty** varies considerably across Europe. **The salaries vary even more.** Our detailed study of the salaries of faculty in twelve European countries **shows, for a similar faculty position, a difference in salaries that can reach a factor of ten or more.** For example, a full professor at the top level receives, in some countries, the salary of a high-level industry executive, whereas in others the compensation is more comparable to that of a junior engineer in the IT industry.

1 Introduction

The quality of higher education in Informatics, the science behind IT¹, is critical to the future of Europe. Safeguarding and improving this quality is of paramount concern to the Informatics community; it is part of the mandate of Informatics Europe, the association of university departments and industrial research laboratories in the field, to help achieve this goal.

Any coherent attempt at improvement must begin with a clear understanding of the current situation, supported by credible qualitative and quantitative data². Examples of fundamental questions that can only be answered seriously by relying on such data include:

- What exactly makes up an Informatics education program, and under what other names can such programs be found?
- What degrees are available, and how do they compare across countries?
- How many students are studying for such degrees?
- How have these student numbers evolved in response to the ups and downs of the economy and of the popular perceptions of IT, for example as a result of concerns about outsourcing?
- Are there significant differences in the state of education in different European countries? Differences with other industrialized countries such as the USA, Japan, or Australia?
- What are typical salaries in Informatics for PhD students, postdoctoral researchers, assistant professors, associate professors, full professors and other ranks for educators and researchers?

The example of the Computing Research Association's surveys in the USA — such as the annual “Taulbee Survey” on Informatics PhDs — shows that providing well-supported data can play a crucial role in the development of the community and the discipline, and form the basis of informed decisions by policymakers.

Until the publication of the first Informatics Europe Key Data report in 2013, there had not been any concerted effort at a Europe-wide collection of data that would permit answering such questions on a trans-national basis. Some national repositories of data exist, but they do not readily give a general European perspective: they can be hard to find; they are at different levels of advancement, some detailed, others partial; they do not necessarily measure exactly the same things, sometimes with subtle differences; they are based on different methodologies; and, naturally enough in light of Europe's diversity, they use different languages.

The present report is the continuation of this concerted effort to provide the European Informatics community with solid information on the state of higher education. It concentrates on the following key aspects:

- Detailed description of the different national higher education systems (Section 3).
- Student enrolment and gender information (Section 4).
- Degrees awarded and gender information (Section 5).
- Academic positions (Section 6).
- Academic salaries (Section 7).
- Names of the “Informatics” subjects in various countries (Appendix A).
- List of higher education institutions teaching Informatics (Appendix B).

In this seventh edition we are including three new countries: Czech Republic, Norway and Portugal and a new subsection presenting the data for all students enrolled in Doctoral (PhD) programs. We hope to continue expanding the country scope in the following years, with the rule that countries can only be included under the condition that precise, verified data is available. We welcome contributors willing to work on providing such data.

¹ Another term for Informatics, prevalent in the USA, is “Computer Science”. For other alternative names, see Section 3.

² Here and in the rest of this report we follow the practice of using “data” as a singular noun.

2 Sources of data

2.1 Methodology

There is no European-wide source for data relative to the topics of this report. It consequently relies on national data repositories. Not all countries, however, have equally accessible and credible repositories.

One possible choice would have been to attempt to cover all European countries, using whatever data one can find in each case. The clear disadvantage of this approach is that the quality of the result may be determined by the quality of the weakest source. Instead, the choice was made to **limit the study to countries for which reliable statistical data was available in accessible form**. To complement this approach, some extrapolations are made to the Europe-wide situation, using simple indicators; these are only extrapolations, and should be viewed with caution.

The methodologies for data collection, analysis and reporting (documented on the web site of the organizations consulted) vary, adding to the general difficulty of cross-country comparisons.

2.2 Data sources for student enrolments, degrees, subjects and institutions

For student enrolments, degrees, subjects and institutions (Sections 4 and 5, Appendices A and B) the report concentrates on twenty one countries, for twenty of them data is available from official organizations:

- Austria: *Bundesministerium für Wissenschaft, Forschung und Wirtschaft* (www.en.bmwf.at)
- Belgium: *Conseil des recteurs* (www.cref.be); *ETNIC* (www.etnic.be), *Onderwijs en Vorming* (www.ond.vlaanderen.be/hogeronderwijs)
- Bulgaria: *INFOSTAT* of the National Statistical Institute (https://infostat.nsi.bg/infostat/pages/module.jsf?x_2=3&lang=en)
- Czech Republic: *Český statistický úřad* (www.czso.cz), Ministry of Education, Youth and Sports (www.msmt.cz)
- Denmark: *StatBank Denmark* (www.statbank.dk)
- Estonia: *Eesti Hariduse Infosüsteem* (www.haridussilm.ee)
- Finland: *Opetushallinnon tilastopalvelu Vipunen* (www.vipunen.fi)
- Germany: *Statistisches Bundesamt* (www.destatis.de)
- Greece: *Ελληνική Στατιστική Αρχή* (www.statistics.gr)
- Ireland: Higher Education Authority (www.heai.ie)
- Italy: *Ufficio di Statistica - Ministero dell'Istruzione, dell'Università e della Ricerca* (statistica.miur.it)
- Latvia: *Izglītības un zinātnes ministrija* (www.izm.gov.lv), *Centrālā statistikas pārvalde* (www.csb.gov.lv)
- Lithuania: *Oficialiosios statistikos portalas* (osp.stat.gov.lt)
- Netherlands: *Dienst Uitvoering Onderwijs* (duo.nl)
- Norway: *Norsk senter for forskningsdata (NSD) - Database for statistikk om høgre utdanning (DBH)* (dbh.nsd.uib.no)
- Poland: *Główny Urząd Statystyczny* (stat.gov.pl/obszary-tematyczne/edukacja)
- Portugal: *Direção-Geral de Estatísticas da Educação e Ciência* (www.dgeec.mec.pt)
- Spain: *Estadísticas Universitarias. Ministerio de Educación, Cultura y Deporte* (www.mecd.gob.es/servicios-al-ciudadano-mecd/estadisticas/educacion/universitaria/estadisticas.html)
- Switzerland: *Bundesamt für Statistik* (www.bfs.admin.ch)
- UK: Higher Education Statistics Agency (www.hesa.ac.uk)

The data provided by these sources are public-domain except in the UK, where HESA sells its reports [UK1]. For Romania, differently than all other countries in this report, the data was collected by direct personal contact with all the Deans of Informatics Faculties in the country.

For the list of institutions (Appendix B), several sources were consulted in each country, including references AT1-AT2, BE1-BE2, BG1, DK1-DK2, FI1-FI2, GE1-GE3, IT1, LT1, NE1-NE2, NE4, NO3, PL1, PT3, SW1-SW3, UK1-UK3, university websites and national contacts.

Like its previous editions, this report includes statistics not only from traditional **“Research Universities”** but also from **“Universities of Applied Sciences”**: *Fachhochschulen* (Austria, Germany and Switzerland³), *Hautes Écoles* (Belgium French community), *Hogescholen* (Belgium Flemish community and The Netherlands), *Колежу* (Bulgaria), *Vysoké školy neuniverzitní* (Czech Republic), *Rakenduskõrgkoolid* (Estonia), *Ammattikorkeakoulujen*⁴ (Finland), *Professionshøjskolerne* (Denmark), Institutes of Technology (Ireland), *Kolegija* (Lithuania), *Høyskoler* (Norway), *Politécnico* (Portugal).

These institutions [EU1], known by different names in different countries (a common English translation is virtually impossible) have a common profile, they do offer profession- (or vocation-) oriented higher education studies. In a few countries only at Bachelor’s level, but in most, studies at Bachelor’s and Master’s level. Excluding Ireland, Norway and Portugal, where Institutes of Technology, *Høyskoler* and *Politécnico* perform research and do offer PhD studies in Informatics, in all the other countries included in this report, UAS do not offer PhD studies and in general do not perform scientific research. In Estonia, most Universities of Applied Sciences are part of Research Universities and have common professors and teaching staff.

Omitting enrolled students and graduates from these institutions would have an important downward effect on the reliability of this report since a significant proportion of Informatics students (e.g. the majority in Belgium, Germany, Finland, Netherlands and Switzerland, more than half in Estonia, Ireland, Portugal) study in such institutions. In addition, it would skew comparisons with the UK, where “polytechnics”, formerly the equivalent of Universities of Applied Sciences, no longer exist as a separate category, having as a result of the Further and Higher Education Act 1992 been either turned into universities or incorporated into existing ones [UK4].

2.3 Data sources for salaries

For salaries (Section 7), reported at the level of PhD Candidate, Postdoctoral Researcher and several Professor ranks, the present report is based on data from Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Spain, Switzerland and the UK. In most of these countries information on the base gross salaries of academics is publicly available and reported by higher education and research ministries, academics associations, unions, or directly by the universities. The only four exceptions are Czech Republic, Latvia, Lithuania and Estonia. In Czech Republic and Latvia, the salary data was collected by directly interviewing representatives of a number of selected relevant institutions. In Lithuania, the numbers for professor salaries were taken from the polling conducted by the local news agency among state Lithuanian Universities. In Estonia, the data was provided by all institutions offering Informatics higher education studies in the country. We report salaries for academic positions at traditional research universities, salaries paid at Universities of Applied Sciences were not included in this report, except for Estonia where teaching positions and employment conditions are exactly the same in both kind of institutions.

³ For discussions of institutions, programs and degrees in Switzerland, we rely on English terminology when in common use, or otherwise on German terminology. French and Italian equivalents of these terms are used in the corresponding regions.

⁴ For discussions of institutions, programs and degrees in Finland, we rely on English terminology when in common use, or otherwise on Finnish terminology. Swedish equivalents of these terms are used in institutions where the primary language of instruction is Swedish.

2.4 A general warning

This report has chosen, as noted, precision and exactness over generality. We have limited ourselves to countries and parameters for which reliable official data was available⁵. We have high confidence in the quality of the results presented here, and ask the reader to be wary of hasty reactions if some results do not immediately seem believable. Even if you think *you* know the situation in your country inside out, and a particular figure does not “look right”, please remember the following observations:

- Do not jump to conclusions after reading the results in a table without consulting the notes that follow it. This comment is particularly important for the salary tables of Section 7, since salary and career conditions vary considerably across countries.
- Student numbers comparisons must take into account the differing definitions of universities, in particular the notion of “University of Applied Sciences” as it exists in some of the countries surveyed.
- All numerical information comes from official governmental sources⁶. In some cases, colleagues told us that they had doubts about some of the resulting figures. Our view has been that, whatever their possible limitations, we were better off trusting government statistical offices than relying on private sources.

Genuine errors may of course have crept in, and we will be grateful to receive corrections.

⁵ The two exceptions, clearly marked as such, are the rough extrapolations in Sections 4.5 and 5.5.

⁶ Here too exceptions are marked clearly, for example with the mention “X, personal communication”.

3 Systems of Higher Education

In the United States, another major region with a modern, advanced, influential and prestigious network of universities⁷, the system of higher education is well-understood. It is also homogeneous in the sense that most universities rely on a considerable collection of common rules, practices, conventions and assumptions, covering the definition of degrees, the modes of recruitment, the role of universities, the status of faculties and other essential ingredients of the structure of higher education. Most features of this system also apply to Canada.

Europe knows no such consistency. Universities as they exist in Europe today are the result of an evolution that is not only long and prestigious, going back to the eleventh and twelfth centuries (Bologna, Paris, Oxford, Salamanca and many others); Europe can lay claim to the invention not only of the notion of University but also of the modern research-oriented ("*Humboldtian*") University. This long and prestigious history has led to diversity, compounded even more in the twentieth century by the application, in the eastern part of the continent, of a Soviet-influenced model, where research occurs in part in academies of sciences rather than universities.

As in other spheres of social activity, this diversity and the richness of national traditions is part of Europe's strengths, but it also complicates analysis (as it complicates cooperation). This section provides some background on the specifics of education among the countries surveyed in the rest of the report.

The discussion makes frequent references to the "Bologna" process, a wide-ranging effort to harmonize European Union systems of higher education, started by a meeting of education ministers in Bologna in 1999 [EU2]. Most European countries (including non-EU members such as Switzerland) have adopted the Bologna standards or are still in the process of consolidating them.

In many European countries, Universities of Applied Sciences (UAS) with more profession (or vocation)-oriented studies have a key role in preparing students for the job market and in a number of countries are responsible by graduating the majority of Informatics professionals (see Section 2.2).

3.1 Austria

Austrian degree programs are offered by traditional (research) Universities (*Universitäten*) and by UAS (*Fachhochschulen*). Their contents and objectives are defined by the universities and are subject to approval by the ministry of education. Universities can be public or private but in either case they have to be consistent with the ministry's requirements.

A diploma from the secondary school (=Matura) is required as general qualification for university admission. Traditional universities do not require any additional entrance exam in Informatics; UAS may apply their own requirements.

Higher education in Austria is organized according to the Bologna agreement in three levels (this is the case for traditional Universities and also for UAS):

- Bachelor's program (three years)
- Master's program (two years)
- PhD program (minimum three years)

Only traditional Universities have the authorization to award doctoral degrees. PhD Candidates (*Prädocs*) can be financed by the university. In this case, they are employed as *Universitätsassistent*. Or, they can be financed by grants, funds or industrial cooperation and be employed as *Forschungsassistent/Projektassistent*. There are also PhD Candidates who are not funded at all and who do not have any employment contract.

⁷ Other obvious examples of such networks exist in Australia, Japan and Singapore.

The same system applies for Postdoctoral Researchers (*postdocs*) who can be employed as *Universitätsassistent* or *Forschungsassistent/Projektassistent*, depending on their funding source.

The academic year in Austria is divided into semesters (winter and summer semester) and starts in October. Degree programs may start in the winter semester only (= October), or they can start both in winter and summer semester (= March).

Higher education in Informatics is usually provided at faculties of Informatics, faculties of sciences, faculties of engineering, and to a smaller extent at other areas.

At Bachelor's and Master's level there are numerous degree programs with different names.

Depending on the degree program the following degrees are awarded:

At the Bachelor's level:

- Bachelor of Science

At the Master's level:

- *Diplom-Ingenieur/Diplom-Ingenieurin (Dipl.-Ing / DI)*, comparable with Master of Science
- Master of Science

The course load for a Bachelor's program is 180 ECTS in total, for a Master's program 120 ECTS, and for a PhD program 180 ECTS. For all three degree programs a final thesis has to be submitted.

To the best of our knowledge internships within a company are not required, although a lot of computer science students work in the field of Informatics either during their holidays or they work part-time during the year.

3.2 Belgium

In Belgium, the higher education system is not unified across the independent communities (Flemish, French and German-speaking communities) that have their own competencies, including their own legislation on education. Each community thus has its own Ministry of Education, even though some educational matters remain the responsibility of the federal government. Below we describe the higher education system in the two main communities Flanders (Flemish) and Wallonia (French).

Higher education in both the Flemish and French communities is organized according to the Bologna agreement in three main cycles:

- Bachelor's program (1st cycle, typically three years)
- Master's program (2nd cycle, typically two years)
- PhD program (3rd cycle, minimum three years)

Bachelor's and Master's programs are offered by Universities (*Universiteit* in the Flemish community, *Université* in the French community) and University Colleges (*Hogescholen* in the Flemish community, *Hautes Écoles* in the French community). Universities focus on research and teaching and offer also post-graduate programs including PhD, which are not offered by University Colleges. University Colleges focus more on professional training and offer professional Bachelor's (in a few cases academic Bachelor also) and Master's programs. In addition, specialized architecture and arts schools (*Écoles Supérieures des Arts*) also exist. Universities and University Colleges cooperate intensively forming the so called "Associatie" in the Flemish area and "Pôles Académiques" in the French area. These associations are formed by one university and at least one university college. Most Bachelor's programs are offered in the language of the region, although a few internationally oriented programs are offered (fully or partially) in English. Master's programs are offered in Dutch, French or English.

Bachelor's programs can have a professional or an academic orientation. Both require a study program of at least 180 ECTS credits and take minimum three academic years to be completed. The difference lies in the general goal of the degrees: professional Bachelor's (e.g. office management, education, commerce, agriculture, health and rehabilitation, social work, applied Informatics, applied arts or the media) are more practice-oriented and focus on the competences necessary for certain professions, whereas academic Bachelors are aimed at providing the learner with theoretic knowledge for further studies at a Master's level. Academic Bachelor's programs are offered mainly by Universities and a few University Colleges while professional Bachelor's programs are offered exclusively by University Colleges. Some University Colleges also offer profession-oriented specialisation programs for holders of a Professional Bachelor's Degree. These advanced Bachelor's programs comply at least 60 ECTS credits.

Master's programs are characterized by the integration of education and research and a Master's dissertation. They mostly consist of 120 ECTS credits, sometimes 60, depending on the field of study, and therefore typically take two (sometimes one) academic years to complete. These programs aim to bring the student to an advanced level of knowledge and competences in a specific field of study. There are also a few profession-oriented Master's programs offered in University Colleges that do not focus on research.

Post-initial degrees exist at Bachelor's and Master's level. Advanced Bachelor's programs are professional post-initial courses for specialisation. Prerequisite is a Bachelor's degree. Advanced Master's programs are academic further studies in which students can enrol after obtaining a Master's degree. They aim to deepen the knowledge and/or competences in the specific field of study. Both advanced programs require at least 60 ECTS credits and mostly take one academic year to complete.

PhD programs (also called "doctoral programs") lead to the degree of doctor, after successful completion of independent scientific research and defence of a doctoral thesis. Enrolment at doctoral programs degrees is based on several conditions, among which holding a Master's degree. The degree of doctor is only awarded by Universities.

For Bachelor's programs (both professional and academic) the general admission requirement is a secondary school-leaving certificate, the "*diploma van secundair onderwijs*" in the Flemish region or the "*certificat d'enseignement secondaire supérieur*" in the French region. Compatible certificates from foreign countries, when officially recognized on the basis of a community decree, a Belgian law, a European directive or an international convention, also grant access to Bachelor's programs. Admission may also be granted to foreign students, after individual assessment of their secondary education diploma.

Academic Bachelor's degrees give direct access to Master's programs. Some Master's degrees will give access to advanced Master's programs (at least another 60 ECTS credits), in some cases after a preliminary examination. In the Flemish region, professional Bachelor's degrees may give access to some Master's programs after a bridging program. The program and study workload will be determined by the institution board, with due consideration for individual skills, working experience, qualifications and competences of the student after an evaluation interview. Foreign higher education degrees give access to Master's programs (including advanced Master's programs) if the higher education institution boards consider the foreign higher education degree equivalent to the Flemish/French community degree.

Doctoral programs are open to graduates with a relevant Master's degree, in some cases after a preliminary examination (depending on the study field). Foreign higher education degrees give access to doctoral programs if the university board considers the foreign higher education degree equivalent to a Flemish/French community Master's degree. The admission may still depend on a preliminary examination.

With the exception of a few small colleges, all universities and university colleges in Belgium are publicly funded. In Flanders, colleges receive subsidies based on their teaching activities (including the number of students) and universities receive subsidies based on their teaching activities and research output. In the French-speaking

community, funding is based on the number of students but the total budget allocated to universities and colleges is fixed, irrespective of the number of students.

3.3 Bulgaria

Under the Higher Education Act (1995), higher education in Bulgaria is provided by the following institutions: universities (*университети*), specialized higher education institutions (*специализирани висши училища*) - academies (*академии*), institutes (*институты*), and colleges (*колежи*) [BG2]. Currently, there are approximately 52 recognized higher education institutions which may be public (state owned) or private. Universities provide training in a wide range of subjects in professional areas within at least three of the four major branches of science - humanities, natural sciences, social sciences and technical sciences and may offer Bachelor's, Master's and Doctoral degrees. Specialized higher education institutions offer degrees (Bachelor's, Master's or Doctoral) in one of the major areas of science, arts, physical education, and military science and their appellation typically signifies the specific area in which they train specialists. Colleges typically offer "Professional Bachelor's" degree (*професионален бакалавър*). Colleges may be also established within the structure of a university or of a specialized higher education institution accredited for the professional areas or majors of regulated professions.

The higher education system is organized according to the Bologna agreement on three levels:

- Bachelor's programs (include two levels: "Professional Bachelor" and "Bachelor");
- Master's programs;
- Doctoral programs.

The National Evaluation and Accreditation Agency is charged with accreditation of Bulgarian higher education institutions and Bachelor's, Master's, PhD programs [BG1].

A "Professional Bachelor's" program is offered by independent colleges and colleges within universities or specialized higher education institutions in different fields of study, including ICT. The education provides specialized professional training and lasts at least three years (180 ECTS). A Bachelor's program (*бакалавър*) is offered by universities and specialized higher education institutions in all fields of study. Its normal length is 4 years (at least 240 ECTS). To be admitted to a Bachelor's/Professional Bachelor's program students must have successfully completed secondary education and state matriculation examinations. Sometimes, higher education institutions may hold additional admission exams or tests.

After receiving a Bachelor's/Professional Bachelor's degree students may be admitted to a Master's program (*магистър*). A Master's degree is awarded after completion of at least 300 ECTS (5 years of education) on the total. The holders of a Professional Bachelor's degree have to complete a study load of at least 120 ECTS, holders of a Bachelor's degree have to complete a study load of at least one year (60 ECTS) or one year and a half (90 ECTS).

Doctoral studies are offered by universities in all fields of science, specialized higher education institutions or research organizations accredited for the specific program. There are full-time, part-time and individual-plan Doctoral programs. A full-time studies and individual-plan studies last up to three years; part-time studies and distance learning have a duration of up to 4 years. In exceptional circumstances the duration can be extended, but by no more than a year. A Doctoral degree (*доктор*) can be acquired by a holder of a Master's degree after a successful defense of a dissertation.

Grades

Students' knowledge and skills are graded on the basis of a six-grade system comprising of: Excellent (6.00), Very Good (5.00), Good (4.00), Fair (3.00) and Poor (2.00). The grade of at least Fair (3.00) is required for an examination to be successfully passed.

Ranking system

In Bulgaria there is a developed ranking system, called “Bulgarian University Ranking System”, supported by the Ministry of Education and Science. It has been developed to support education service users in their choice of a university. The 2017 updated version of the system contains information on 51 accredited universities in Bulgaria, which offer education in a variety of majors that have been grouped into 52 professional fields. Depending on the individual priorities and needs of each user, the system allows for producing comparisons and rankings of different scope and type in each professional field [BG3].

3.4 Czech Republic

In Czech Republic there are two types of higher education institutions (*vysoké školy*): university and non-university. Universities provide all types of degree programs whereas non-university higher education institutions provide mainly Bachelor's degree programs and may also carry out Master's degree programs [CZ1]. Both types of institutions may be public, private or state. Public and private higher education institutions come under the responsibility of the Ministry of Education, Youth and Sports, while state institutions are under the responsibility of the Ministry of Defence and the Ministry of Interior.

The higher education system is organized according to the Bologna agreement in three levels: Bachelor's, Master's and Doctoral (PhD). Bachelor's degree programs (*bakalářský studijní program*) take from 3 to 4 years (180–240 ECTS credits) to complete, and end with a final state examination. Part of the examination is usually the defence of a Bachelor's thesis. Graduates are awarded an academic degree of *Bakalář umění*, Bachelor of Fine Arts (*BcA.*), in the field of fine arts or *Bakalář*, Bachelor (*Bc.*), in other fields.

Master's degree programs usually take from 1 to 3 years (60–180 ECTS credits) of study after a Bachelor's degree program or, in the case of a long-cycle Master's program, 4 to 6 years (240–360 ECTS credits) of study from the beginning of the university studies. To obtain the degree, students should take a final state examination and defend a Master's thesis. The following academic degrees are awarded depending on the field of study:

- *Inženýr (Ing.)*, Engineer, in the fields of economics, technical sciences and technologies, agriculture, forestry and military education;
- *Inženýr architekt (Ing. arch.)*, Engineer Architect, in the field of architecture;
- *Doktor medicíny (MUDr.)*, Doctor of Medicine;
- *Zubní lékař (MDDr.)*, Dentist;
- *Doktor veterinární medicíny (MVDr.)*, Doctor of Veterinary Medicine;
- *Magistr umění (MgA.)*, Master of Fine Arts;
- *Magistr (Mgr.)*, Master, in other fields.

Holders of the *Magistr* degree can take an advanced (*rigorózní*) state examination in the same field of study and obtain the titles of *JUDr. (doktor práv, or Doctor of Law)*, *ThDr. (doktor teologie, or Doctor of Theology)*, *RNDr. (doktor přírodních věd, Doctor of Natural Sciences)*, or *PhDr (doktor filozofie, or Doctor of Philosophy)*, *PharmDr. (doktor farmacie, or Doctor of Pharmacy)* [CZ1]. These degrees gained after graduation or after graduation and rigorous examination are popularly called small doctorate (*malý doktorát*) [CZ2].

However, they are not comparable and should be clearly distinguished from traditional Doctoral (PhD) degrees gained after the 3-4 years' doctoral degree program (180–240 ECTS credits). Graduates who successfully passed the doctoral state examination and defended a thesis are awarded one of the following academic degrees: *Doctor (Ph.D.)*, Doctor, or *Doktor teologie (Th.D.)*, Doctor of Theology. Doctoral degrees can be awarded only by accredited Universities. The accreditation is granted for a period of 4 to 8 years by the National Accreditation Bureau for Higher

Education. Only universities with significant scientific performance and with the necessary number of full professors in a field of study can award PhD degrees in the given field.

Admission

A general prerequisite to be admitted to a Bachelor's degree program or exceptionally to a long-cycle Master's degree program is to hold a diploma from the secondary school (i.e., successfully passing the final examination, *maturita*). Each university itself determines the number of admitted students and the admission procedure [CZ1]. Most degrees are in the Czech language, but lectures in selected subjects may be in English. Recently, higher education institutions have started offering entire study programs in English.

3.5 Denmark

Danish higher education institutions (HEIs) use the European Credit Transfer System (ECTS) for measuring study activities. 60 ECTS correspond to one year of full time study. Public HEIs are regulated by national legislation concerning degree structures, teacher qualifications and examinations. All programs are accredited by national, independent accreditation agencies and the Accreditation Council.

There are four types of institutions offering higher education programs, each with well-defined profiles:

- Academies of Professional Higher Education (*Erhvervsakademi*) offering professionally oriented first cycle degree programs.
- University Colleges (*Professionshøjskole*) offering professionally oriented first cycle degree programs.
- Research Universities (*Universitet*) offering first, second and third cycle degree programs in all academic disciplines.
- University level institutions offering first, second and third cycle degree programs in subject fields such as architecture, design, music and fine and performing arts.

Most of the HEIs are regulated by the Ministry of Science, Innovation and Higher Education. The Ministry of Culture regulates a small number of HEIs offering first, second and third cycle degree programs in fine and performing arts.

Degrees

The Academy Profession degree is awarded after 90-150 ECTS and includes a period of work placement of at least 15 ECTS. The programs are development-based and combine theoretical studies with a practical approach. The Danish title is "field of study" followed by the abbreviation AK and the English title is AP Graduate in "field of study".

The Professional Bachelor's degree is awarded after 180-240 ECTS and includes a period of work placement of at least 30 ECTS. The programs are applied programs. They are development-based and combine theoretical studies with a practical approach. The Danish title is *Professionsbachelor i* [field of study] and the English title is Bachelor of [field of study].

The Bachelor's degree from a University is awarded after 180 ECTS. The programs are research-based and are offered in all scientific fields. The Danish title is *Bachelor (BSc) i* [field of study] and the English title is Bachelor (BSc) of Science in [field of study].

The Master's degree is awarded after 120 ECTS. The programs are research-based and are offered in all scientific fields. The Danish title is abbreviated to *Cand.* [latin abbreviation of academic area] *i* [field of study]. The English title is *Master of Science (MSc)* in [field of study].

The PhD degree is awarded after 180 ECTS. PhD programs are offered by the Universities and some university level institutions offering degrees in the artistic and cultural field.

Admission and progression

General access to higher education in Denmark requires an Upper Secondary School Leaving Certificate or comparable qualifications. Admission to some particular programs requires entrance examination or submission of a portfolio of artistic work.

Completion of a short-cycle degree qualifies students for admission to a first cycle program. Holders of an Academy Profession degree can obtain a Professional Bachelor's degree within the same field of study through a top-up program. Completion of a first cycle degree qualifies students for admission to the second cycle.

The 7-point grading scale is used in all state-regulated education programs as of September 2007 is the 7-point grading scale. Apart from the 7-point grading scale, pass/fail assessment may also be used. 2 is the minimum grade for passing an exam.

3.6 Estonia

Degree programs in Estonia are offered by traditional (research) Universities (*Ülikoolid*) and UAS (*Rakenduskõrgkoolid*). Universities can be public or private, in either case they have to meet the requirements of the Ministry of Education and Research.

The higher education system is organised according to the Bologna agreement on three levels:

- Bachelor's programs (three years)
- Master's programs (two years)
- PhD programs (three to four years)

Any student with a secondary-level education certification can apply to a university. Universities may require entrance exams, tests, and interviews. Most of the Bachelor-level ICT programs are provided in Estonian. Estonia provides Master's and PhD students a rather broad range of internationally recognised English-based degree programs. Since the 2012/2013 academic year, higher education is free of charge in Estonia for those studying full time and in Estonian. However, there is a wide range of opportunities to study free of charge also in English, especially in ICT faculties.

Bachelor's studies are the first level of higher education. The nominal length of studies is generally three years with 180 ECTS credits, and in a few disciplines, is up to four years with 240 ECTS credits. Graduates who have completed their studies are awarded a Bachelor's degree. The ICT Bachelor's programs include a final thesis, which is usually 8–10 ECTS.

The admission requirements to Master's programs include the Bachelor's degree or an equivalent level of qualification. The nominal length of studies is one to two years with 60 to 120 ECTS credits, but combined with the first cycle at least five years and 300 ECTS credits. The ICT Master's programs include a thesis that must be prepared during the studies, usually during the second year and in parallel with courses.

Only research universities are authorised to award doctoral degrees. Although the universities of applied science are allowed to award Master's degrees, currently all of the ICT Master's programs are offered by traditional (research) universities.

Public and private higher education institutions are regulated by national legislation concerning degree structures and teacher qualifications. All programs have to be accredited by a national, independent accreditation agency: *Eesti Kõrghariduse Kvaliteediagentuur* (Estonian Higher Education Quality Agency). This agency is responsible for conducting institutional accreditation of higher education institutions and quality assessment of study program groups. Within the assessment process for study program groups, it is assessed whether the programs correspond

with the current legislation and the national and international standards, including the quality of theoretical and practical training, the qualifications of the teaching and research staff, as well as the availability of the necessary resources.

Professional programs include a mandatory practical internship corresponding to 15% of the total ECTS of a particular program. A practical internship is also required in Bachelor's and Master's programs, but the amount of time is defined by the specific program. The typical duration of the internship is 1–2 months, and the typical number of credits varies from 3–12 ECTS.

Admission requirements to PhD programs include the Master's degree or an equivalent level of qualification. It is not possible to apply to PhD studies having only a Bachelor's degree. In the 2016/2017 academic year, the principles for admission to PhD studies in the ICT faculties will change. Admission to PhD studies will take place by means of a competition, which is based on PhD thesis topics approved by the university.

A doctoral degree is granted after completion of the respective doctoral curriculum and doctoral thesis defence. Additionally, it is necessary to publish in leading international peer-reviewed scientific journals. The dissertation defence is usually public. The expected size of the defence committee is at least 5–6 members. The requirements for the defence committee differ by university. The main rules specify that at least one members of the committee should come from outside Estonia, the defence committee shall include members with a doctoral degree or an equivalent qualification.

3.7 Finland

Degree programs in Finland are offered by traditional research Universities (*yliopisto*) and Universities of Applied Sciences (*ammattikorkeakoulu*, AMK). Universities focus on scientific research and theoretical education and have the right to award doctoral degrees. By contrast, UAS are mainly multidisciplinary and regional higher education institutions that offer a pragmatic education putting the emphasis on applied research and development. In addition, UAS do not offer doctoral programs.

In total, there are fourteen Universities in the Ministry of Education and Culture sector. Two of them are foundations pursuant to the Foundations Act and the others are public corporations. Twenty-three Finnish UAS operate as public limited companies in the Ministry of Education and Culture's administrative branch. In addition to these, the universities include *Maanpuolustuskorkeakoulu* (National Defence University) which is part of the Finnish Defence Forces, *Högskolan på Åland* (Åland University of Applied Sciences) in the self-governing Province of Åland, and *Poliisiammattikorkeakoulu* (Police University College) which operates under the mandate of the Ministry of the Interior.

The objectives, extent and overall structure of degrees and specialization studies offered at Universities and UAS are defined by the following government decrees:

- The Government Decree on University Degrees (794/2004 with amendments 561/2005, 1136/2009, 967/2010, 351/2011, 421/2012, 1039/2013, 1439/2014);
- University Act (558/2009 with amendments up to 644/2016);
- The Government Decree on UAS (1129/2014).

Within the framework of these regulations, Universities and UAS decide independently on the detailed content and structure of their degrees, as well as on their annual curricula and forms of instruction.

Finland has two official national languages, Finnish and Swedish. In most institutions, the primary national language of instruction is Finnish. However, at Åbo Akademi University, in the Hanken School of Economics, Arcada UAS, Novia UAS, and Åland UAS, the primary national language of instruction is Swedish. The University of Helsinki and

the Engineering Schools of Aalto University provide bilingual education. In most research universities, almost all MSc programs are taught in English, and several English-language BSc programs are also available, both in the RU and the UAS.

Admission

In Finland there is restricted entry, "*numerus clausus*", to all fields of study, as there are more applicants than there are places available, as determined in performance negotiations between the Ministry of Education and Culture and the higher education institutions.

Each higher education institution decides on which students it admits as well as on the criteria on the basis of which students are selected for admission. In general, access to first cycle higher education programs requires a Finnish matriculation examination taken at the end of the General Upper Secondary School. The same eligibility is also provided by the International Baccalaureate (IB), European Baccalaureate (EB) and *Reifeprüfung* examinations, vocational upper secondary qualification of at least three years or other degree that has been deemed equivalent. Student selection is usually based either on grades, an entrance exam, or both. In addition, some UAS may ask for the proof of a sufficient knowledge and skills for a specific program.

Higher education is free of charge for citizens of European Union member states and those belonging to the European Economic Area. For students from other states, tuition fees are charged as of 1 August 2017.

Degrees

Finland is full member of the Bologna Process since 1999. Higher education studies are measured in credits (*opintopiste*). One year of full-time studies on average is equivalent to 1600 hours of student work and is defined as 60 credits, complying with the European Credit Transfer and Accumulation System (ECTS).

Universities

In Universities, students can complete Bachelor's and Master's degrees, and continue to academic postgraduate degrees. Universities may also provide professional specialization programs, degree modules as open university education or as other non-degree studies, and continuing professional education.

Attainment of the first cycle university degree (Bachelor, *kandidaatti*) requires at least 180 credits (three years of full-time study), including 6-10 credits for a Bachelor's thesis.

Second cycle university degrees (Master) are taken after a Bachelor's degree or equivalent studies. Its length is at least 120 credits (two years of full-time study), including 20 – 40 credits for a Master's thesis. In most fields of studies, the degree title is *maisteri*, in the field of Technology the title awarded is *diplomi-insinööri*.

Postgraduate degrees include Doctoral and Licentiate's degrees, which are completed after a Master's degree or equivalent studies. A Doctor's degree (*tohtori*) takes approximately four years of full-time study after a second cycle degree. To receive a Doctorate, a student must complete the required postgraduate studies; demonstrate independent and critical thinking in the field of research; and write a doctoral dissertation and defend it in public. A degree of Licentiate (*lisensiaatti*) may be taken before the Doctor's degree. This degree takes about two years of full-time study to complete, with postgraduate study requirements similar to a Doctorate, but with less stringent requirements on the thesis.

Universities of Applied Sciences

At UAS, students can complete Bachelor's and Master's degrees. UAS may also provide professional specialization programs, degree modules as open university education or as other non-degree studies, and continuing professional education.

The Bachelor's degree consists of 180 – 270 credits (3 - 4.5 years of full-time study) depending on the field of study. The title is *ammattikorkeakoulututkinto (AMK)*. To apply for Master's degree studies, students must have completed a Bachelor's degree program at UAS, or some other suitable higher education qualification, and had three years of work experience in the field after completing their Bachelor's degree. The Master's degree (*ylempi ammattikorkeakoulututkinto (AMK)*) consists of 60 or 90 credits (1 or 1.5 years of full-time study).

Grades

The typical grading scale at Universities is from 0 to 5 (in integers), with a grade zero meaning a fail, grade one - lowest passing grade and grade five – the highest achieved grade. Some courses do not use number grading, but give only a "pass" or "fail" mark.

3.8 France

Even though France only figures in the Positions and Salaries part of this report (Sections 6 and 7), it is useful to describe briefly some peculiarities of the French system of higher education, particularly as they pertain to Informatics.

Outsiders to the French system often miss its most distinctive characteristic and, when they discover it, find it baffling. That French exclusive is the coexistence between two components:

- Universities, as known in the rest of the world (and pioneered by France with the Sorbonne, the original University of Paris, from about 1150 on).
- *Grandes Écoles* (literally: great schools), some of them known more specifically as *Écoles d'Ingénieurs* (engineering schools).

The *Grandes Écoles* distinguish themselves from Universities through the following traits:

- They are ranked in the public mind according to a non-official but well-understood hierarchy.
- Those at the top of that hierarchy, particularly *École Polytechnique* and *École Normale Supérieure* (the Paris branch) are extremely prestigious, and better considered than universities. Polytechnique has been, since Napoleon used it to ensure that artillery would have competent engineers, the golden path to technocratic and administrative careers (complemented, for administration, by the *École Nationale d'Administration*). *Normale Supérieure* is the most prestigious path to research careers particularly in mathematics, physics and the humanities. Just behind them in the ranking and also very prestigious are *École Centrale*, *École des Mines*, *École des Ponts et Chaussées*, *École Nationale Supérieure des Télécommunications* and a few others.
- Part of the source of the prestige is the competitive nature of entrance to these schools. They only provide a set number of places every year, awarded on the basis of competitive examinations, some specific to a given school, some shared. In contrast, admission to universities (outside of specific subjects such as law and medicine) is not subject to a *numerus clausus* but dependent only on a high-school degree (*baccalauréat*), awarded to about 80% of an age group [FR1].
- For most of these schools, preparation to the competitive examination takes place not in universities but in two-year special programs (*classes préparatoires*, preparatory curriculum) physically held in high-schools (*lycées*). These programs are extremely intensive, because of the specter of the competitions, in an atmosphere that is significantly different from universities.
- For those admitted after these two years (or three, since the second preparatory year may usually be repeated once in case of initial failure at the competitive exam), the program in the Grande École itself is generally two years, sometimes three.

- The focus of the preparatory programs and the *Grandes Écoles* is on teaching rather than research. This observation applies less to those at the top hierarchy; Polytechnique, for example, has numerous research laboratories of excellent standing, and *École Normale* is one of the high places of French research. But in the *Grandes Écoles* system at large the students get less exposed to research than they would in a Humboldt-style research university.
- Administratively, while universities are under the control of the ministry of education, some *Grandes Écoles* report to and get their financing from other departments. Polytechnique, for example, traditionally enjoys good funding though being formally a military school, managed by the department of defence.

The two systems, universities and *Grandes Écoles*, are not entirely disjoint, and efforts have taken place over recent years to establish bridges and build consortia. As an example of a bridge, paths exist for the best university students to transfer to a *Grande École* outside of the usual competition system; the other way around, many *Grandes Écoles* students take advanced degrees in universities, or pursue research there. As an example of a consortium, created in particular to achieve a scaling-up effect with a view to better positioning in international rankings, the new Paris-Saclay university brings together over 20 institutions including Paris-Sud University and the Polytechnique, Centrale and HEC *Grandes Écoles*. The fundamental division remains, however, and the differences of prestige remain firmly anchored in the French mindset. (The French equivalent of the popular saying “*This is not rocket science*” is “*This does not require a degree from Polytechnique*”.)

While universities in general have not encountered undue difficulties in moving to the Bologna system, the *Grandes Écoles* are having a harder time. The problem is in part the existence of the two-year preparatory system, which does not give students any degree (they are supposed to get into some *Grande École*, and those who fail can usually transfer to the third year of a University), and would be too short for a Bachelor’s anyway. *Grande École* degrees are usually positioned as equivalent to a Master’s.

The planned inclusion of French student and degree data in future editions of this report will have to take into account these important peculiarities of the French system of higher education, which are particularly relevant to education in Informatics.

3.9 Germany

Education in Germany is governed and organised by the states (*Länder*), not by the federal government. Therefore, one has to deal with 16 state university laws that in some respect show slight differences. Nevertheless, the 16 states agree on the general structural properties of higher education. The standing conference of Ministers of Education (*Kultusministerkonferenz, KMK*) releases common regulations that the states are expected to observe.

Higher education in Germany differentiates three types of institutions: Universities (*Universitäten*), UAS (*Fachhochschulen*) and Universities of Cooperative Education (*Duale Hochschulen*).

Universities are the traditional institutions of higher education. They are research oriented and offer Bachelor’s, Master’s, and PhD degrees. The Universities’ Bachelor’s Informatics programs provide the scientific and methodological foundations of the discipline. Master’s programs are research oriented involving students in the current research activities of the Universities and allow a smooth transition to PhD programs. Qualification for professors is a PhD and the Habilitation or equivalent achievements.

Fachhochschulen are the successors of the previous engineering schools. They have in general a limited scope of topics (mostly engineering and business administration). Education at *Fachhochschulen* is more application oriented providing knowledge and skills directly needed by the job market. Despite the different profile academic degrees from University and *Fachhochschule* are formally equivalent which means that graduates from *Fachhochschule* may continue a Master’s program at a University and vice versa. Qualification for a professor at *Fachhochschule* is a PhD and five years of practical work experience.

Duale Hochschule is the new name for what was previously called a *Berufsakademie* (vocational academy). In some states the *Duale Hochschulen* are recognized as academic institutions. They offer Bachelor's degrees in cooperation with companies. The education is organised as phases where students work at their company interleaving with phases in classes at the University. The students finish with a Bachelor's degree, which also formally entitles them to continue with a Master's program at *Fachhochschule* or University, if the institution is officially recognized as academic. Students are from the very beginning employees of the company and earn some money. Qualification for a professor at *Duale Hochschule* is an academic degree and five years of practical work experience.

Students in Informatics are enrolled in roughly equal numbers in University and *Fachhochschule*. In terms of student numbers, *Duale Hochschule* does not play a major role. For the remainder of this document, we refer to Universities only, since they represent the members of Informatics Europe in Germany.

The structure of an Informatics program is usually a 3-year Bachelor's (180 ECTS) and a 2-year Master's (120 ECTS). Bachelor's programs may be up to four years, but in this case the corresponding consecutive Master's program has to be only one year, since the complete Bachelor-Master-cycle has to be five years corresponding to 300 ECTS. Basic entrance requirement for Bachelor's programs is the school leaving certificate ("*Hochschulreifezeugnis*"). In recent years, some state University laws also allow students who have finished a vocational training. This type of permeability between academic and vocational education has high priority at the political agenda, despite problems of qualification mismatch.

The German constitution ensures free choice of profession which includes the right to enter higher education programs. A German University can limit the access only if there are more applicants than places. Otherwise, any applicant fulfilling the formal requirements has to be accepted. There are laws regulating the calculation of places based on the number of teaching personnel and the respective curriculum (*Kapazitätsrecht*). Some universities limit the number of places (*numerus clausus*), some don't. If a limitation is in place a ranking has to be calculated based on grades and some other criteria to select the admitted applicants. Students are expected to earn 30 credits per semester. Depending on the state's University law, some universities set an upper bound for the individual study duration or a lower bound for the study progress (ECTS/semester) but in general there is only little pressure to finish in time.

The programs are organized in modules which consist of one or more courses and are finished by one exam. The size of a module is usually between 5 and 12 ECTS. Each program requires submitting a thesis at the last semester. A Bachelor's thesis is worth 12 ECTS, a Master's thesis 30 ECTS.

The academic year consists of two semesters and starts at October 1st with the winter semester. The summer semester starts on April 1st. Classes in the winter semester usually begin Oct. 15 and end Feb 15, classes in the summer semester run from April 15 to July 15. Directly after the lectures are finished, there is 2- or 3-week examination period.

The prevailing Bachelor's program is called "*Informatik*" (Informatics, Computer Science), but there is also "*Technische Informatik*" (Computer Engineering) offered. Also common are blended programs like Business Informatics, Bioinformatics, or Media Informatics. At the Master's level there is even more specialization available, e.g. programs like e.g. Embedded Systems, Computer Security or Computational Neuroscience.

The academic degree of the first cycle is "Bachelor of Science" (B.Sc.), at the second cycle "Master of Science" (M.Sc.). At the doctoral level you get either a *Dr.-Ing.* (Doctor in Engineering) or a *Dr.rer.nat.* (Doctor of Natural Sciences). This depends on the doctoral regulations of the respective faculty. The usual way to obtain a PhD in Informatics is to apply for a position as a research assistant at a University. This is a full-time position typically for up to 5-6 years that has some teaching obligation (4 weekly hours) but leaves sufficient time to work on a PhD thesis.

3.10 Greece

Higher education in Greece is public and provided by HEIs, which are Legal Entities under Public Law. HEIs are subject to state supervision which is carried out by the Minister of Education and Religious Affairs and are financed by the government.

According to the Framework Law (2007), higher education consists of two parallel sectors: the University sector (Universities, Polytechnics, Fine Arts Schools, the Open University) and the Technological sector (Technological Education Institutions (TEI) and the School of Pedagogic and Technological Education). The same law regulates issues concerning governance of higher education along the general lines of increased participation, greater transparency, accountability and increased autonomy.

Studies leading to a first cycle degree in Greek Universities last at least four years for most scientific sectors while they last five years at Polytechnics, other applied sciences and certain Art Departments and six years for Medical School. Each academic year comprises two semesters and every semester includes thirteen weeks of teaching. Obtaining a University diploma/certificate requires the attendance of a study program which includes courses corresponding to a minimum of 60 ECTS credits per academic year.

Entrance to the various Schools of the Universities (*Panepistimio*) and Technological Education Institutions (*Technologiko Ekpaideftiko Idryma* - TEI) depends on the general score obtained by Lyceum graduates, on the results of state examinations, on the number of available places and on the candidates' ranked preferences among schools and sections.

Students who successfully complete their studies in Universities and TEIs are awarded a first cycle degree, which is called *Ptychio*. Recent legislation on quality assurance in Higher Education, the Credit Transfer System and the Diploma Supplement defines the framework and criteria for evaluation of university departments and for certification of student degrees. These measures aim at promoting student mobility and contributing to the creation of a European Higher Education Area.

Ptychio leads to employment or further study at the post-graduate level that includes the second cycle leading to the second degree, which is called *Metaptychiako Diploma Eidikefsis* - equivalent to a Master's degree - and the third cycle leading to the Doctoral degree, which is called *Didaktoriko Diploma*. A program leading to a Master's degree includes courses corresponding to a minimum of 60 ECTS credits. A Doctoral study program includes courses corresponding to at least 30 ECTS credits, as well as a dissertation preparation with a public defence which must be approved by a seven-member committee of experts. Some of the committee members can be affiliated with foreign universities.

3.11 Ireland

In Ireland, the Bologna style degree has not been implemented, but the ECTS is used to define courses load. Presently degrees are typically four years long. Some universities offer three-year degree but this are normally class as ordinary level degrees and are less common for computer science and technical degrees.

Public HEIs are regulated by national legislation. There are two types of institutions offering higher education programs, Universities and Institutes of Technologies. The Universities are governed by the Universities Act. Their role is explicit to "to advance knowledge through teaching, scholarly research and scientific investigation". Institutes of Technology (IOT) are governed by Institutes of Technologies Act. Their principal function is "to provide vocational and technical education and training for the economic, technological, scientific, commercial, industrial, social and cultural development". IOT do engage in research and many are also PhD granting institutions, differently than the UAS in the other countries included in this report, to which IOT have comparable profile.

Students who wish to enter a University or an IOT must normally hold a secondary school degree. In order to obtain a place on a particular course, candidates must obtain sufficient 'points' on the senior cert examinations. The

'points' for a various course vary based on demand and number of places. There is also a constraint for most Informatics degrees in universities on the grade obtained in secondary school mathematics. There are some small caveats: if a student fails to obtain the requisite grade in mathematics, special university run entrance exams are sometime provided.

There is also an alternative route (known as the access program) for students from non-typical educational backgrounds, who can, based on an application and interview process, enter into a one-year preparation course; if requisite scores are obtained, they can progress to first year of the degree.

A Bachelor's program typically includes a final year project and report performed over seven months (taken in parallel with coursework). A practical internship in a company during the studies is required (typical duration: 5-9 months, depending on the University).

There are examinations and continuous assessment every year. If a student fails to pass the examinations and assessment, they may repeat examinations in the autumn. Failure to pass the examinations as a whole in autumn warrant repeating the year (or component thereof). The rules for compensation vary across universities.

If a student fails to complete examinations for a particular year in a requisite time (normally four attempts in two years), they may have to leave the course. Permission to try to pass the examinations again is usually at the discretion of the Department or Faculty.

A Master's research program includes a thesis, performed over 18-24 months. A taught Master's program usually has course work for 60 ECTS and then a mini-thesis worth 30 ECTS. There are some exceptions to the above. Students are not expected to have a practical internship in a company during the Master's studies.

Progress in taught Master's is evaluated every year, either through continuous control or through end-of-year exam), with possibility of being expelled from the program if failing. For Master's by research evaluation is done at the end of the Master's program.

Normally, to start a PhD, candidates must hold a first class or second class *honours* Bachelor's degree in computer science or related discipline. Candidates may be accepted under circumstances, e.g., a primary degree and sufficient relevant experience. A candidate will also be accepted with a Master's degree in a relevant discipline.

A PhD leads to a dissertation which is subject to a private defence currently restricted to the external examiner(s), internal examiner(s), supervisor and usually Professor of the discipline (or nominee) as chair. Publications are not formal requirement to conclude a PhD, but the candidate is expected to publish papers in well ranked peer reviewed conferences and/or paper in well ranked journal.

3.12 Italy

Higher education in Italy is organized according to the Bologna agreement in two levels: a Bachelor's degree level (called *Laurea* or *Laurea Triennale*) and a Master's degree level (called *Laurea Magistrale*). Degree programs are defined by the Ministry at a very high level in terms of teaching goals and required disciplines. Each University can then specialize this general framework, subject to approval by the Ministry itself. Universities can be public or private, but in either case they have to conform to Ministry regulations in terms of degree programs and their requirements. A University can provide just a few or many degrees. The standard name is "*Università*", but some universities are called "*Politecnico*" (Polytechnic) simply because for historical reasons they have focused on teaching and researching in technical areas. Medical schools are usually part of Universities. There is no classification in "Research" Universities and "Applied Sciences" Universities: therefore, any University is able to offer doctoral programs as well as professionally oriented degrees. Most universities are public, and private universities have to follow the same requirements set forth by the Ministry.

Higher education in Informatics is provided in the classes of degrees in Sciences and in the classes of degrees in Engineering, and to a smaller extent in other areas.

At the Bachelor's level there are the following degree programs:

- *Laurea in Scienze dell'Informazione* (L-31), in the area of Science.
- *Laurea in Ingegneria dell'Informazione* (L-8), in the area of Engineering

At the Master's level there are the following degree programs:

- *Laurea Magistrale in Informatica* (LM-18), in the area of Science
- *Laurea Magistrale in Ingegneria Informatica* (LM-32), in the area of Engineering
- *Laurea Magistrale in Metodologie Informatiche per le Discipline Umanistiche* (LM-43), in the area of Humanities
- *Laurea Magistrale in Tecniche e Metodi per la Società dell'Informazione* (LM-91), also in the area of Humanities
- *Laurea Magistrale in Sicurezza Informatica* (LM-66), in the area of Science

Any student with a secondary level degree (called *Maturità*) can enter a University, but for areas regulated by the European Union (e.g., Medicine, Architecture, ...) there is an entrance exam to comply with the *numerus clausus* requirement. Some universities or degrees may have an entrance evaluation, which is not selective, but may impose some additional teaching duties to students below a given threshold. This may happen for Informatics degrees.

Teaching is usually organized in semesters of about 13 weeks each, typically October-January and March-June. Course load is always measured in ECTS. For Informatics degrees, it's typical to use courses of 6 credits (one semester course) or 12 credits (two semester course).

Company internship is foreseen by the national regulation only at the Bachelor's level. It is not required, but if performed credits are assigned to students, up to a maximum of 15 credits. Internship can be done in every period, but is usually done during the last year.

Both for Bachelor and Master there is some kind of final work to be done. It is typically 6 credits for the Bachelor and 30 for the Master. While for the Master it is explicitly envisaged the production of a written thesis, for Bachelor each University can freely decide the format of such a work.

3.13 Latvia

Higher education in Latvia is organized according to the Bologna agreement in four levels: a short-cycle program (called *Pirmā līmeņa profesionālā augstākā izglītība*), a Bachelor's degree level (called *Bakalaurs*), a Master's degree level (called *Maģistrs*), and a Doctor degree level (called *Doktors*). Degree programs are defined by the Ministry of Education and Science at a very high level in terms of teaching goals and required disciplines. Each HEI can then specialize this general framework, subject to approval by the Ministry. Universities can be public or private, but in either case they have to conform to Ministry regulations in terms of degree programs and their requirements.

Both public and private HEIs are regulated by national legislation concerning degree structures, teacher qualifications and examinations. All programs are accredited by national, independent accreditation agencies and the Accreditation Council.

There are four types of institutions offering higher education in Latvia, each with well-defined profiles: *koledža*, *augstskola*, *akadēmija*, *universitāte*.

Koledža (College) offers professionally oriented short-cycle programs (2-3 years, including internship with at least 24 ETCS). Colleges award diploma of first level professional higher education and fourth level (highest being fifth level) professional qualification.

Augstskola (sometimes called University of Applied Sciences) offers first, second and third (not always) cycle degree programs, offers academic and professional study programs, performs research and development, and artistic creation. In *Augstskola* 40% of elected teachers must have a doctoral degree.

Akadēmija (Academy) offers first, second and third (not always) cycle degree programs. It offers academic and professional study programs, performs research and development, and artistic creation. In *Akadēmija* at least 50% of elected teachers must have a doctoral degree.

Universitāte (University) is a HEI meeting the following criteria:

1. to offer Bachelor's, Master's, and Doctoral programs (defence of doctoral works in every doctoral program takes place annually);
2. at least 65 % of elected teachers must have a Doctoral degree;
3. to publish scientific periodical journals in the fields of the HEI study programs;
4. to have structural units or scientific institutions in the main scientific directions where research is performed.

Most of the HEIs are regulated by the Ministry of Education and Science. The Ministry of Culture regulates a small number of HEIs offering first, second and third cycle degree programs in fine and performing arts. There are some HEI regulated by other ministries (Ministry of Agriculture, Ministry of Health, Ministry of Defence).

Any student with a secondary level diploma can attend an HEI. In the majority of the cases, as in Informatics, marks from a centralized final examination at secondary school are taken to decide the results of the competition. Teaching is usually organized in semesters of about 20 weeks each, around September-January and February-June. Course load is always given in Latvian credits (1 Latvian credit equals 1.5 ECTS).

Professional programs include mandatory company internship corresponding to 24-39 ECTS, academic programs may include internship.

Both for Bachelor and Master there is some kind of final work to be done. It is typically 15 credits for Bachelor and 30 credits for Master. It is explicitly envisaged the production of a written thesis.

Degrees

The first level Professional Higher Education Diploma is awarded after 120-180 ECTS and includes a period of work placement of at least 24 ECTS. The programs are development-based and combine theoretical studies with a practical approach.

The Professional Bachelor's degree is awarded after 240 ECTS and includes a period of work placement of at least 39 ECTS. The programs are applied development-based programs and combine theoretical studies with a practical approach.

The Bachelor's degree is awarded after 180-240 ECTS. The programs are more research-based and are offered in all scientific fields.

The [Professional] Master's degree is awarded after 60-120 ECTS (together with first cycle degree it must make at least 300 ECTS). The programs are more research-based and are offered in all scientific fields.

The PhD degree is awarded after 180 ECTS. PhD programs are offered by the Universities and some university level institutions offering degrees in the artistic and cultural field.

Admission and progression

General access to higher education in Latvia requires an Upper Secondary School Leaving Certificate or comparable qualifications. Admission to some particular programs requires entrance examination or submission of a portfolio of artistic work.

Completion of a short-cycle degree qualifies students for admission to a first cycle program, usually in the second or third year. Completion of a first cycle degree qualifies students for admission to the second cycle.

The 10-point grading scale is used in all state-regulated education programs. Apart from the 10-point grading scale, pass/fail assessment may also be used. 4 is the minimum grade for passing an exam.

3.14 Lithuania

Lithuania has a binary system of higher education with traditional research university institutions called *universitetas* (university), *akademija* (academy), or *seminarija* (seminary) and professionally-oriented institutions – *kolegija* (colleges), or *aukštoji mokykla* (higher education institution). University institutions primarily provide academic education and award Bachelor's, Master's, and Doctor's degrees. Colleges (equivalent to Universities of Applied Sciences) focus on non-academic professional education and might award only Professional Bachelor's degrees. Universities and Colleges can be public (state) or private (non-state), in either case they should meet the requirements of the Ministry of Education and Science.

Until 2000, the higher education system was unitary. The binary system of higher education, divided into university sector and non-university sector, was introduced in 2000 with the institutional reform. The reform was aimed at phasing out what was known as advanced vocational education and training (*aukštesnysis mokslas*) provided by advanced vocational education and training schools (*aukštesnioji mokykla*) and developing a non-university segment of the higher education system in its place. Institutions that were sufficiently qualified to provide non-university higher education were transformed into higher education colleges (*kolegija*) or departments of such colleges [LT2].

Degrees

The higher education system is organized according to the Bologna agreement on three levels:

- Bachelor's degree programs (*Profesinis bakalaūras* or *Bakalaūras*);
- Master's degree programs (*Magistras*);
- Doctoral degree programs (*Daktaras*).

Applicants to first cycle studies are required to have a general secondary education diploma (*brandos atestatas*) or an equivalent qualification. The Professional Bachelor's degree (*Profesinis bakalaūras diplomas*) consists of 180-210 ECTS and is awarded after completion of the college (UAS) level study programs which are more oriented towards preparation for professional activity and applied research.

Bachelor's degree study programs (*Bakalaūras*) require completion of 210-240 ECTS. Compared to college (UAS) studies, university curriculum is more academically oriented. After completion of the studies a Bachelor's Diploma (*Bakalauro diplomas*) is awarded.

The admission requirements to Master's programs include Bachelor's/Professional Bachelor's degree or an equivalent qualification. The programs require completion of 90-120 ECTS, after which a Master's degree (*Magistro laipsnis*) is awarded. Master's degree may also be awarded after completion of integrated long-cycle (*Vientisosios*) university studies, which combine the 1st and 2nd cycle of university studies. Traditionally, these studies are offered in several fields of medicine, pharmacy, veterinary medicine, law, and religious studies.

To be admitted to Doctor of Science degree studies (*Mokslo daktaras*), candidates must hold Master's degree or a comparable qualification. The purpose of doctoral studies of science is to prepare scientists who would be able to independently conduct research and experimental development work, and to solve scientific problems. Doctoral studies usually last 4 years for full-time and 6 years for part-time. After completion of the studies and passing public defense of a PhD thesis, a Doctoral Diploma (*Daktaro diplomas*) is awarded.

Grades

The typical grading scale is from 1 to 10, with 5 as the minimum pass grade and with 10 as the maximum pass grade. Alongside the ten-point grading institutions can use the pass/fail system of evaluation. A student passes when he/she proves that he/she assimilated no less than 50 % of the required knowledge scope.

3.15 The Netherlands

Higher education in The Netherlands is organized at two levels:

- scientific education (*Wetenschappelijk Onderwijs, WO*) – at Universities (*Universiteiten*)
- higher vocational education (*Hoger Beroepsonderwijs, HBO*) – at UAS (*Hogescholen*)

The Bachelor-Master system is used in Dutch higher education. Course loads are expressed in terms of the ECTS.

Informatics at Universities

Bachelor's programs at Universities span three years (180 ECTS). For admission, a diploma of pre-university education (VWO) is necessary. There are additional requirements regarding the presence of an elective mathematics subject in the student's secondary school exam. A Bachelor's program contains a thesis (typically 9–15 ECTS), often written in parallel with courses. A practical internship is usually not required.

Master's programs are typically research-oriented and two years in duration (120 ECTS). In the second year a substantial MSc project is carried out, completed by a MSc thesis. Some one-year Master's programs exist (60 ECTS), in applied areas. MSc projects are carried out internally, in a research group at the university, or externally, on selected projects in companies.

For admission, a University Bachelor's degree is necessary. Additional requirements apply for admission with a related Bachelor's degree, or for admission to specific tracks within a Master's program.

Students with a vocational Bachelor's degree in an Informatics-related discipline are usually required to complete an additional pre-Master's program in order to be admitted to a University Master.

PhD Candidates in the Netherlands are not regarded as students, but are normally employed by the university as "*promovendus*" (PhD Researcher) with mainly research tasks and some teaching duties. For admission to the PhD examination, a Master's degree (or equivalent) is required. After their manuscript is approved by their PhD supervisor, PhD Candidates submit a thesis, which is examined by a reading committee, typically consisting of 4-5 qualified members. After approval there is a public defence in front of a bigger committee including the reading committee.

Informatics at Universities of Applied Sciences

Education at this level concerns mostly Bachelor's programs. There are only a few 'professional Master's' programs. Awarding PhDs is restricted to Universities.

Vocational Bachelor's programs span four years (240 ECTS). For admission, a diploma of senior general secondary education (HAVO) is necessary. For Technical Informatics, a specific elective mathematics subject is required to be part of the student's exam.

Vocational Bachelor's programs are practice oriented. The programs contain an internship (usually about 30 ECTS, including a thesis or internship report).

3.16 Norway

Higher education in Norway is provided by universities (*Universiteter*), specialised university institutions (*Vitenskapelige høyskoler*), university colleges (*Høgskoler*) and institutions with accredited programs.

Universities and specialised university institutions provide education at university level, offering programs at Bachelor's, Master's and PhD level. They are autonomous in terms of the accreditation of their own programs of study and authorized to create new educational programs at all levels, without needing to apply to an external accrediting body. The university colleges and other higher education institutions also have the right to accredit their own programs but not at all levels. These institutions are authorized to create their own Bachelor's degree programs; however, they must apply to the Norwegian Agency for Quality Assurance in Education (NOKUT) for the external accreditation of new Master's and PhD programs [NO1].

The degree system in Norwegian higher education was completely restructured in 2002/2003 as part of the Bologna Process. The basic structure of the current degree system follows the 3+2+3 model, representing a 3-year Bachelor's degree program, a 2-year Master's degree program and a 3-year PhD program. In addition, traditional programs of one single cycle of 5 to 6 years are still offered. There are also undergraduate programs of relatively short duration [NO2].

In Norway, the following qualifications are offered:

- *Høgskolekandidat* awarded by university colleges upon completion of a 2-year undergraduate program. This degree might allow students to continue to the third year of a Bachelor's degree program. The statistics regarding 2-year undergraduate programs have not been included in this report.
- Bachelor's degree (*Bachelorgrad*) programs are usually of 3 years (180 ECTS). The titles used under Norwegian legislation refer directly to the field of study (e.g. Bachelor of Nursing, Bachelor of Biology, etc).
- Master's degree (*Mastergrad*) programs usually take 2 years (120 ECTS). One of the major requirements for the Master's degree is the completion of an independent research work of at least 30 ECTS credits. In addition to the 2-year Master's programs, there are also integrated Master's programs lasting 5 years as well as experience-based Master's programs that last one year and a half. Admission to these 1,5-year Master's programs requires earning 180 ECTS and having at least two years of professional work experience.
- PhD (*Doktorgrad*) programs last for 3 years following the attainment of a Master's degree. The PhD program consists of classes on research skills, and the writing and public defence of a doctoral thesis.

Admission

Completion of secondary education at advanced level, equivalent to passing the exam at the end of Norwegian secondary school, is the general basic requirement for entry to Norwegian universities and university colleges accredited by NOKUT. Some study programs have special admission requirements, usually related to specialist subjects or fields of study from secondary school.

3.17 Poland

In Poland, there are two main categories of higher education institutions: university-type and non-university institutions. Both categories of institutions may provide first-cycle, second-cycle and/or long-cycle programs; but only the university-type institution is authorized to offer a doctoral program and confer the academic degree of doctor (PhD). According to the Polish Central Statistical Office [PL1], in the 2016/17 academic year there were 390

higher education institutions (132 public and 258 private) of different types: Universities, Technical Universities, Agricultural Academies, Academies of Economics, Higher teacher education schools, Medical universities/academies, Maritime Universities, Physical academies, Fine arts academies, Theological academies, Academies of the Ministry of National Defense and of the Ministry of Interior and Administration and other higher education institutions. Typically, most of Universities (*Uniwersytety*), Technical Universities (*Wyższe szkoły techniczne*), Medical universities/academies (*Uniwersytety/Akademie medyczne*) and Maritime Universities (*Wyższe szkoły morskie*) offer doctoral programs, whereas most of Academies of Economics (*Wyższe szkoły ekonomiczne*) and other higher education institutions (*Wyższe Szkoły*) offer only first or second-cycle programs.

Higher education in Poland is organized according to the Bologna agreement in three levels. First-cycle studies (3 to 4 years, or 180-240 ECTS) include Bachelor's programs leading to the title of a *Licencjat* or *Inżynier* (Bachelor or Engineer, in the field of agriculture, economics or technical science, including Informatics) which is an equivalent of the Bachelor's degree. Access to first-cycle programs is open to holders of a matura certificate given by the state (*Świadectwo maturalne*). Admission to some higher education institutions is competitive and is based on the results of the matura examination.

Second-cycle studies (1.5 to 2 years, or 90-120 ECTS) include Master's programs following the first cycle studies and leading to the title of Master (*Magister*, or an equivalent degree depending on the study course profile). In addition, 11 fields of study offer long-cycle programs (4.5 to 6 years, or 270-360 ECTS) leading to the professional title of Master (*Magister*, or an equivalent degree depending on the study course profile).

Third-cycle studies include doctoral programs (3 to 4 years) which are accessible for graduates with a Master's degree. The PhD degree (*Doktor*) is awarded to candidates who submit and successfully defend a doctoral dissertation before the thesis committee and pass the doctoral examination. In Poland, doctoral programs may be offered by academic universities, institutes of the Polish Academy of Science, or other research institutes or international institutes which meet the criteria to award a PhD degree [PL2].

Grades

Each higher education institution identifies its grading scale in its Study Rules. The most common scale comprises the marks from 2 to 5, with a grade 2 meaning a fail, grade 3 – lowest passing grade and grade 5 – the highest achieved grade. Sometimes the plus symbol or decimal is used to modify the numerical grades.

3.18 Portugal

Portugal has a dual system of higher education with traditional university institutions (*Universitário*) and polytechnic institutions (*Politécnico*). University institutions provide academic scientific education while Polytechnic institutions (equivalent to Universities of Applied Sciences) provide profession-based training focusing on applied research and advanced technical training. Both kinds of institutions award Bachelor's, Master's and Doctoral degrees. Both kinds of institutions can be either public or private [PT1].

All higher education institutions are governed by the Portuguese Ministry of Science, Technology and Higher Education (MCTES). Each university awards its own degrees which are regulated by the Higher Education Assessment and Accreditation Agency (A3ES) and granted by the Directorate-General for Higher Education (DGES).

Higher education in Portugal is organized according to the Bologna agreement in three levels:

- Bachelor's programs leading to the academic degree of *Licenciado* (Bachelor);
- Master's programs leading to the academic degree of *Mestre* (Master);
- PhD programs leading to the academic degrees of *Doutor* (Doctor).

This structure was introduced in 2006 and fully implemented in Portugal from the 2009/2010 academic year [PT2].

First cycle degrees (*Licenciado*) can be obtained after completing 180 ECTS and a normal length of 6 semesters, or, exceptionally, up to 240 ECTS and 7 or 8 semesters.

Second cycle degrees (*Mestre*) are taken after a Bachelor's degree or equivalent studies. To obtain a *Mestre* degree, students should complete from 90 to 120 ECTS (with a normal duration from 3 to 4 semesters), or exceptionally 60 ECTS (2 semesters), and publicly defend their dissertation, project work or traineeship report. In addition to the normal second cycle Master's programs, Portuguese universities offer in some fields of education (e.g. medicine, engineering, pharmacy, psychology, architecture, law, etc.) long-cycle integrated Master's programs (*Mestrado Integrado*) which has from 300 to 360 ECTS and a normal duration between 10 and 12 semesters. Access to this cycle of studies is governed by the same norms of the access to the first cycle of studies (Bachelor's programs). In the case of engineering, the integrated Master's programs are bound to be split into regular Bachelor's and Master's programs by 2021/2022 [PT1].

Third cycle degrees (*Doutor*) are taken after a Master's degree or equivalent studies. The *Doutor* degree is awarded to those who have passed the Doctorate examinations and have publicly defended a thesis, usually to pursue a highly qualified teaching or researching career. The typical duration of PhD programs is from 6 to 8 semesters but there is no fixed period to prepare for the Doctorate examinations.

Admission and Grades

In Portugal, there is a "numerus clausus" system and each year, the Portuguese Ministry of Science and Higher Education publishes the number of study places available at public universities and polytechnics. Students apply to a General Access Contest (*Concurso Geral de Acesso*) and then are ranked on their grade point average for access to limited places. There are special provisions for international students, disabled students and students from Portuguese Peripheral Regions.

Applicants for the first cycle studies (Bachelor's and integrated Master's programs) are required to hold a secondary education diploma (*Diploma de Ensino Secundário*) or equivalent and take, or have taken within the last two years, the national exams (*Exames Nacionais do Ensino Secundário*). An extraordinary exam process is available to anyone aged 23 or older. Admission to private institutions is at the total discretion of each institution.

Applicants for the second cycle studies (Master's programs) should possess a relevant Bachelor's or equivalent diploma. To be admitted to a PhD program, applicants should have a relevant Master's diploma or equivalent curriculum.

The grading scale at universities is from 0 to 20, with 10 as the minimum passing grade.

3.19 Romania

Higher education in Romania is offered by research universities that are divided into two categories: traditional universities and technical universities. Degree programs are defined by faculties and must be approved by the Romanian Agency for Quality Assurance in Higher Education (ARACIS) and must be periodically reviewed at every five years. Universities can be public (the majority in the country) or private, either have to be consistent with the ARACIS requirements.

Higher education in Romania is organized according to the Bologna agreement in three levels:

- Bachelor's program (three years in traditional universities, four years in technical universities)
- Master's program (two years)
- PhD program (three years)

Bachelor program

The “*Bacalaureat*” Diploma (certificate of graduating high-school education), granted after a national examination, is a prerequisite for admission to higher education. Universities and faculties may decide to organize additional admission exams and most faculties in Computer Science enrol students based on their own exams.

A Bachelor’s program consists of 180 ETCS (typically three years) or 240 ETCS (typically four years) and include a mandatory period on internship. Additional to the final examination (*examen de licență*), the presentation of a Bachelor’s dissertation, developed over the last 12 months of the studies, in parallel with courses, might be required. In Computer Science the degree granted is either *Licentiat* or *Inginer*.

Master program

The admission conditions for Master’s programs vary from one faculty to another, typically a Bachelor’s level degree is required. Master’s studies include 120 ETCS, and internships are optional. Students are expected to write and defend a Master’s thesis at the end of their studies.

PhD program

A candidate for PhD in Computer Science in Romania must have a Bachelor’s and a Master’s degree in Computer Science or equivalent subject, and is expected to attend some courses and develop yearly technical reports. The candidate will have a supervisor professor and an advisory board. In order to obtain the title, the candidate must write a doctor thesis, defend it in front of a committee, and also satisfy the publication criteria imposed by CNATDCU (National Council for University Titles, Diplomas and Certificates). The PhD program lasts typically three years, can be extended for a maximum of two years in case of interruption for medical reasons or maternity leave. Finally, there is also a “grace” period of two more years for finishing the thesis.

3.20 Spain

Higher education in Spain follows the European Higher Education Area (EHEA) guidelines since 2010. Official qualifications consist of three cycles:

- First cycle: Bachelor’s program (four years)
- Second cycle: Master’s program (two years)
- Third cycle: PhD program (maximum of three years if full-time; maximum of five years if part-time)

Both the title of Master and Bachelor are linked to the following branches of knowledge: Arts and Humanities; Science; Health Sciences; Social and Legal Sciences; Engineering and Architecture. Higher education in Informatics provides degrees in the Engineering and Architecture area.

Degree programs are defined by the Ministry of Education, Culture and Sport at very high level in terms of teaching goals and required disciplines. Each University can then specialize this general framework, design its curricula and fix the contents, which always conform to the minimum quality criteria required and agreed upon by all countries of the EHEA.

The curricula of the official degree programs, approved by the universities, to be valid must be approved by the Council of Universities. There exists a national agency for accreditation (*ANECA - Agencia Nacional de Evaluación de la Calidad y Acreditación* – National Agency for Quality Assessment and Accreditation) and some regional agencies (for instance, AQU for Catalonia). Universities can be public or private but in either case they have to be consistent with the ministry’s requirements. In Spain online universities also offer study program at the three cycle levels (Bachelor’s, Master’s and Doctoral).

Bachelor (*Grado*)

To enter a Bachelor's program in Spanish Universities students must have a diploma from the secondary school called "*Bachillerato*". University candidates must have passed either of the following:

- *Bachillerato* + university entrance examination (*selectividad*).
- Higher cycle vocational courses + university entrance examination (*selectividad*).
- University entrance examination for students over 25 years old.

The workload required in a Bachelor's degree program is 240 ECTS credits. Studies are spread over four academic years (including a final project).

Master

In order to apply for admission in a Master's program candidates must hold an official university degree, issued by a Spanish university or by a HEI within the EHEA. Each university decides on the number of students who may be admitted to Master's degree programs. The goal of university Master's degree programs is to provide students with advanced specialised or multidisciplinary training, geared towards academic or professional specialisation, or towards the acquisition of basic research skills. Master's degrees can be professionally, academically or research oriented. The workload required in a Master's degree program ranges from 60 to 120 ECTS credits. University Master's degree programs require students to write and defend a Master's thesis, which is awarded between 6 and 30 ECTS credits.

Doctorate

The doctoral studies are organized through programs according to the university laws and in accordance with the criteria established by the Ministry of Education, Culture and Sport. Studies may include courses, seminars or other activities aimed at research training and at the end a doctoral thesis, which incorporates original research results, must be defended. The maximum duration of doctoral studies full-time is three years, from admission to thesis defence. Doctoral programs can also be part time in this case the maximum duration of the program is five years, from admission to thesis defence. In addition to the doctoral program, PhD candidates must write, submit and defend a Doctoral thesis, which consists of an original research project which requires a defence, in public session, in front of a board of examiners who are in charge of its evaluation. In general, for admission to an official doctoral program the applicant needs to be in possession of a Spanish official Master's degree, or equivalent.

About Spanish Universities

The University System in Spain is composed of 82 universities, 50 of which are public and 32 are private. There are also universities specialized on distance training that offer Bachelor's, Master's and doctoral degrees. Also, an increasing number of public and private universities offer the possibility of online studies. There is no classification in "Research" Universities and "Applied Sciences" Universities. A University can provide just a few or many degrees.

Most Spanish universities divide the academic year into two semesters. The first one usually begins in September, it ends late December, and January is the exam period. The second semester starts in late January or early February and ends in May, with June as the exam period. A few universities organize their academic calendar quarterly.

3.21 Switzerland

Three distinctive properties set the Swiss system of higher education apart from the situation in many neighbouring countries:

- The Swiss government does not wish to increase the share of the population going to Universities. In fact, the minister of education explicitly stated in 2012 that it was already too high [SW4].
- This view follows from a general policy of dividing education into tracks at different levels, including a strong emphasis on apprenticeship and the presence of UAS (*Fachhochschulen, Écoles des Hautes Études, Scuola Universitaria Professionale*) alongside Universities. Where France, for example, awards the *Baccalauréat* (high-school degree) to 87.9% of students (80% of a generation) [FR1] the corresponding *Maturität figure in Switzerland* is only about 20% [SW4]. The avowed purpose is to avoid channel too many students into tracks where they have little chance of succeeding. On the other the hand the tracks are designed to allow for horizontal mobility between them at any stage. This means that, for example, outstanding students in the apprenticeship or professional track may decide to move later to a university.
- As in other aspects of Swiss life, local devolution plays an important role. Most Swiss Universities are cantonal: University of Basel, Bern, Fribourg, Geneva, Lausanne, Lucerne, Lugano, Neuchatel, St. Gallen, Zurich. Only two Universities are under the responsibility of the Federal Government, the two Federal Institutes of Technology, ETH Zurich and EPF Lausanne. Cantonal Universities receive financial support from the Confederation and from those cantons which do not have their own University.

Since 2001, Swiss Universities have been rapidly adjusting their curricula to comply with the Bologna Declaration. Today, all degree courses have been adapted to the Bologna system. Under the Bologna system the Bachelor's degree is the first step in scientific formation, allowing students to acquire a methodological and scientific approach to their education. In the Bologna system, one academic year corresponds to 60 ECTS credits, which are equivalent to 1,500-1,800 hours of study. This includes contact hours (lectures, seminars, practical work, etc.), as well as independent study at home or in a library. Attainment of the Bachelor's degree requires three years of full-time study (180 ECTS-credits). The Bachelor's degree is a pre-requisite for enrolment in a Master's program. It can in some cases lead directly to a Master of Advanced Studies (MAS). However, a Bachelor's degree is not sufficient for enrolment in a doctoral program, which requires the attainment of a Master's degree as well.

All Bachelor's programs are open to students in possession of a valid secondary school diploma, a Swiss school-leaving certificate, or a foreign degree that has been deemed equivalent. The prerequisite for access to a Master's program is a successfully completed Bachelor's program. Each University makes its own decisions as to whether a Bachelor's degree obtained in a foreign country gives its holder access to Master's programs - with or without entrance examinations, under certain conditions, with further requirements, or no access at all. The University may set additional requirements, equally applicable to all candidates, for admission to specialized Master's programs.

In the second cycle of studies, students will further advance their knowledge and specialize in a particular field, or acquire an interdisciplinary formation. This program is completed with the writing of a Master's thesis. In the Bologna system, a Master's program lasts three to four semesters (depending on the field of study) and awards 90 to 120 ECTS credits.

Doctoral degrees are generally awarded after 3-5 years of postgraduate research and study, and submission of a thesis. A Master's degree and a high-grade average during the Master's studies are the main pre-requisites for admittance to a doctoral program. In Switzerland, only the twelve state-run university institutions of academic learning (10 cantonal Universities, plus 2 Federal Institutes of Technology) are allowed to award doctoral degrees.

Application to a doctoral program is subject to specific conditions, the most important of which are the acceptance of the thesis proposal by the Faculty and a professor willing to be the supervisor. The doctoral candidate must perform original research for the thesis and defend the thesis content before a committee of professors. In some universities, depending on the Faculty or the field of research, the student must also complete an advanced course of study, and pass comprehensive examinations on the subject, or/and attend specific doctoral seminars offered by the University. PhD Candidates in Switzerland are usually employed by the Universities, having temporary contracts as research assistants. Their tasks include research, teaching and supervision of undergraduate students. For admission to the PhD examination, a Master's degree (or equivalent) is required. PhD Candidates submit a

thesis, which is examined by a (usually small, e.g., three members) 'manuscript committee'. After approval there is a public defence in front of a bigger committee including the manuscript committee.

3.22 UK

In England, Wales and Northern Ireland Bachelor's degrees are usually three-year programs, with students' studies focused almost exclusively on the degree discipline. In Scotland the Bachelor's degree is usually a four-year degree, and during the first two years the students spend one third of their time on Informatics, one third on Mathematics and one third on any other subjects of their choice. There are some exceptions to these general patterns; for example, some degrees include a year of industrial placement. Most degrees are termed *Honours* degrees and the degree is awarded with a class (First - A average, Upper Second - B average, Lower Second - C average, and Third - D average). At most universities, students who fail to make the third class cutoff do not earn an *Honours* degree, rather they may be awarded an Ordinary (pass) degree. Universities that do not award pass degrees fail students who do not have a D average. The usual reason for obtaining a pass degree is not passing a final year individual project (or dissertation).

Entry to University is centrally organized by UCAS (Universities and College Admissions Service). In the autumn of the final year of secondary school students apply to up to five programs through UCAS. They may receive offers based on their actual or predicted grades in national exams (A-levels in England, Wales and Northern Ireland, Highers and Advanced Highers in Scotland). Many courses have standard offers in terms of the grades that they expect students to have achieved before entering the program, but they may relax these for individual students that they particularly want. In the spring students must select a preferred offer, and a secondary offer (usually with lower grades). The national exams are taken in May and results are published in August. Students who match their preferred offer grades take up the places offered. Other students enter a process known as Clearing, in which UCAS tries to match them with programs in the same discipline that still have places and are willing to accept the lower grades.

Most MSc courses in the UK are one-year programs, taking a full 12 months (in contrast to undergraduate programs which usually only operate over 9 months of the year). Entry into the program is made on the basis of the applicant's undergraduate degree. For UK students at least an upper second class degree is expected. Entrance is handled by each program within each University in a distributed manner: there is no equivalent to UCAS.

Within the UK there is a standard of transferrable credits system. It is called CATS (Credit Accumulation and Transfer Scheme) and can be comparable with ECTS: 2 CATS points = 1 ECTS point. 10 CATS points correspond to a module entailing approximately 100 hours of work, and would be typically be one course over one semester. The standard load for undergraduates is 120 CATS points per year; for MSc students, 180 CATS points.

In the undergraduate programs, progression is judged from year to year and generally requires that the requisite number of credits at the appropriate level have been achieved in the previous year. In Bachelor's degrees the major component of assessment will be written exams, either taken at the end of the course or at the end of the year. For computer science there will also typically be some practical component. For *Pre-Honours* years, students who fail a course may resit⁸ the exam, up to three times. Exams are usually offered twice per year: in the main diet⁸ and in the resit diet⁸. Thus, a student who fails an exam twice will be required to repeat the year. Once students have entered the *Honours* years they usually need to pass the exams at the first sitting to achieve *Honours*.

⁸ "Resit" and "diet" are commonly used academic terms in the UK. A resit is a repeat exam in the sense that the student is examined on the material as previously presented although the examination paper is new — no further teaching is involved before the examination. The term "resit" is widely used but it is not universal (for example, at the University of Southampton these are called "referred exams"). Exams are only offered at certain times of the year and each of these times is known as "diet". For example in Edinburgh there is the December diet, the April diet and the August diet (which is the resit diet) [Jane Hillston, personal communication]

MSc students are assessed in a similar way, with exams at the end of the course or the end of the year, although it is a little more likely here to have some courses that are assessed on the basis of coursework only, without a written exam. Students must successfully pass all courses before they are allowed to progress to the project. Some universities permit resits for MSc exams, but many do not. Successful completion of the MSc degree requires both the taught element and the project to be passed. Students who successfully complete some courses but not sufficient to gain admittance to the project stage of the MSc are awarded a Post-graduate Certificate or Post-graduate Diploma depending on the number of credits achieved.

A dissertation project is an integral part of an *Honours* degree and is typically performed over six months in parallel with courses in the final year. Failure of the project will generally mean that the student cannot be awarded an *Honours* degree and will be awarded a Pass degree instead. Students who do not manage to pass the requisite number of courses for an Ordinary degree may be awarded a Certificate of Higher Education.

For an MSc program, the dissertation project typically takes place after courses have been completed (and successfully passed), and lasts for about 3 months at the end of the program.

With a few exceptions, industrial placements or internships are not required for most undergraduate or MSc degrees in the UK. However, many undergraduates undertake internships during the summer vacation before their final year. This is encouraged by the Universities but does not accrue any credit for the student's program. Since the MSc program is typically a full 12 months there is no opportunity for industrial placements or internships during the program.

Like admission to MSc programs, admission to PhD programs is handled in a distributed manner for each department, or even subgroups within departments. Each applicant is judged on a case-by-case basis so it is difficult to give any general rules. However, if the applicant is from the UK a Bachelor's degree of at least upper second class will be required. Most PhD programs do not require an MSc, but some programs funded by the UK government through the Engineering and Physical Sciences Research Council (EPSRC) as Centres of Doctoral Training, are four-year programs and most incorporate a Master's degree within the first year. However, this is often a MRes (MSc by research) rather than a taught MSc, and has a much higher proportion of dissertation work and only a few taught courses.

Students are often admitted to PhD programs on one-year probation, and only gain full admission to the program at the end of the first year after some progression hurdle. This typically involves writing a thesis proposal document and defending it to a small committee of academics. The final examination of a PhD is through the written dissertation and a closed oral examination, termed a *viva*. Each student has two examiners: one from another University, one from the same department who has not been formally involved in the supervision of the student. The student submits a version of the dissertation to be assessed by the examiners before the *viva*, and then has an opportunity to discuss the work in the *viva*. After the *viva* the examiners make recommendations about the award of the degree and any corrections that they require to the dissertation.

Practice varies between universities, but vivas are generally closed with only the examiners, student and possibly the supervisor present. There is no formal requirement for publications from the dissertation to have appeared before the viva, although in practice most students will have at least two or three publications at this stage. Most universities have a minimum period of study of three years for a PhD and a maximum of four years.

4 Student enrolments

The following tables show enrolment and ratios both for population and gender at the Bachelor's, Master's and Doctoral (PhD) levels in the selected countries.

Table 1 provides information on first-year students, which is particularly interesting to track for trends in enrolment resulting in part from changes in the popularity of Informatics. Table 2 covers Bachelor-program students, or “undergraduates” in the American terminology. Table 3 covers Master-program data where available. Table 4 covers Doctoral (PhD) programs students where available.

Any country comparisons made on the basis of these tables must **exercise caution** because of three factors: differing degree programs, explained after each table; differing notions of “Informatics”, in particular for mixed degrees, as discussed in Appendix A; different organization of the systems of higher education, as discussed in Section 3. Where in some countries there is an explicit distinction between “Research Universities” and “Universities of Applied Sciences”. In all tables for those countries where such a distinction exists, data has been presented separately: in these cases, the row marked “RU” refers to data from “Research Universities” and the row marked “UAS” refers to data from “Universities of Applied Sciences”.

Numbers per 1,000,000 inhabitants were calculated, for all years, using as basis the following data for the national populations: Austria (8,504,850), Belgium (11,267,910), Bulgaria (7,050,034), Czech Republic (10,649,800), Denmark (5,627,235), Estonia (1,313,271), Finland (5,503,297), Germany (80,716,000), Greece (10,816,286), Ireland (4,593,100), Italy (60,782,668), Latvia (2,001,468), Lithuania (2,808,901), The Netherlands (16,848,600), Norway (5,328,212), Poland (38,433,600), Portugal (10,276,617), Romania (19,870,000), Spain (46,464,053), Switzerland (8,417,700) and UK (63,705,000).

The data can be also accessed online via the Informatics Higher Education Data Portal: <https://www.informatics-europe.org/data/higher-education>. Having a user-friendly format, the portal provides plenty of opportunities for data visualization and more in-depth analyses of key trends, issues, and aspects that need or could be improved with a better understanding of the higher education system in the field. Members of Informatics Europe have the additional benefit of having privileged access and download rights of the whole dataset (<https://www.informatics-europe.org/data/higher-education/download.html>).

4.1 First year students

Table 1 presents numbers of first year students at Bachelor's level.

<i>Table 1. Students in Informatics Bachelor's programs (first year)</i>							<i>(Ratio = Total/1,000,000 inhabitants)</i>					
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	1,949	229	2,187	257	2,337	275	2,663	313	1,857	218	1,907	224
(UAS) Austria	1,154	136	1,173	138	1,166	137	1,283	151	1,218	143	1'256	148
(RU) Belgium	507	45	493	44	527	47	572	51	(a)	(a)	(a)	(a)
(UAS) Belgium	3,588	318	3,807	338	3,644	323	(b)	(b)	(b)	(b)	(a)	(a)
(RU) Bulgaria	1,993	283	2,362	335	2,247	319	2,182	310	2,591	368	2,418	343
(UAS) Bulgaria	123	17	124	18	142	20	109	15	60	9	162	23
(RU) Czech Republic	8,848	831	8,579	806	7,665	720	7,601	714	7,207	677	7,241	680
(UAS) Czech Republic	421	40	550	52	593	56	427	40	506	48	419	39
(RU) Denmark	1,071	190	1,104	196	1,196	213	1,030	183	1,060	188	1,171	208
(UAS) Denmark	133	24	169	30	155	28	(b)	(b)	(b)	(b)	(b)	(b)
(RU) Estonia	582	443	538	410	491	374	499	380	540	411	753	573
(UAS) Estonia	490	373	414	315	339	258	390	297	429	327	146	111
(RU) Finland	1,110	202	1,019	185	1,096	199	1,200	218	1,127	205	1,097	199
(UAS) Finland	3,246	590	3,149	572	3,249	590	3,185	579	3,236	588	3,140	571
(RU) Germany	16,605	205	18,447	229	20,227	251	21,952	272	22,895	284	23,421	290
(UAS) Germany	19,159	237	19,213	238	20,652	256	21,162	262	22,092	274	22,645	281
Greece	3,587	332	4,246	393	5,403	500	4,130	382	(a)	(a)	(a)	(a)
(RU) Ireland	966	210	959	209	1,050	229	1,049	228	1,019	222	998	217
(UAS) Ireland	2,070	451	2,144	467	1,981	431	2,044	445	2,058	448	1,857	404
Italy	15,005	247	16,043	264	17,223	283	18,597	306	19,850	327	21,783	358
Latvia	1,918	958	1,832	915	1,731	865	1,803	901	1,846	922	1,743	871
(RU) Lithuania	n.a.	n.a.	847	302	959	341	1,026	365	1,450	516	1,438	512
(UAS) Lithuania	n.a.	n.a.	237	84	275	98	353	126	390	139	636	226
(RU) Netherlands	1,003	60	1,316	78	1,319	78	1,485	88	1,785	106	2,183	130
(UAS) Netherlands	5,304	315	5,694	338	6,191	367	6,216	369	7,136	424	8,104	481
(RU) Norway	1,000	188	1,060	199	1,150	216	1,150	216	1,280	240	1,600	300
(UAS) Norway	1,105	207	1,185	222	1,345	252	1,335	251	870	163	860	161
Poland	21,720	565	20,786	541	20,213	526	21,057	548	23,032	599	25,413	661
(RU) Portugal	2,137	156	2,552	248	2,269	221	2,565	250	2,598	253	2,799	272
(UAS) Portugal	1,600	124	1,753	171	1,900	185	2,186	213	2,030	198	2,217	216
Romania	2,473	124	2,670	134	2,962	149	3,250	164	5,269	265	(a)	(a)
Spain	n.a.	n.a.	13,985	301	13,148	283	12,933	278	12,967	279	13,272	286
(RU) Switzerland	467	55	518	62	580	69	603	72	648	77	727	86
(UAS) Switzerland	1,234	147	1,309	156	1,380	164	1,515	180	1,610	191	1,708	203
UK	25,475	400	28,240	443	28,805	452	29,715	466	30,885	485	32,430	509

Numbers in italics: updated since the previous edition of the report, for reasons that are explained in the notes for each country.

(a) Data will be available in the next edition of the report

(b) Data not available due to changes in the archival system

The definition of Bachelor's programs is the following for each country considered:

Austria RU: studies aiming at a Bachelor's degree offered by Universities (*Universitäten*) [AT3]. Since 2016/17 certain Universities in Austria have limited the numbers of students applying to Informatics, and introduced a specific entrance exam. It resulted in a significant decrease in the number of first-year students admitted in 2016/17 compared to the previous years.

Austria UAS: studies aiming at a Bachelor's degree offered by UAS (*Fachhochschulen*) [AT3].

Belgium RU: studies aiming at a Bachelor's degree offered by Universities (*Universiteiten/ Universités*) [BE3, BE4].

Belgium UAS: studies aiming at a Bachelor's degree offered by University Colleges (*Hogescholen/Hautes Écoles*) [BE4, BE5]. The numbers of students at the first year of the Bachelor's degree in Wallonia is not available for 2015/16 and 2016/17 due to the implementation of the decree "Paysage" which defines students' progression through the credit accumulation and not by the years of study. According to our contacts in Belgium, the numbers will be again available since 2017/18⁹.

Bulgaria RU: studies aiming at a Bachelor's degree offered by Universities (*университети*) and specialized higher education institutions (*специализирани висши училища*) [BG4].

Bulgaria UAS: studies aiming at a Professional Bachelor's degree offered by colleges (*колежи*) [BG4].

Czech Republic RU: Studies aiming at a Bachelor's degree offered by University type higher education institutions (*Vysoká škola univerzitní*) [CZ1].

Czech Republic UAS: Studies aiming at a Bachelor's degree offered by non-University type higher education institutions (*Vysoká škola neuniverzitní*) [CZ1].

Denmark RU: studies aiming at a Bachelor's degree offered by Universities (*Universiteter*) [DK3].

Denmark UAS: studies aiming at a Professional Bachelor's degree offered by University Colleges (*Professionshøjskoler*) [DK3].

For Denmark numbers are updated once each year. In connection with the next updating the numbers of the most recent year will be subject to changes, they are regarded as temporary and will be replaced by new numbers in the subsequent year. This explains the small difference in the 2017/18 data (in this and all subsequent tables) when compared to the corresponding tables in the previous edition of this report.

Since 2015/16 the number of students in Informatics Bachelor's programs, including first-year students (Tables 1, 1bis and Tables 2, 2bis), and the number of Informatics Bachelor's degrees awarded at University Colleges (*Professionshøjskoler*) (Table 5; 5bis), are not available anymore due to the changes in the system of Statistics Denmark. Students of University Colleges who were previously classified to the individual group 'Computer Science' are now reported aggregated across a new group called 'Electronics and IT, technical'¹⁰.

Estonia RU: studies aiming at a Bachelor's degree offered by Universities (*Ülikoolid*) [EE1].

Estonia UAS: studies aiming at a Bachelor's degree offered by UAS (*Rakenduskõrgkoolid*) [EE1]. The significant decrease of first-year Bachelor's students at UAS in 2017/18 was due to the merge of *Eesti Infotehnoloogia Kolledž* (UAS) with *Tallinna Tehnikaülikool* (RU). The former became part of the *Tallinna Tehnikaülikool* and new entrants who started their studies in *IT College of Tallinna Tehnikaülikool* since 2017/2018 are now counted as RU students.

Finland RU: studies aiming at a Bachelor's degree offered by Universities (*Yliopistokoulutus*) [FI1].

Finland UAS: studies aiming at a Bachelor's degree offered by UAS (*Ammattikorkeakoulutus*) [FI2].

⁹ ARES – Académie de recherche et d'enseignement supérieur, personal communication

¹⁰ Statistics Denmark, personal communication

The data covers only UAS administered by the Ministry of Education and Culture. Statistics from Åland University of Applied Sciences (*Högskolan på Åland*) that offers studies in Information Technology were not included [FI2]. The numbers for UAS include both full and part-time students in Bachelor's programs (full-time students: students having completed 20 or more credits during the academic year).

Germany RU: studies aiming at a University degree (*Universitärer Abschluss*) including Bachelor, *Lizenziat/Diplom* and Others (phasing out after the Bologna reform) [GE4-GE5]. Numbers for studies aiming at a teaching degree (*Lehramtsprüfung*) were not included.

Germany UAS: studies aiming at a UAS degree (*Fachhochschulabschluss*) including Bachelor and *Diplom* [GE4-GE5].

Greece: studies aiming at a Bachelor's degree offered by Universities [GR1].

Ireland RU: studies aiming at a Bachelor's *Honours* degree offered by Universities [IR1].

Ireland UAS: studies aiming at a Bachelor's *Honours* degree offered by Institutes of Technology [IR1].

Italy: studies aiming at a Bachelor's degree (*Laurea Triennale*) offered by Universities, both in Science faculties (*Scienze e Tecnologie Informatiche* degree) and in Engineering faculties (*Ingegneria dell'Informazione* degree) [IT2]. Degree programs according the pre-Bologna system have not been included.

Latvia: studies aiming at a Bachelor's degree offered by HEIs (*Augstskola, Akadēmija* or *Universitāte*) [LV1].

Lithuania RU: studies aiming at a Bachelor's degree offered by University institutions (*Universitetas, Akademija*) [LT3].

Lithuania UAS: studies aiming at a Professional Bachelor's degree offered by colleges (*Kolegija*) [LT3]. The data for Lithuanian RU and UAS is available from 2013-2014.

Netherlands RU: studies aiming at Bachelor's and *oude stijl doctoraalopleidingen* degree (old-style doctoral program, phasing out after the Bologna reform [NE3]) in Research Universities (*Wetenschappelijk onderwijs*) [NE4].

Netherlands UAS: studies aiming at a Bachelor's degree in UAS (*Hogescholen, Hoger Beroepsonderwijs*) [NE4].

Note that numbers for previous years for both RU and UAS have been updated. In previous years, the data for the Netherlands was collected from *Centraal Bureau voor de Statistiek (CBS)* which in 2015/16 introduced a new classification for the studies considered part of the domain "Informatica". Since this new classification does not match with the one we used to collect the data for the previous editions of our report, we decided this year to collect the data from a new national source - *Dienst Uitvoering Onderwijs*. Their database is more complete and flexible, allowing access to more descriptive data and also to separate numbers for enrolment at both Bachelor's and Master's level, which was not available in the CBS database.

Norway RU: Studies aiming at a Bachelor's degree and degrees obtained after the completion of 5-year long-cycle programs offered by Universities (*Universiteter*) and specialised university institutions (*Vitenskapelige høyskoler*) [NO3]. Note that a significant increase in the numbers of Bachelor's and Master's students and degrees awarded at RU since 2016/17 was due to several mergers between RU (*Universiteter*) and UAS (*Høyskoler*). The former became part of different public Universities and students or degrees awarded are counted since 2016/17 as RU students [NO4].

Norway UAS: Studies aiming at a Bachelor's degree in University Colleges (*Høyskoler*) [NO3]. Note that a significant decrease in the numbers of Bachelor's and Master's students and degrees awarded at UAS since 2016/17 was due to several mergers between RU (*Universiteter*) and UAS (*Høyskoler*). The former became part of different public Universities and students or degrees awarded are counted since 2016/17 as RU students [NO4].

Poland: Studies aiming at degrees obtained after the completion of 3-4 year first-cycle programs and degrees obtained after the completion of 4.5-6 year long-cycle programs [PL1]. The data for first-year, total number of

students (Tables 1, 2, 3) and total number of graduates (Tables 5,6) includes the number of students enrolled in both university-type (RU in our definition) and non university-type (in our definition classified as UAS) of higher education institutions (see Section 3.17). This explains the comparatively much higher numbers of enrolled students reported for Poland. For all the other countries where both RU and UAS co-exist, numbers are reported separately.

Portugal RU: Studies aiming at a Bachelor's degree (*Licenciado*) and degrees obtained after the completion of long-cycle integrated programs (*Mestrado Integrado*) offered by Universities (*Universidades*) [PT3].

Portugal UAS: Studies aiming at a Bachelor's degree (*Licenciado*) offered by polytechnic institutions (*Politécnico*) [PT3].

Romania: studies aiming at a Bachelor's degree offered by Universities (*Universități*) [RO1].

For Romania, differently than all the other countries in this report, the data was collected by direct personal contact with all the Deans of Informatics Faculties in the country. In 2017, with the exception of two institutions, all Faculties where Informatics studies are offered provided the data, comprising almost all students in the field in Romania (more than 95% coverage rate). In previous editions of the report (before 2017), the coverage rate was 80%¹¹. Therefore, comparisons between the most recent numbers (> 95% coverage) and the previous years (80% coverage), in the tables and graphics showing absolute numbers (Tables 1,2,3,5,6 and 7), are not meaningful. The numbers for female percentages (all tables and graphs with the ending *bis*) are less affected by the change in the coverage rate.

Spain: studies aiming at a Bachelor's degree (*Estudios de Grado*) offered by Universities (*Universidad*) [SP1]. Note that a small error in the numbers of Bachelor's students at first year was found for 2015/16 and 2016/17 affecting Tables 1, 1bis, 8.

Switzerland RU: studies aiming at Bachelor's and *Lizenziat/Diplom* (phasing out after the Bologna reform) degrees in research Universities (*Universitäten*) in the following subject areas: Informatics (*Informatik*) and Business Informatics (*Betriebsinformatik*). Numbers for studies aiming at a teaching (*Lehramtsprüfung*) were not included [SW5, SW6].

Switzerland UAS: studies aiming at Bachelor's and *Diplom* (phasing out after the Bologna reform) degrees in UAS (*Fachhochschulen*) [SW7] in the following programs: Informatics (*Informatik*), Information Technology (*Informationstechnologie*), Medical Informatics (*Medizininformatik*) and Business Information Technology (*Wirtschaftsinformatik*) [SW7, SW8].

UK: numbers include studies aiming at "First Degree" and "Other Undergraduate" degree [UK5]. The UK has a unique higher-education system, with a variety of degrees at the undergraduate level and a complex system of options [UK6]. In addition, the numbers include full and part-time students (full time: attending an institution for periods amounting to at least 24 weeks within the year of study) [UK6].

¹¹ Simona Motogna, personal communication

Table 1 graph: students in Informatics Bachelor's programs (first year) per 1,000,000 inhabitants

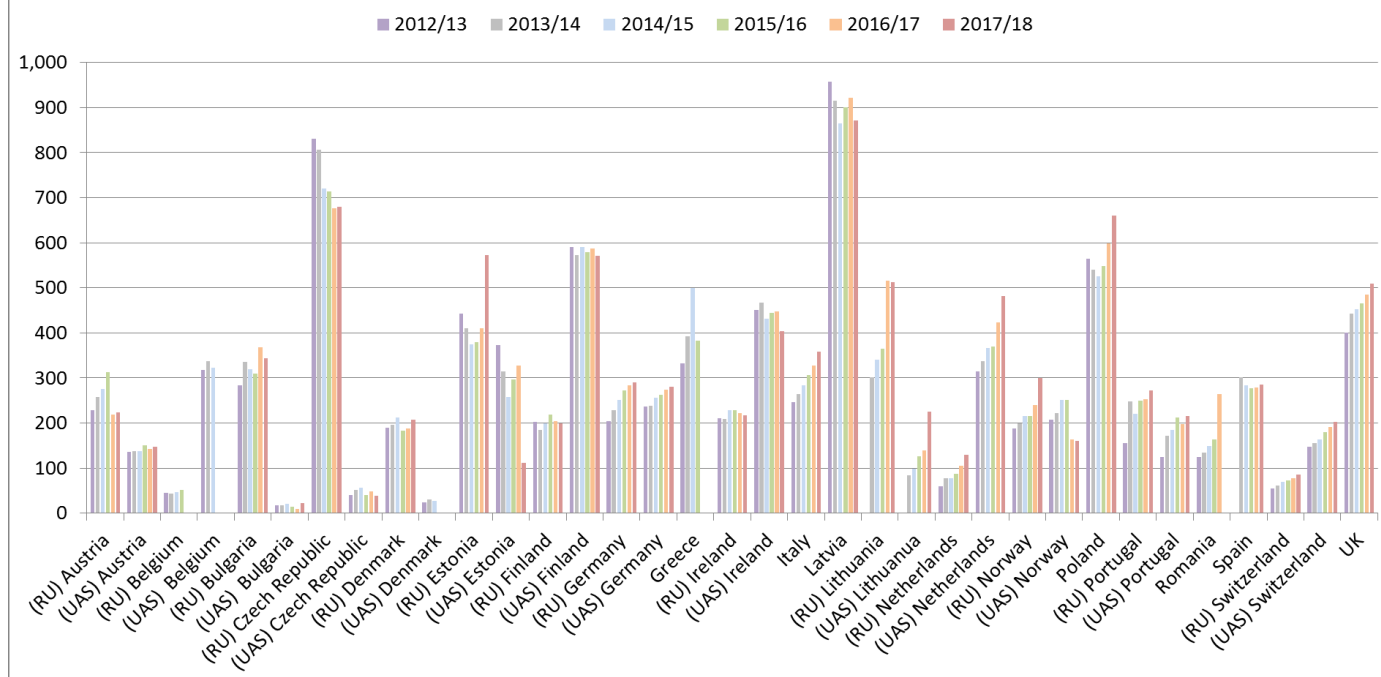
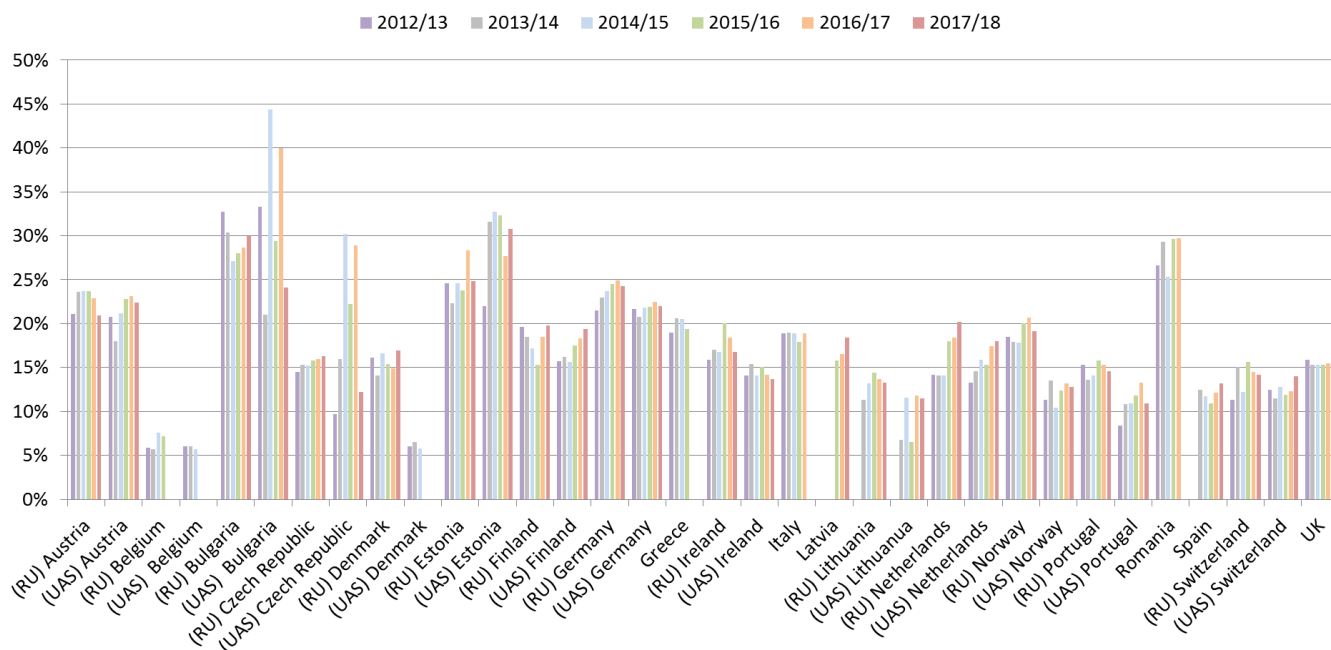


Table 1bis. Female percentage of students in Informatics Bachelor's programs (first year)

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	21.1	23.6	23.7	23.7	22.9	20.9
(UAS) Austria	20.8	18.0	21.2	22.8	23.1	22.4
(RU) Belgium	5.9	5.7	7.6	7.2	(a)	(a)
(UAS) Belgium	6.0	6.0	5.7	(b)	(b)	(a)
(RU) Bulgaria	32.7	30.4	27.1	28.0	28.7	30.0
(UAS) Bulgaria	33.3	21.0	44.4	29.4	40.0	24.1
(RU) Czech Republic	14.5	15.3	15.2	15.8	16.0	16.3
(UAS) Czech Republic	9.7	16.0	30.2	22.2	28.9	12.2
(RU) Denmark	16.1	14.1	16.6	15.4	14.9	16.9
(UAS) Denmark	6.0	6.5	5.8	(b)	(b)	(b)
(RU) Estonia	24.6	22.3	24.6	23.8	28.3	24.8
(UAS) Estonia	22.0	31.6	32.7	32.3	27.7	30.8
(RU) Finland	19.6	18.5	17.2	15.3	18.5	19.8
(UAS) Finland	15.7	16.2	15.6	17.5	18.3	19.4
(RU) Germany	21.5	23.0	23.7	24.5	24.9	24.3
(UAS) Germany	21.7	20.8	21.8	21.9	22.5	22.0
Greece	19.0	20.6	20.5	19.4	(a)	(a)
(RU) Ireland	15.9	17.0	16.8	20.0	18.4	16.8
(UAS) Ireland	14.1	15.4	14.1	15.1	14.2	13.7
Italy	18.9	19.0	18.9	17.9	18.9	(a)
Latvia	n.a	n.a	n.a	15.8	16.5	18.4
(RU) Lithuania	n.a	11.3	13.2	14.4	13.7	13.3
(UAS) Lithuania	n.a	6.8	11.6	6.5	11.8	11.5
(RU) Netherlands	14.2	14.1	14.1	18.0	18.4	20.2
(UAS) Netherlands	13.3	14.6	15.9	15.3	17.4	18.0
(RU) Norway	18.5	17.9	17.8	20.0	20.7	19.1
(UAS) Norway	11.3	13.5	10.4	12.4	13.2	12.8
Poland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
(RU) Portugal	15.3	13.6	14.1	15.8	15.3	14.6
(UAS) Portugal	8.4	10.8	10.9	11.8	13.3	10.9
Romania	26.6	29.3	25.3	29.6	29.7	(a)
Spain	n.a	12.5	11.7	10.9	12.1	13.2
(RU) Switzerland	11.3	15.1	12.2	15.6	14.5	14.2
(UAS) Switzerland	12.5	11.5	12.8	11.9	12.3	14.0
UK	15.9	15.3	15.3	15.3	15.5	15.4

Table 1bis graph: female percentage of students in Informatics Bachelor's programs (first year)



4.2 Bachelor's students

Tables 2 and 2bis present the data for all students enrolled in Bachelor's programs. Sources and footnotes are the same as for Table 1. Additional footnotes provide detail for specific situations in some countries.

<i>Table 2. Students in Informatics Bachelor's programs (all semesters)</i>							<i>(Ratio = Total/1,000,000 inhabitants)</i>					
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	7,976	938	8,159	959	8,417	990	8,969	1,055	8,659	1,018	8,387	986
(UAS) Austria	2,559	301	2,606	306	2,617	308	2,740	322	2,567	302	2,937	345
(RU) Belgium	1,676	149	1,748	155	1,826	162	1,753	156	(a)	(a)	(a)	(a)
(UAS) Belgium	9,018	800	9,682	859	9,731	864	10,050	892	(a)	(a)	(a)	(a)
(RU) Bulgaria	7,067	1,002	7,556	1,072	7,591	1,077	7,822	1,009	8,429	1,196	8,510	1,207
(UAS) Bulgaria	289	41	332	47	353	50	358	51	318	45	398	56
(RU) Czech Republic	19,719	1,852	19,319	1,797	18,021	1,692	17,023	1,598	16,246	1,525	15,950	1,498
(UAS) Czech Republic	714	67	877	82	825	77	722	68	742	70	779	73
(RU) Denmark	2,628	467	2,948	524	3,127	556	2,876	511	2,748	488	2,828	503
(UAS) Denmark	184	33	181	32	199	35	(b)	(b)	(b)	(b)	(b)	(b)
(RU) Estonia	1,613	1,288	1,660	1,264	1,667	1,269	1,652	1,258	1,623	1,236	1,778	1,354
(UAS) Estonia	1,736	1,322	1,590	1,211	1,461	1,112	1,373	1,045	1,335	1,017	983	749
(RU) Finland	9,317	1,693	8,720	1,585	8,200	1,490	8,113	1,474	7,543	1,371	7,578	1,377
(UAS) Finland	12,459	2,264	12,203	2,217	12,297	2,234	12,212	2,219	12,484	2,268	12,968	2,356
(RU) Germany	61,351	760	65,213	808	68,788	852	73,784	914	78,306	970	82,318	1,020
(UAS) Germany	68,867	853	72,116	893	76,103	943	78,688	975	82,380	1,021	85,644	1,061
Greece	14,271	1,319	15,558	1,438	17,529	1,621	17,452	1,613	(a)	(a)	(a)	(a)
(RU) Ireland	3,396	739	3,313	721	3,641	793	3,857	840	3,917	853	3,955	861
(UAS) Ireland	3,204	698	3,470	755	3,811	830	4,131	899	4,306	937	4,483	976
Italy	66,887	1,100	68,518	1,127	71,673	1,179	75,258	1,238	78,928	1,299	83,338	1,371
Latvia	4,518	2,257	4,598	2,297	4,303	2,150	4,584	2,290	4,854	2,425	4,629	2,313
(RU) Lithuania	n.a.	n.a.	2,570	915	2,870	1,022	3,202	1,140	3,722	1,325	4,407	1,569
(UAS) Lithuania	n.a.	n.a.	603	215	632	225	736	262	831	296	1,147	408
(RU) Netherlands	3,640	217	4,292	255	5,107	303	5,842	347	6,815	404	7,960	472
(UAS) Netherlands	22,945	1,362	24,564	1,458	28,173	1,672	29,332	1,741	31,388	1,863	33,683	1,999
(RU) Norway	3,640	683	3,930	738	4,190	786	4,430	831	6,350	1,192	6,605	1,240
(UAS) Norway	3,480	653	3,685	692	3,940	739	4,250	798	2,815	528	2,990	561
Poland	58,075	1,511	57,586	1,498	55,733	1,450	57,572	1,498	61,034	1,588	65,836	1,713
(RU) Portugal	9,427	917	9,520	926	9,476	922	10,231	996	10,594	1,031	10,992	1,070
(UAS) Portugal	6,318	615	6,236	607	6,612	643	7,728	752	7,611	741	8,112	789
Romania	7,122	358	7,376	371	8,144	410	8,837	445	15,807	796	(a)	(a)
Spain	51,930	1,118	50,267	1,082	48,030	1,034	45,430	978	46,032	991	46,898	1,009
(RU) Switzerland	1,725	205	1,847	219	2,052	244	2,230	265	2,378	282	2,611	310
(UAS) Switzerland	4,190	498	4,448	528	4,746	564	5,081	604	5,437	646	5,752	683
UK	73,015	1,146	74,895	1,176	76,480	1,201	79,500	1,248	83,645	1,313	88,025	1,382

Ireland: note that a small error in the numbers of Bachelor's and Master's students for the RU and UAS was found for 2014/15 affecting Tables 2, 2bis, 3.

Netherlands: Note that the numbers for the UAS are considerably higher than the numbers for RU in part because Bachelor's studies at RU are 3-year programs while at UAS 4-year programs (see Section 3.15).

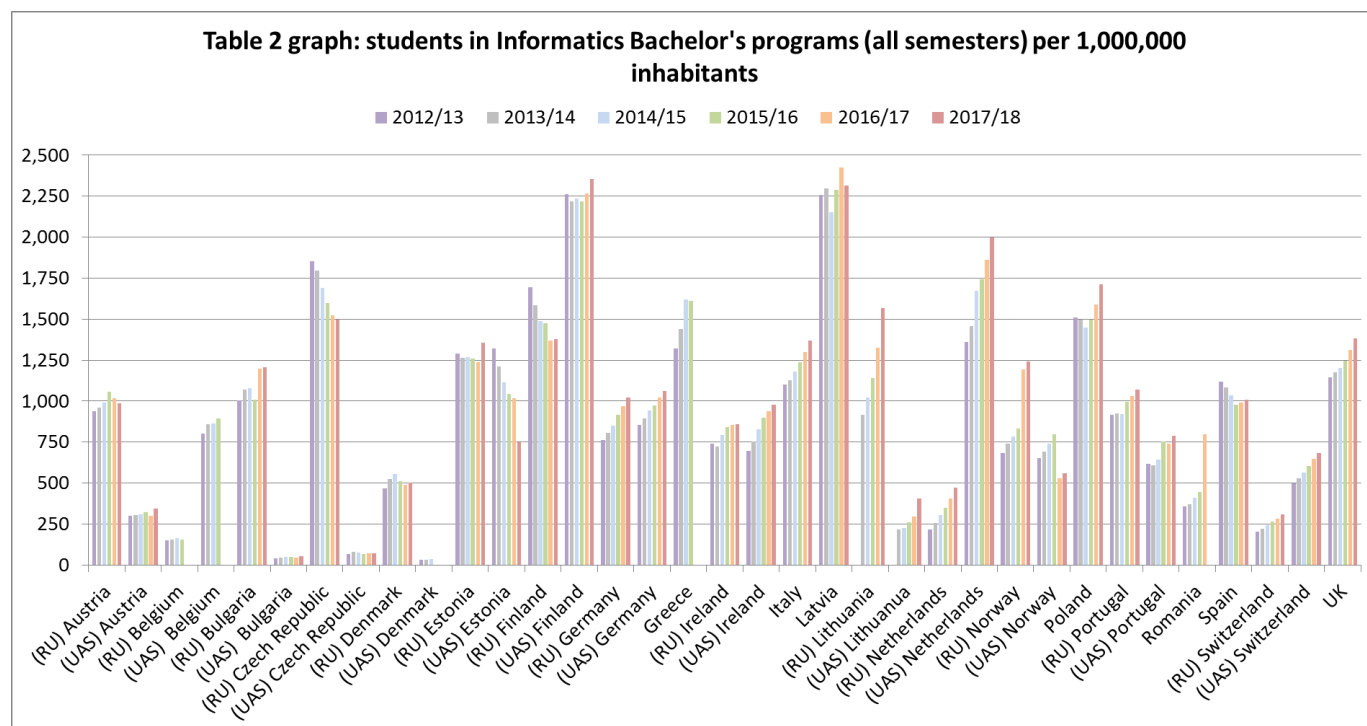
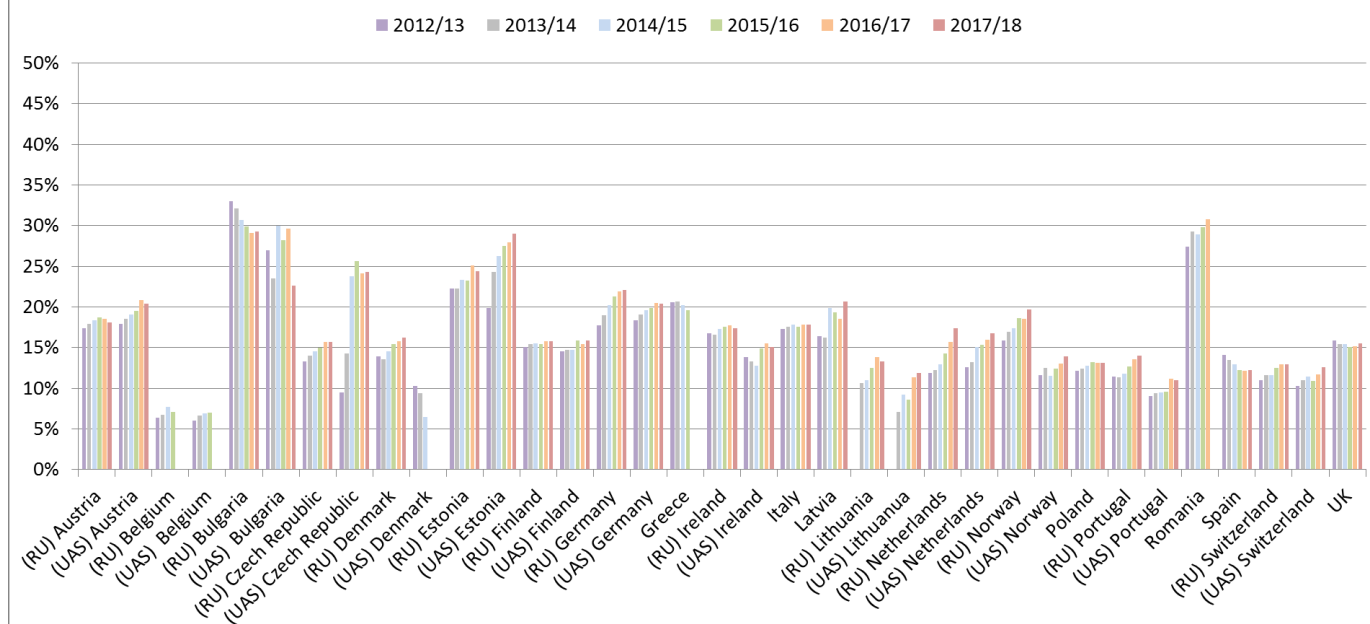


Table 2bis. Female percentage of total students in Informatics Bachelor's programs (all semesters)

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	17.4	17.9	18.4	18.7	18.5	18.1
(UAS) Austria	17.9	18.5	19.1	19.5	20.8	20.4
(RU) Belgium	6.4	6.7	7.7	7.1	(a)	(a)
(UAS) Belgium	6.0	6.6	6.9	7.0	(a)	(a)
(RU) Bulgaria	33.0	32.1	30.7	29.9	29.1	29.3
(UAS) Bulgaria	27.0	23.5	30.0	28.2	29.6	22.6
(RU) Czech Republic	13.3	14.0	14.5	15.0	15.7	15.7
(UAS) Czech Republic	9.5	14.3	23.8	25.6	24.1	24.3
(RU) Denmark	13.9	13.6	14.5	15.4	15.8	16.2
(UAS) Denmark	10.3	9.4	6.5	(b)	(b)	(b)
(RU) Estonia	22.3	22.3	23.3	23.2	25.1	24.4
(UAS) Estonia	19.9	24.3	26.3	27.5	27.9	29.0
(RU) Finland	15.1	15.4	15.5	15.4	15.8	15.8
(UAS) Finland	14.5	14.7	14.7	15.9	15.4	15.9
(RU) Germany	17.7	19.0	20.2	21.3	21.9	22.1
(UAS) Germany	18.4	19.1	19.6	19.9	20.5	20.4
Greece	20.6	20.7	20.2	19.6	(a)	(a)
(RU) Ireland	16.8	16.6	17.3	17.6	17.7	17.4
(UAS) Ireland	13.8	13.3	12.8	14.9	15.5	15.1
Italy	17.3	17.6	17.8	17.6	17.8	17.8
Latvia	16.4	16.2	19.9	19.3	18.5	20.7
(RU) Lithuania	n.a.	10.6	11.0	12.5	13.8	13.3
(UAS) Lithuania	n.a.	7.1	9.2	8.6	11.3	11.9
(RU) Netherlands	11.9	12.2	12.9	14.3	15.7	17.4
(UAS) Netherlands	12.6	13.2	15.1	15.3	16.0	16.8
(RU) Norway	15.9	16.9	17.4	18.6	18.5	19.7
(UAS) Norway	11.6	12.5	11.5	12.4	13.0	13.9
Poland	12.1	12.4	12.8	13.2	13.1	13.1
(RU) Portugal	11.4	11.3	11.8	12.7	13.6	14.0
(UAS) Portugal	9.0	9.4	9.5	9.6	11.2	11.0
Romania	27.4	29.3	28.9	29.8	30.8	(a)
Spain	14.1	13.5	12.9	12.2	12.1	12.2
(RU) Switzerland	11.0	11.6	11.6	12.5	12.9	12.9
(UAS) Switzerland	10.3	11.0	11.4	10.9	11.7	12.6
UK	15.9	15.4	15.4	15.1	15.2	15.5

Table 2bis graph: female percentage of students in Informatics Bachelor's programs (all semesters)



4.3 Master's students

Table 3 and 3bis present the data for all students enrolled in Master's programs. Sources and footnotes are the same as for Table 1. Additional footnotes provide detail for specific situations in some countries.

<i>Table 3. Students in Informatics Master's programs</i>							<i>(Ratio = Total/1,000,000 inhabitants)</i>					
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	3,316	390	3,370	396	3,489	410	3,591	422	3,591	422	3,878	456
(UAS) Austria	1,188	140	1,373	161	1,489	175	1,485	175	1,446	170	1,420	167
(RU) Belgium	1,203	107	1,234	110	1,213	108	1,489	132	(a)	(a)	(a)	(a)
(UAS) Belgium	132	12	172	15	154	14	202	18	(a)	(a)	(a)	(a)
(RU) Bulgaria	1,677	238	1,661	236	1,693	240	1,659	235	1,623	230	1,824	259
(RU) Czech Republic	7,665	720	7,555	709	7,509	705	7,178	674	6,741	633	6,321	594
(UAS) Czech Republic	61	6	67	6	53	5	53	5	45	4	41	4
(RU) Denmark	1,658	295	1,754	312	1,238	220	1,346	239	1,296	230	1,364	242
(RU) Estonia	760	579	793	604	848	646	926	705	991	775	1,107	843
(RU) Finland	4,401	800	4,560	829	4,407	801	4,425	804	4,802	873	4,772	867
(UAS) Finland	454	82	560	102	703	128	718	130	762	138	750	136
(RU) Germany	15,888	197	19,199	238	22,132	274	25,402	315	27,914	346	29,809	369
(UAS) Germany	7,839	97	8,935	111	10,203	126	11,422	142	12,641	157	13,733	170
Greece	2,967	274	3,445	319	3,514	325	3,962	366	(a)	(a)	(a)	(a)
(RU) Ireland	1,347	293	1,396	304	1,185	258	1,145	249	1,335	291	1,429	311
(UAS) Ireland	587	128	695	151	592	129	541	119	604	132	650	142
Italy	9,478	156	9,057	149	8,975	148	9,307	153	9,857	162	11,162	184
Latvia	1,202	601	1,191	595	1,389	693	1,249	625	1,488	743	1,136	568
(RU) Lithuania	n.a.	n.a.	489	174	493	176	495	176	541	193	601	214
(RU) Netherlands	2,374	141	2,597	154	2,817	167	3,098	184	3,494	207	4,214	250
(UAS) Netherlands	0	0	0	0	20	1	13	1	11	1	13	1
(RU) Norway	1,015	190	1,130	212	1,175	221	1,215	228	1,670	313	1,835	344
(UAS) Norway	230	43	305	57	375	70	490	92	245	46	250	47
Poland	11,203	291	10,790	281	10,814	281	10,950	285	11,368	296	11,644	303
(RU) Portugal	1,725	168	1,666	162	1,621	158	1,521	148	1,621	158	1,953	190
(UAS) Portugal	843	82	822	80	738	72	696	68	784	76	933	91
Romania	1,994	100	2,022	102	1,860	94	1,904	96	3,815	192	(a)	(a)
Spain	4,052	87	4,176	90	4,398	95	4,593	99	5,539	119	5,936	128
(RU) Switzerland	1,034	123	1,081	128	1,063	126	1,157	137	1,283	152	1,367	162
(UAS) Switzerland	683	81	779	93	848	101	1,006	120	1,147	136	1,293	154
UK	12,045	189	11,960	188	11,970	188	11,875	186	12,630	198	14,315	225

Bulgaria: Colleges (*колежи*) do not offer Master's studies in Informatics.

Denmark: Master's studies in Informatics are not offered by UAS (*Professionshøjskoler*).

Estonia: UAS (*Rakendusõrgkoolid*) do not offer Master's studies in Informatics.

Lithuania: Master's studies in Informatics are not offered by UAS (*Kolegija*).

Netherlands UAS: There are only a few Master's programs offered by UAS (*Hogescholen*).

Switzerland UAS: Studies aiming at a Master's degree [SW7] in UAS (*Fachhochschulen*) in the following programs: *Engineering Technik und IT, Wirtschaftsinformatik* and Business Information Systems [SW7-SW8].

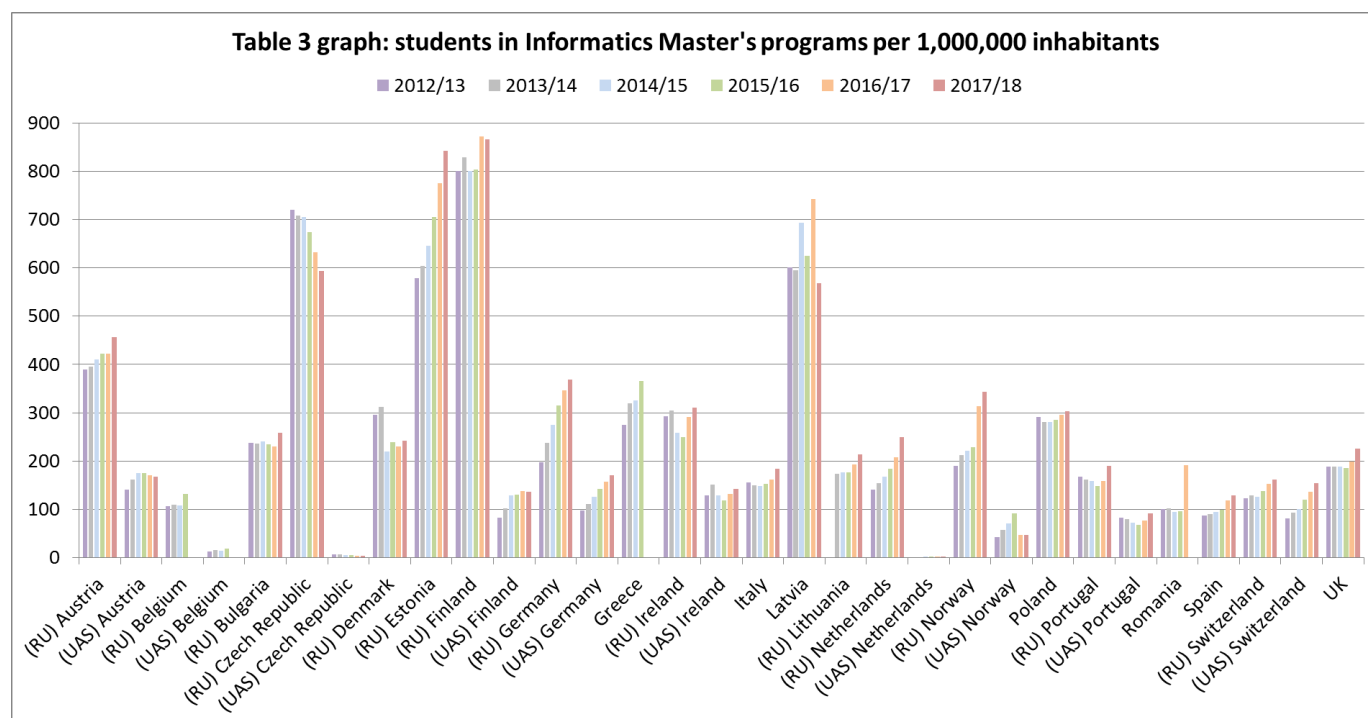
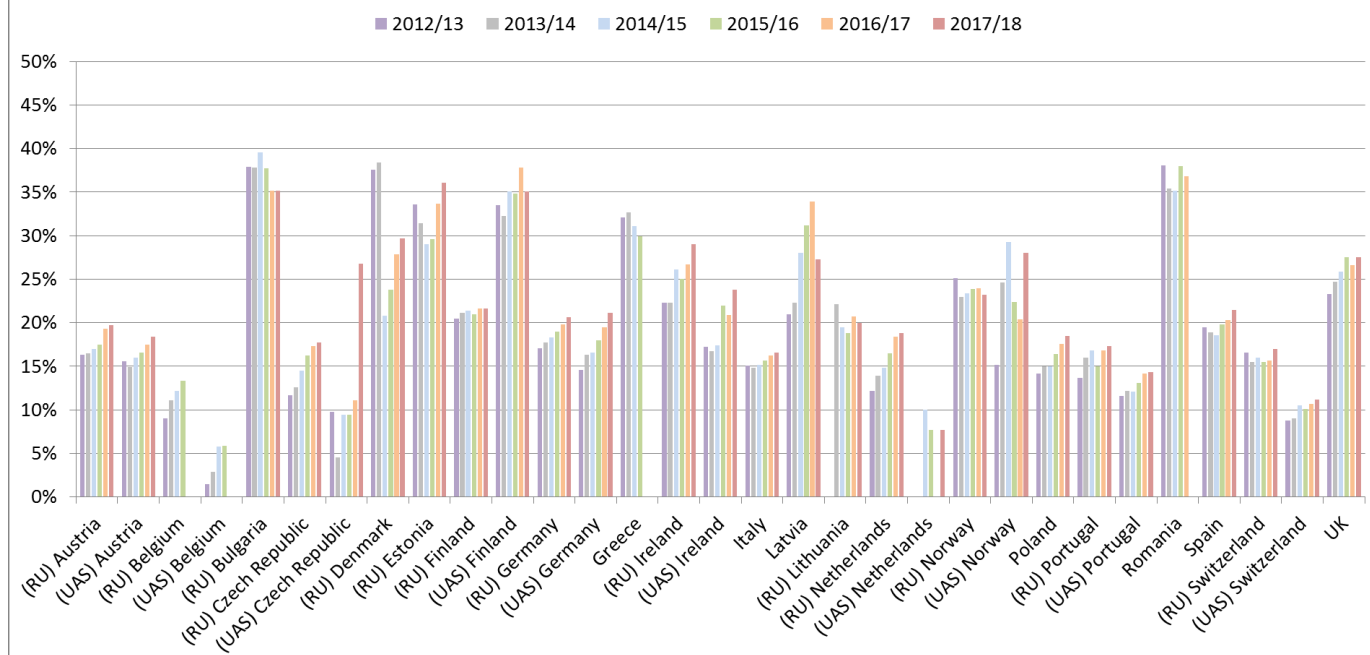


Table 3bis. Female percentage of total students in Informatics Master's programs						
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	16.3	16.5	17.0	17.5	19.3	19.7
(UAS) Austria	15.6	14.9	16.0	16.6	17.5	18.4
(RU) Belgium	9.0	11.1	12.2	13.3	(a)	(a)
(UAS) Belgium	1.5	2.9	5.8	5.9	(a)	(a)
(RU) Bulgaria	37.9	37.8	39.6	37.7	35.2	35.2
(RU) Czech Republic	11.7	12.6	14.5	16.2	17.3	17.7
(UAS) Czech Republic	9.8	4.5	9.4	9.4	11.1	26.8
(RU) Denmark	37.6	38.4	20.8	23.8	27.9	29.7
(RU) Estonia	33.6	31.4	29.0	29.6	33.7	36.1
(RU) Finland	20.5	21.1	21.4	21.0	21.6	21.6
(UAS) Finland	33.5	32.3	35.1	34.8	37.8	35.1
(RU) Germany	17.1	17.7	18.3	19.0	19.8	20.6
(UAS) Germany	14.6	16.3	16.6	18.0	19.5	21.1
Greece	32.1	32.7	31.1	29.9	(a)	(a)
(RU) Ireland	22.3	22.3	26.1	25.0	26.7	29.0
(UAS) Ireland	17.2	16.7	17.4	22.0	20.9	23.8
Italy	15.1	14.8	15.2	15.7	16.2	16.6
Latvia	21.0	22.3	28.0	31.2	33.9	27.3
(RU) Lithuania	n.a.	22.1	19.5	18.8	20.7	20.0
(RU) Netherlands	12.2	13.9	14.8	16.5	18.4	18.8
(UAS) Netherlands	0	0	10.0	7.7	0	7.7
(RU) Norway	25.1	23.0	23.4	23.9	24.0	23.2
(UAS) Norway	15.2	24.6	29.3	22.4	20.4	28.0
Poland	14.2	15.0	15.0	16.4	17.6	18.5
(RU) Portugal	13.7	16.0	16.8	15.0	16.8	17.3
(UAS) Portugal	11.6	12.2	12.1	13.1	14.2	14.3
Romania	38.1	35.4	35.2	38.0	36.8	(a)
Spain	19.5	18.9	18.6	19.8	20.3	21.5
(RU) Switzerland	16.6	15.5	16.0	15.5	15.7	17.0
(UAS) Switzerland	8.8	9.0	10.5	10.1	10.7	11.2
UK	23.3	24.7	25.9	27.5	26.6	27.5

Note that the significant variations in the female percentage of Master's students enrolled in Universities of Applied Sciences in Czech Republic and in the Netherlands can be better understood considering that the number of Master's students in all cases is quite small and therefore small variations in the absolute numbers reflect on a strong variation in the percentages.

Table 3bis graph: female percentage of total students in Informatics Master's programs



4.4 Doctoral students

Table 4 and 4bis present the data for all students enrolled in Doctoral (PhD) programs. Sources and footnotes are the same as for Table 1. Additional footnotes provide detail for specific situations in some countries.

<i>Table 4. Students in Informatics Doctoral (PhD) programs</i>							<i>(Ratio = Total/1,000,000 inhabitants)</i>					
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	1,525	179	1,438	169	1,354	159	1,103	130	1,111	131	1,014	119
(RU) Bulgaria	141	20	149	21	176	25	168	24	195	28	204	29
(RU) Czech Republic	1,986	186	1,990	187	2,008	189	1,955	184	1,856	174	1,677	157
(RU) Estonia	211	161	210	160	225	171	219	167	206	157	191	145
(RU) Finland	1,519	276	1,484	270	1,421	258	1,360	247	1,327	241	1,269	231
(RU) Germany	4,407	55	4,608	57	4,709	58	4,788	59	4,863	60	4,864	60
Greece	2,125	196	2,156	199	2,243	207	2,317	214	(a)	(a)	(a)	(a)
(RU) Ireland	387	84	365	79	356	78	344	75	353	77	318	69
(UAS) Ireland	42	9	47	10	35	8	45	10	63	14	69	15
Italy	1,931	32	1,995	33	2,171	36	2,122	35	2,047	34	2,127	35
Latvia	216	108	180	90	197	98	194	97	201	100	213	106
(RU) Portugal	809	79	731	71	683	66	656	64	634	62	639	62
Spain	(b)	(b)	(b)	(b)	1,012	22	1,381	30	1,483	32	1,889	41
(RU) Switzerland	807	96	817	97	821	98	810	96	807	96	843	100

Belgium: numbers were not available since the statistics on Doctoral students and degrees is reported combined across the entire field of Sciences or Engineering [BE3, BE4].

Denmark: numbers were not available since the statistics on Doctoral students and degrees is reported combined across the entire field of Natural or Technical Sciences¹⁰.

Lithuania: numbers were not available since the statistics on Doctoral students and degrees is reported combined across the entire field of Technological sciences [LT3].

Netherlands: numbers were not available since the statistics on Doctoral students and degrees is reported across the entire field of Engineering or Natural Sciences [NE4].

Norway: numbers have not yet been collected, we plan to collect and publish them in the next edition of the report.

Poland: numbers were not available since the statistics on Doctoral students and degrees is reported combined across the entire field of Technical sciences [PL1].

Romania: numbers have not yet been collected, we plan to collect and publish them in the next edition of the report.

UK: numbers were not available since the statistics on Doctoral (Postgraduate research) students is reported combined with Master of Research (MRes) students [UK1].

In all countries included in this study, except Ireland, Norway and Portugal, PhD degrees are only awarded by traditional Universities and not by University of Applied Sciences/University Colleges. In Portugal, Universities of Applied Sciences (*Politécnico*) have been granted rights to offer Doctoral studies only since August 2018 [PT1].

Table 4 graph: students in Informatics Doctoral (PhD) programs per 1,000,000 inhabitants

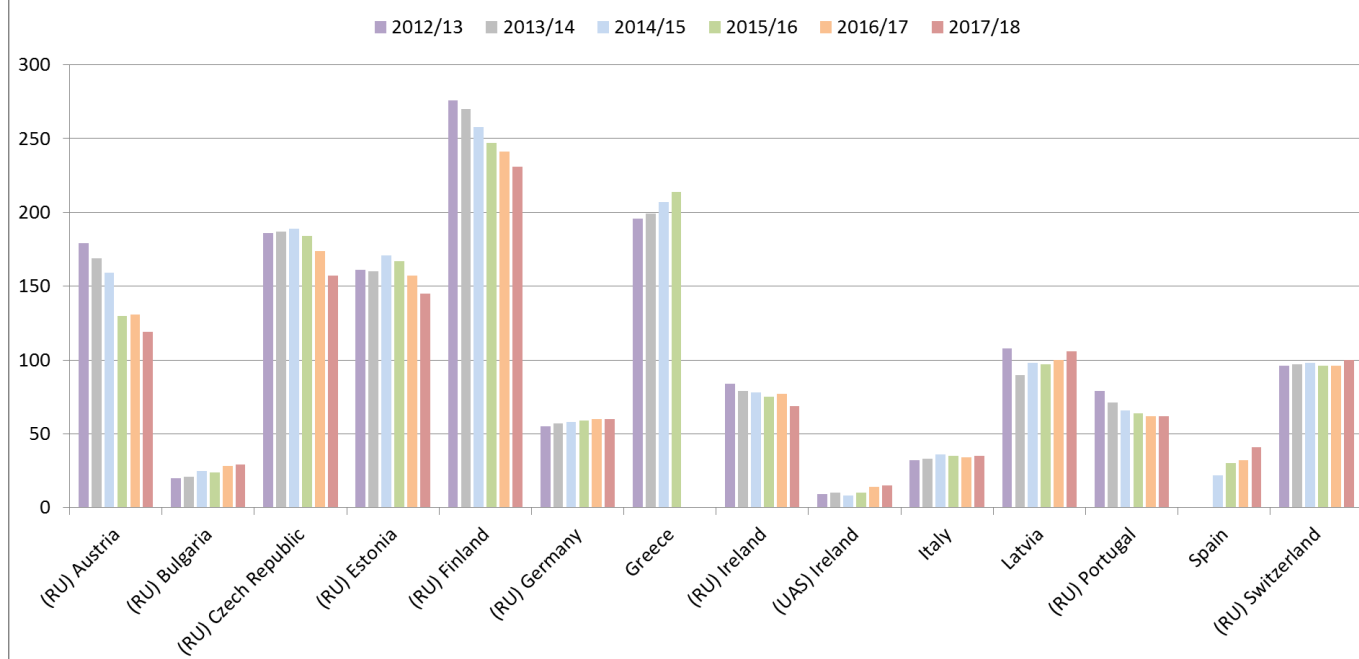
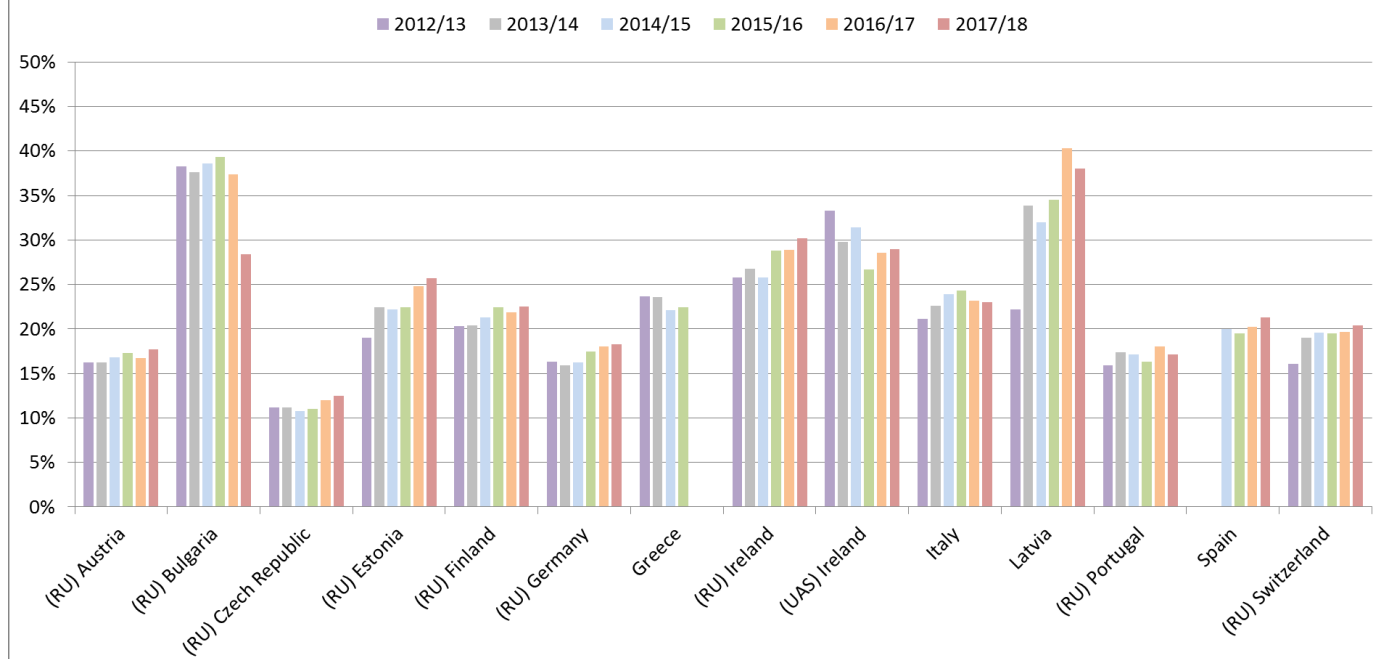


Table 4bis. Female percentage of total students in Informatics Doctoral (PhD) programs

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	16.2	16.2	16.8	17.3	16.7	17.7
(RU) Bulgaria	38.3	37.6	38.6	39.3	37.4	28.4
(RU) Czech Republic	11.2	11.2	10.8	11.0	12.0	12.5
(RU) Estonia	19.0	22.4	22.2	22.4	24.8	25.7
(RU) Finland	20.3	20.4	21.3	22.4	21.9	22.5
(RU) Germany	16.3	15.9	16.2	17.5	18.0	18.3
Greece	23.7	23.6	22.1	22.4	(a)	(a)
(RU) Ireland	25.8	26.8	25.8	28.8	28.9	30.2
(UAS) Ireland	33.3	29.8	31.4	26.7	28.6	29.0
Italy	21.1	22.6	23.9	24.3	23.2	23.0
Latvia	22.2	33.9	32.0	34.5	40.3	38.0
(RU) Portugal	15.9	17.4	17.1	16.3	18.0	17.1
Spain	(b)	(b)	20.0	19.5	20.2	21.3
(RU) Switzerland	16.1	19.0	19.6	19.5	19.7	20.4

Table 4bis graph: female percentage of total students in Informatics Doctoral (PhD) programs



4.5 Tentative extrapolation to the whole of Europe

It is possible to attempt a rough estimate of how the preceding measurements generalize to Europe as a whole, defined here according to the United Nations Classification of countries by region [UN1]. The population of the countries used for this study¹² (see Section 4) is around 50% the population of Europe (considered 373,397,171 inhabitants out of 745,415,000¹³). A simple rule of thirds gives the following approximation (rounded) for the data from 2017/2018:

- First-year students in Informatics: 368,000
- Bachelor's students in Informatics: 1,217,000
- Master's students in Informatics: 244,000.

Unlike the carefully documented measurements of the preceding tables, these numbers cannot be taken as exhibiting any degree of precision. They do, however, suggest an order of magnitude. If they are indeed within range, we note that more Europeans are in an Informatics Bachelor's program than live in Brussels, the capital of both Belgium and de facto the European Union, or Cologne, the fourth most populated city in Germany.

¹² Note that Belgium, Denmark, Greece and Romania were not included in the extrapolations since the data for student enrolment either at Research Universities or Universities or Applied Sciences was not available for 2017/2018.

¹³ The total population of the European region for 2017 [UN2].

5 Degrees

The tables that follow present data about degrees awarded: Bachelor's in Tables 5 and 5bis; Master's in Tables 6 and 6bis; Doctoral (PhD) in Tables 7 and 7bis. Source and footnotes are the same as Tables 1, 2, 3 and 4. Additional footnotes following each Table provide detail for specific situations in some countries. Also, as before, any comparison must take into account the different definitions used in the countries investigated.

5.1 Bachelor's degrees

<i>Table 5. Informatics Bachelor's degrees awarded</i>							<i>(Ratio = Total/1,000,000 inhabitants)</i>					
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	521	61	544	64	512	60	602	71	586	69	593	70
(UAS) Austria	651	77	695	82	702	83	613	72	601	71	676	79
(RU) Belgium	223	20	217	19	249	22	259	23	(a)	(a)	(a)	(a)
(UAS) Belgium	1,436	127	1,384	123	1,355	120	1,463	130	(a)	(a)	(a)	(a)
(RU) Bulgaria	1,176	167	1,232	175	1,082	153	1,199	170	1,102	156	1,288	183
(UAS) Bulgaria	61	9	46	7	64	9	58	8	48	7	13	2
(RU) Czech Republic	3,153	296	2,998	282	2,906	273	2,699	253	2,431	228	2,436	229
(UAS) Czech Republic	117	11	126	12	94	9	95	9	103	10	86	8
(RU) Denmark	312	55	378	67	515	92	559	99	594	106	569	101
(UAS) Denmark	51	8	126	22	108	19	(b)	(b)	(b)	(b)	(b)	(b)
(RU) Estonia	169	129	178	136	187	142	266	203	298	227	220	168
(UAS) Estonia	173	132	146	111	172	131	175	133	176	134	115	88
(RU) Finland	767	139	781	142	759	138	868	158	1,014	184	771	140
(UAS) Finland	1,558	283	1,621	295	1,610	293	1,630	296	1,583	288	1,502	273
(RU) Germany	6,640	82	6,203	77	6,107	76	6,241	77	5,853	73	6,085	75
(UAS) Germany	8,927	111	8,970	111	9,490	118	10,251	127	10,353	128	10,353	128
Greece	2,254	208	2,187	202	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
(RU) Ireland	375	82	515	112	537	117	646	141	814	177	824	179
(UAS) Ireland	543	118	711	155	728	159	868	189	895	195	946	206
Italy	8,352	137	8,166	134	8,278	136	8,537	140	9,328	153	9,775	161
Latvia	705	352	656	328	557	278	560	280	532	266	489	244
(RU) Lithuania	n.a.	n.a.	598	213	428	152	384	137	382	136	488	174
(UAS) Lithuania	n.a.	n.a.	98	35	101	36	58	21	86	31	91	32
(RU) Netherlands	555	33	567	34	692	41	819	49	1,014	60	1,167	69
(UAS) Netherlands	2,806	167	3,348	199	3,541	210	3,692	219	3,866	229	4,085	242
(RU) Norway	335	63	420	79	525	99	590	111	710	133	1,040	195
(UAS) Norway	535	100	595	112	685	129	645	121	445	84	450	84
Poland	9,534	248	8,636	225	8,785	229	8,756	228	9,361	244	(a)	(a)
(RU) Portugal	1,446	141	1,382	134	1,176	114	1,390	135	1,605	156	1,795	175
(UAS) Portugal	830	81	657	64	723	70	760	74	948	92	1,055	103
Romania	1,206	61	1,292	65	1,423	72	2,363	119	(a)	(a)	(a)	(a)
Spain	7,209	155	6,957	150	6,548	141	5,196	112	5,144	111	4,423	95
(RU) Switzerland	247	29	233	28	277	33	284	34	327	39	358	43
(UAS) Switzerland	665	79	754	90	758	90	839	100	941	112	989	117
UK	17,865	280	17,835	280	17,445	274	17,035	267	18,655	293	19,730	310

Belgium: note that a small error in the numbers of Bachelor's and Master's degrees awarded for the RU was found for 2013/14 affecting Tables 5, 5bis, 6bis, 8.

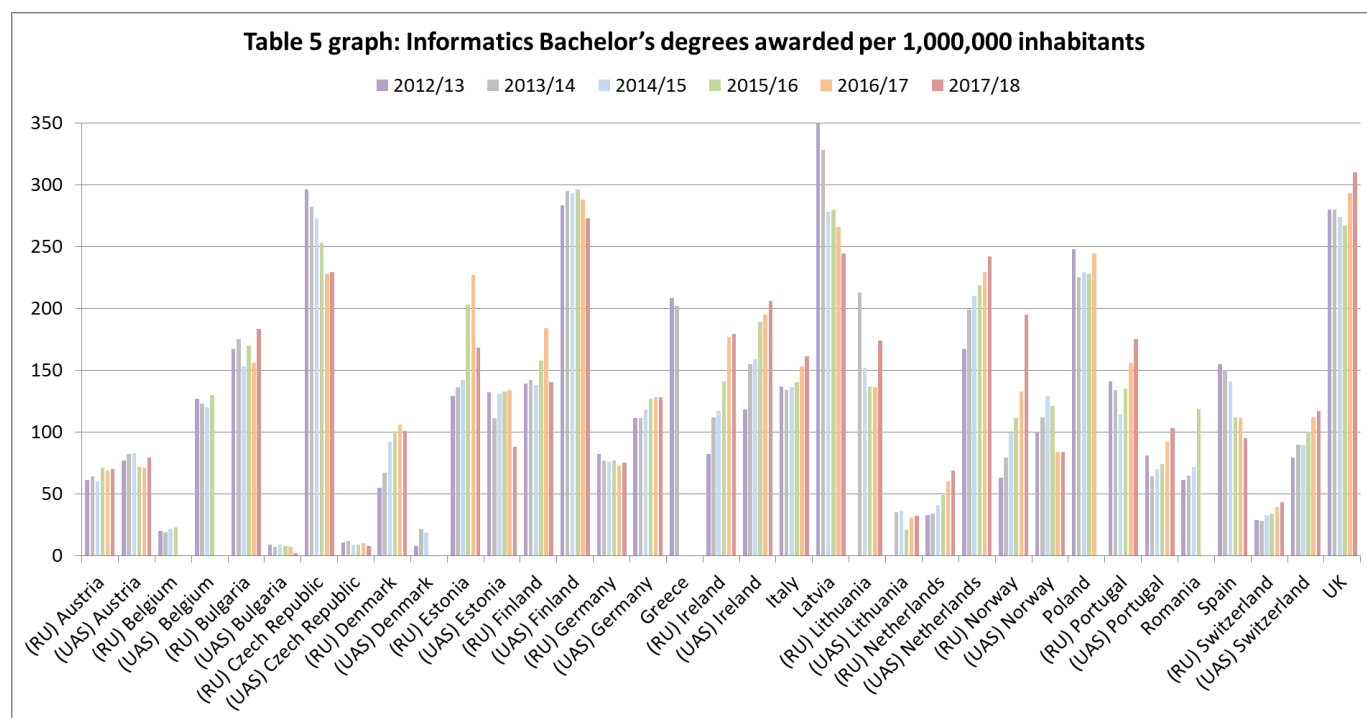
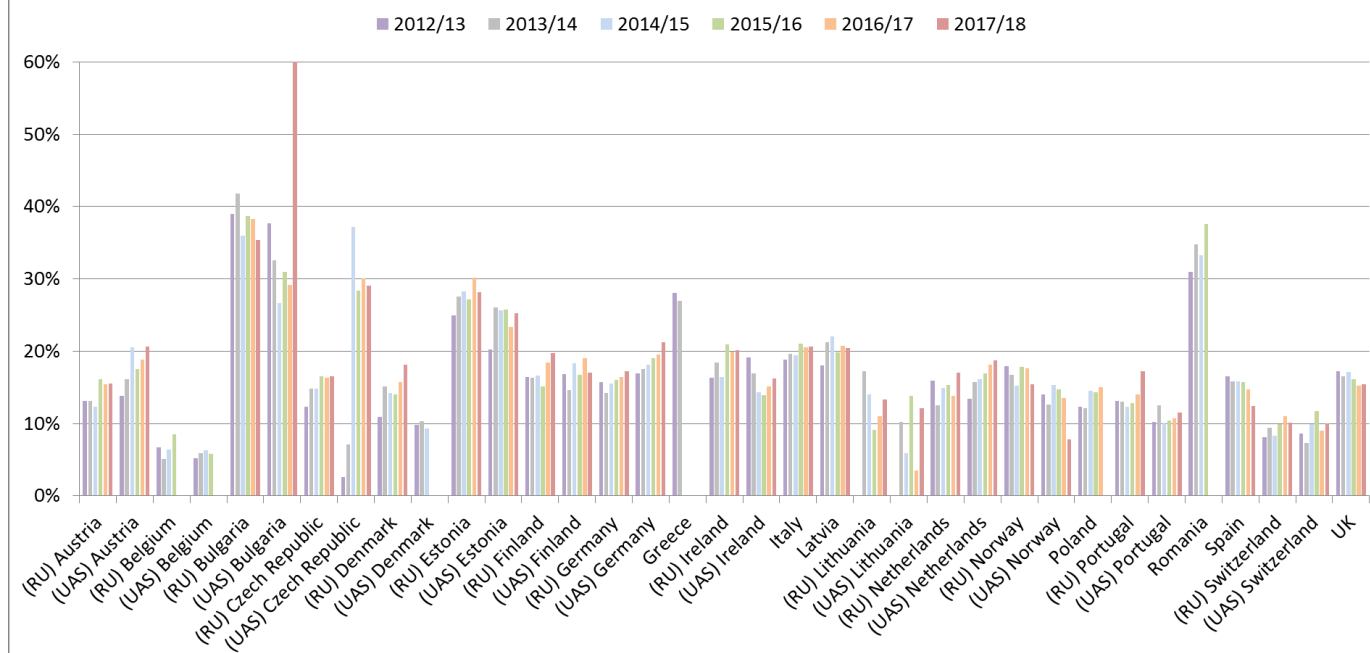


Table 5bis. Female percentage of total Informatics Bachelor's degrees awarded

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	13.1	13.1	12.3	16.1	15.4	15.5
(UAS) Austria	13.8	16.1	20.5	17.5	18.8	20.6
(RU) Belgium	6.7	5.1	6.4	8.5	(a)	(a)
(UAS) Belgium	5.2	5.9	6.3	5.8	(a)	(a)
(RU) Bulgaria	39.0	41.8	36.0	38.7	38.3	35.4
(UAS) Bulgaria	37.7	32.6	26.6	31.0	29.2	61.5
(RU) Czech Republic	12.3	14.8	14.8	16.5	16.3	16.5
(UAS) Czech Republic	2.6	7.1	37.2	28.4	30.1	29.1
(RU) Denmark	10.9	15.1	14.2	14.0	15.7	18.1
(UAS) Denmark	9.8	10.3	9.3	(b)	(b)	(b)
(RU) Estonia	24.9	27.5	28.3	27.1	30.2	28.2
(UAS) Estonia	20.2	26.0	25.6	25.7	23.3	25.2
(RU) Finland	16.4	16.3	16.6	15.1	18.4	19.7
(UAS) Finland	16.8	14.6	18.3	16.7	19.0	17.0
(RU) Germany	15.7	14.2	15.5	16.0	16.4	17.2
(UAS) Germany	16.9	17.5	18.1	19.0	19.5	21.2
Greece	28.1	26.9	(a)	(a)	(a)	(a)
(RU) Ireland	16.3	18.4	16.4	20.9	19.9	20.1
(UAS) Ireland	19.1	16.9	14.3	13.9	15.1	16.2
Italy	18.8	19.6	19.4	21.0	20.5	20.6
Latvia	18.0	21.2	22.0	19.8	20.7	20.4
(RU) Lithuania	n.a.	17.2	14.0	9.1	11.0	13.3
(UAS) Lithuania	n.a.	10.2	5.9	13.8	3.5	12.1
(RU) Netherlands	15.9	12.5	14.9	15.3	13.8	17.0
(UAS) Netherlands	13.4	15.7	16.1	16.9	18.1	18.7
(RU) Norway	17.9	16.7	15.2	17.8	17.6	15.4
(UAS) Norway	14.0	12.6	15.3	14.7	13.5	7.8
Poland	12.3	12.1	14.5	14.3	15.0	(a)
(RU) Portugal	13.1	13.0	12.3	12.8	14.0	17.2
(UAS) Portugal	10.2	12.5	10.1	10.4	10.7	11.5
Romania	31.0	34.8	33.3	37.6	(a)	(a)
Spain	16.5	15.8	15.8	15.7	14.7	12.4
(RU) Switzerland	8.1	9.4	8.3	9.9	11.0	10.1
(UAS) Switzerland	8.6	7.3	9.9	11.7	9.0	10.0
UK	17.2	16.5	17.1	16.1	15.2	15.4

Note that the significant variations in the female percentage of Bachelor's degrees awarded in University of Applied Sciences in Bulgaria and Czech Republic can be better understood considering that the number of Bachelor's degrees awarded in all cases is quite small and therefore small variations in the absolute numbers reflect on a strong variation in the percentages.

Table 5bis graph: female percentage of total Informatics Bachelor's degrees



5.2 Master's degrees

Table 6. Informatics Master's degrees awarded

(Ratio = Total/1,000,000 inhabitants)

	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	434	51	493	58	519	61	384	45	362	43	470	55
(UAS) Austria	442	52	520	61	583	69	652	77	598	70	549	65
(RU) Belgium	410	36	438	39	422	37	373	33	(a)	(a)	(a)	(a)
(UAS) Belgium	60	5	58	5	69	6	60	5	(a)	(a)	(a)	(a)
(RU) Bulgaria	491	70	593	84	570	81	703	100	585	83	787	112
(RU) Czech Republic	2,438	229	2,316	217	2,224	209	2,287	215	2,099	197	1,964	184
(UAS) Czech Republic	15	1	19	2	15	1	11	1	7	1	8	1
(RU) Denmark	428	76	488	87	517	92	379	67	510	91	503	89
(RU) Estonia	130	99	136	104	141	107	195	148	224	171	240	183
(RU) Finland	829	151	957	174	978	178	1,082	197	1,114	202	977	178
(UAS) Finland	79	14	105	19	125	23	139	25	171	31	194	35
(RU) Germany	2,407	30	3,003	37	3,764	47	4,470	55	4,992	62	5,793	72
(UAS) Germany	1,736	22	2,113	26	2,227	28	2,456	30	2,795	35	3,010	37
Greece	975	90	916	85	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
(RU) Ireland	500	109	728	159	837	182	734	160	690	150	829	180
(UAS) Ireland	122	27	173	38	260	57	273	59	207	45	229	50
Italy	2,520	41	2,445	40	2,270	37	2,271	37	2,325	38	2,377	39
Latvia	313	156	316	158	283	141	272	136	261	130	229	114
(RU) Lithuania	n.a.	n.a.	155	55	158	56	137	49	127	45	173	62
(RU) Netherlands	691	41	826	49	816	48	935	55	965	57	1,233	73
(UAS) Netherlands	0	0	0	0	15	1	9	1	9	1	5	0
(RU) Norway	275	52	310	58	355	67	400	75	370	69	510	96
(UAS) Norway	45	8	30	6	55	10	75	14	25	5	40	8
Poland	4,206	109	4,218	110	3,847	100	4,165	108	5,370	140	(a)	(a)
(RU) Portugal	585	57	476	46	441	43	385	37	404	39	542	53
(UAS) Portugal	95	9	99	10	125	12	95	9	129	13	138	13
Romania	487	25	505	25	460	23	914	46	(a)	(a)	(a)	(a)
Spain	1,390	30	1,437	31	1,534	33	1,485	32	1,744	38	1,928	41
(RU) Switzerland	289	34	337	40	382	45	357	42	353	42	426	51
(UAS) Switzerland	242	29	190	23	253	30	266	32	309	37	326	39
UK	6,590	103	5,875	92	6,000	94	6,080	95	6,095	96	6,900	108

Table 6 graph: Informatics Master's degrees awarded per 1,000,000 inhabitants

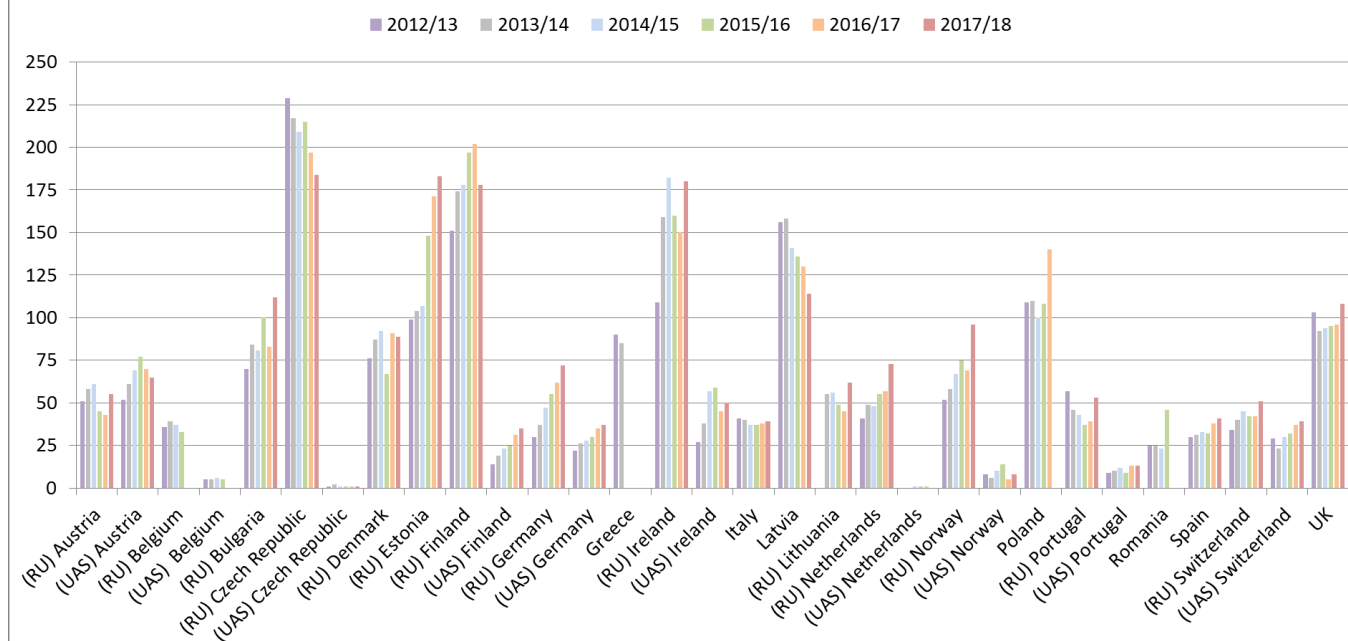
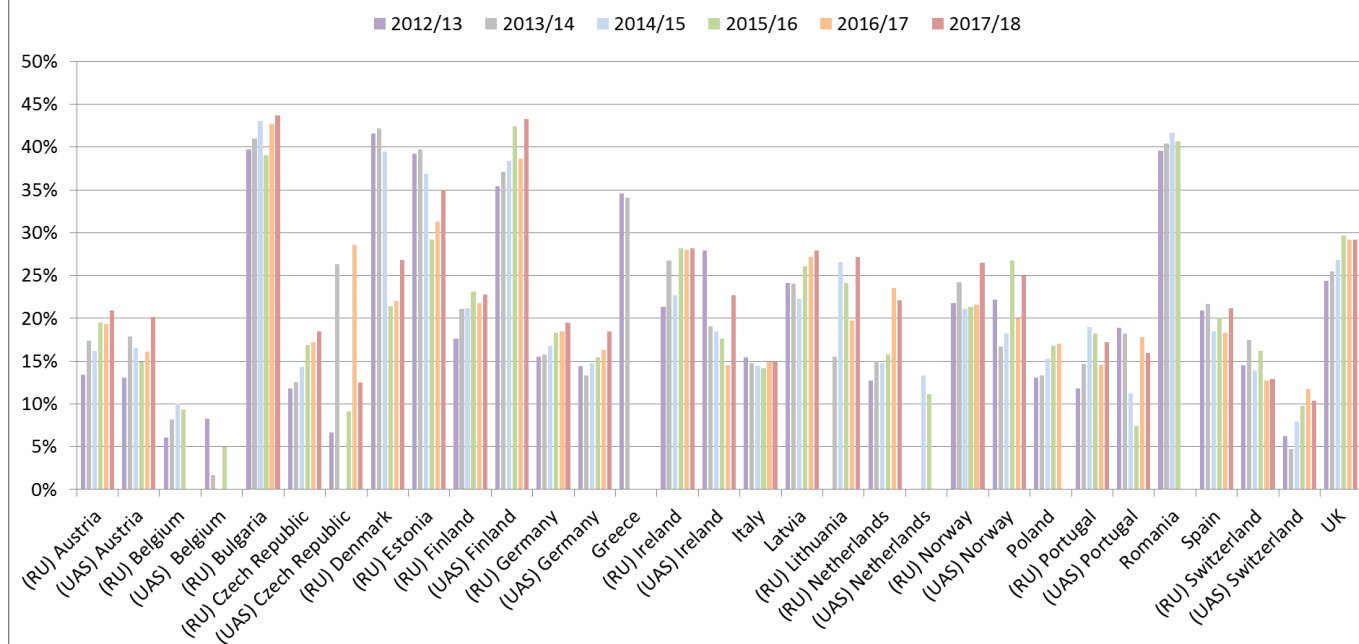


Table 6bis. Female percentage of total Informatics Master's degrees awarded

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	13.4	17.4	16.2	19.5	19.3	20.9
(UAS) Austria	13.1	17.9	16.5	14.9	16.1	20.2
(RU) Belgium	6.1	8.2	10.0	9.4	(a)	(a)
(UAS) Belgium	8.3	1.7	0.0	5.0	(a)	(a)
(RU) Bulgaria	39.7	41.0	43.0	39.1	42.7	43.7
(RU) Czech Republic	11.8	12.6	14.3	16.9	17.2	18.5
(UAS) Czech Republic	6.7	26.3	0.0	9.1	28.6	12.5
(RU) Denmark	41.6	42.2	39.5	21.4	22.0	26.8
(RU) Estonia	39.2	39.7	36.9	29.2	31.3	35.0
(RU) Finland	17.6	21.1	21.2	23.1	21.8	22.8
(UAS) Finland	35.4	37.1	38.4	42.4	38.6	43.3
(RU) Germany	15.5	15.8	16.8	18.3	18.5	19.5
(UAS) Germany	14.4	13.3	14.8	15.4	16.3	18.5
Greece	34.6	34.1	(a)	(a)	(a)	(a)
(RU) Ireland	21.3	26.7	22.7	28.2	28.0	28.2
(UAS) Ireland	27.9	19.1	18.5	17.6	14.5	22.7
Italy	15.4	14.8	14.4	14.2	14.9	15.0
Latvia	24.1	24.0	22.3	26.1	27.2	27.9
(RU) Lithuania	n.a.	15.5	26.6	24.1	19.7	27.2
(RU) Netherlands	12.7	15.0	14.8	15.8	23.5	22.1
(UAS) Netherlands	0.0	0.0	13.3	11.1	0.0	0.0
(RU) Norway	21.8	24.2	21.1	21.3	21.6	26.5
(UAS) Norway	22.2	16.7	18.2	26.7	20.0	25.0
Poland	13.1	13.3	15.3	16.8	17.0	(a)
(RU) Portugal	11.8	14.7	19.0	18.2	14.6	17.2
(UAS) Portugal	18.9	18.2	11.2	7.4	17.8	15.9
Romania	39.6	40.4	41.7	40.7	(a)	(a)
Spain	20.9	21.7	18.5	20.1	18.3	21.2
(RU) Switzerland	14.5	17.5	13.9	16.2	12.7	12.9
(UAS) Switzerland	6.2	4.7	7.9	9.8	11.7	10.4
UK	24.4	25.5	26.8	29.7	29.2	29.2

Note that the significant variations in the female percentage of Master's degrees awarded in University of Applied Sciences in Czech Republic and the Netherlands can be better understood considering that the number of Master's degrees awarded in all cases is quite small and therefore small variations in the absolute numbers reflect on a strong variation in the percentages.

Table 6bis graph: female percentage of total Informatics Master's degrees



5.3 Doctoral degrees

Table 7. Informatics Doctoral (PhD) degrees awarded												
<i>(Ratio = Total/1,000,000 inhabitants)</i>												
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio	Total	Ratio
(RU) Austria	109	13	107	13	112	13	108	13	106	12	97	11
(RU) Bulgaria	24	3	25	4	33	5	36	5	18	3	39	6
(RU) Czech Republic	164	15	156	15	171	16	165	15	191	18	184	17
(RU) Estonia	13	10	9	7	16	12	16	12	19	14	29	22
(RU) Finland	129	23	143	26	157	29	146	27	149	27	128	23
(RU) Germany	885	11	941	12	994	12	1,100	14	1,021	13	969	12
Greece	178	16	158	15	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
(RU) Ireland	69	15	95	21	80	17	84	18	68	15	52	22
(UAS) Ireland	7	2	11	2	5	1	2	0	3	1	4	1
Italy	471	8	485	8	533	9	544	9	527	9	511	8
Latvia	24	12	25	12	20	10	16	8	14	7	6	3
(RU) Portugal	100	10	98	10	118	11	99	10	88	9	87	8
Romania	55	3	40	2	26	1	19	1	(a)	(a)	(a)	(a)
Spain	439	9	532	11	709	15	755	17	958	21	822	18
(RU) Switzerland	149	18	94	11	131	16	131	16	126	15	155	18
UK	925	15	745	12	910	14	980	15	965	15	1,080	17

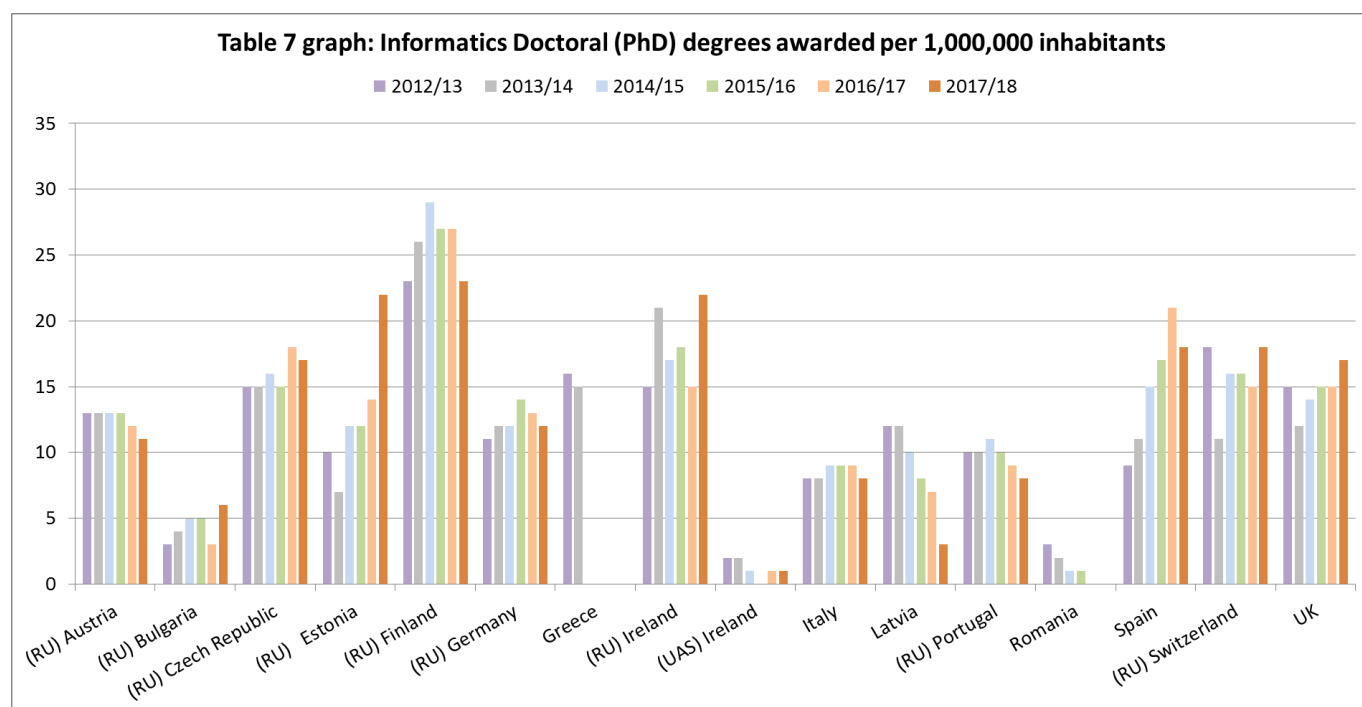
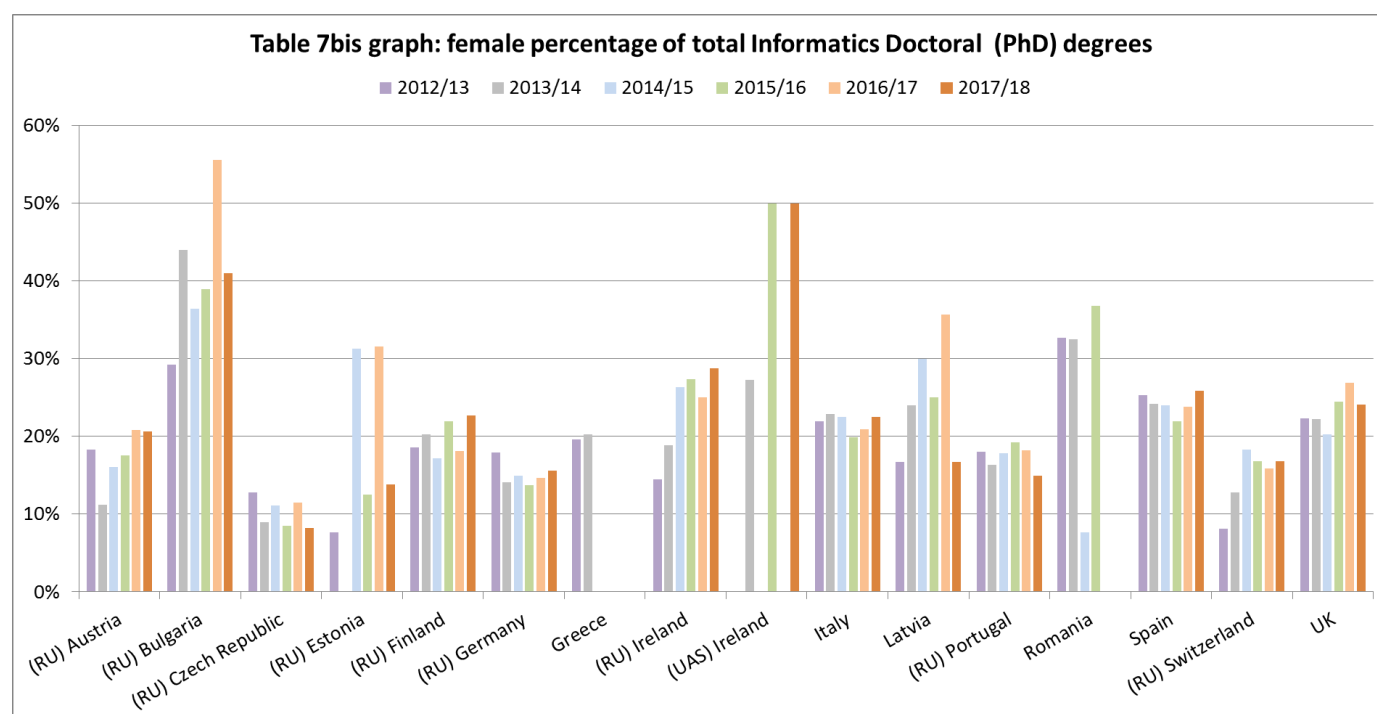


Table 7bis. Female percentage of total Informatics Doctoral (PhD) degrees awarded						
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	18.3	11.2	16.1	17.6	20.8	20.6
(RU) Bulgaria	29.2	44.0	36.4	38.9	55.6	41.0
(RU) Czech Republic	12.8	9.0	11.1	8.5	11.5	8.2
(RU) Estonia	7.7	0.0	31.3	12.5	31.6	13.8
(RU) Finland	18.6	20.3	17.2	21.9	18.1	22.7
(RU) Germany	17.9	14.1	14.9	13.7	14.7	15.6
Greece	19.6	20.3	(a)	(a)	(a)	(a)
(RU) Ireland	14.5	18.9	26.3	27.4	25.0	28.8
(UAS) Ireland	0.0	27.3	0.0	50.0	0.0	50.0
Italy	21.9	22.9	22.5	19.9	20.9	22.5
Latvia	16.7	24.0	30.0	25.0	35.7	16.7
(RU) Portugal	18.0	16.3	17.8	19.2	18.2	14.9
Romania	32.7	32.5	7.7	36.8	(a)	(a)
Spain	25.3	24.2	24.0	21.9	23.8	25.9
(RU) Switzerland	8.1	12.8	18.3	16.8	15.9	16.8
UK	22.3	22.2	20.3	24.5	26.9	24.1

Note that the significant variations in the female percentage of PhD degrees awarded in University of Applied Sciences in Ireland, and in Universities in Bulgaria, Estonia, Latvia and Romania can be better understood considering that the number of PhD degrees awarded in all cases is quite small and therefore small variations in the absolute numbers reflect on a strong variation in the percentages.



5.4 Ratio Bachelor's graduates/new students

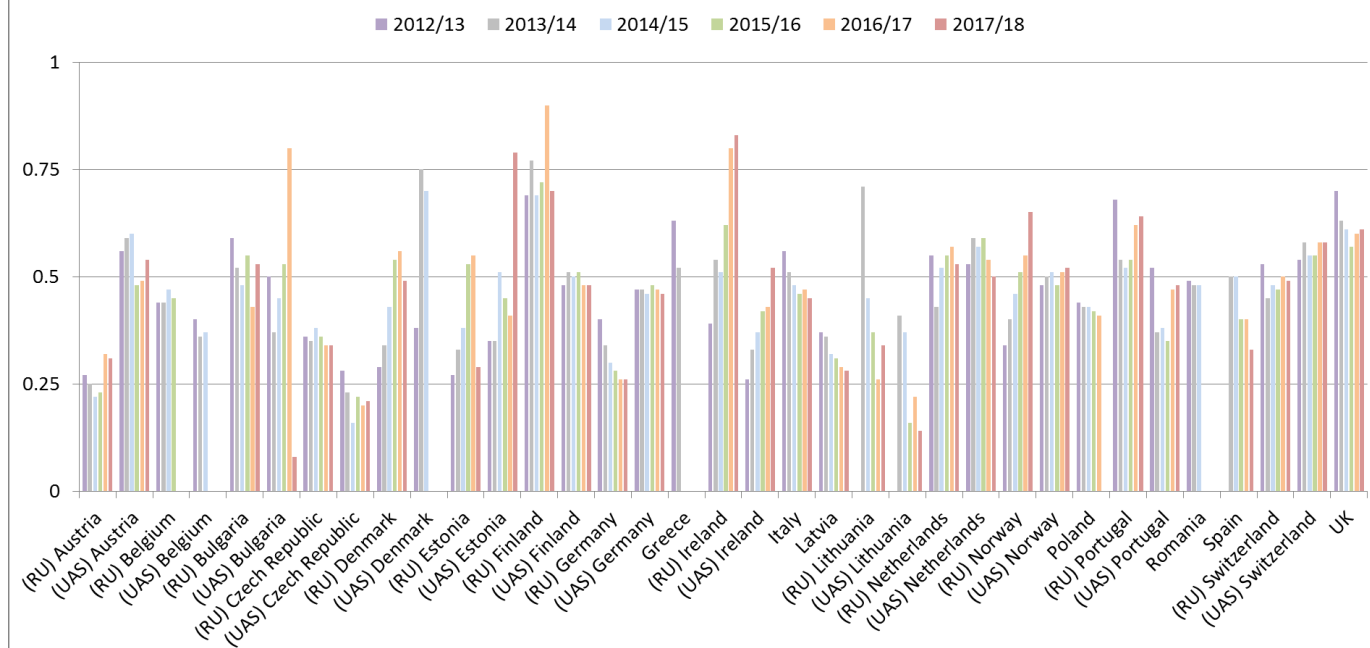
Table 8 and graph 8 show the correlation between the number of students starting their studies (Table 1, Section 4.1) and the number of students successfully concluding their studies (Table 5, Section 5.1) in Informatics Bachelor's programs in the countries included in this report.

Table 8. Ratio between the number of graduates and the number of new students in Informatics Bachelor's programs

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
(RU) Austria	0.27	0.25	0.22	0.23	0.32	0.31
(UAS) Austria	0.56	0.59	0.60	0.48	0.49	0.54
(RU) Belgium	0.44	0.44	0.47	0.45	(a)	(a)
(UAS) Belgium	0.40	0.36	0.37	(b)	(b)	(a)
(RU) Bulgaria	0.59	0.52	0.48	0.55	0.43	0.53
(UAS) Bulgaria	0.50	0.37	0.45	0.53	0.80	0.08
(RU) Czech Republic	0.36	0.35	0.38	0.36	0.34	0.34
(UAS) Czech Republic	0.28	0.23	0.16	0.22	0.20	0.21
(RU) Denmark	0.29	0.34	0.43	0.54	0.56	0.49
(UAS) Denmark	0.38	0.75	0.70	(b)	(b)	(b)
(RU) Estonia	0.27	0.33	0.38	0.53	0.55	0.29
(UAS) Estonia	0.35	0.35	0.51	0.45	0.41	0.79
(RU) Finland	0.69	0.77	0.69	0.72	0.90	0.70
(UAS) Finland	0.48	0.51	0.50	0.51	0.48	0.48
(RU) Germany	0.40	0.34	0.30	0.28	0.26	0.26
(UAS) Germany	0.47	0.47	0.46	0.48	0.47	0.46
Greece	0.63	0.52	(a)	(a)	(a)	(a)
(RU) Ireland	0.39	0.54	0.51	0.62	0.80	0.83
(UAS) Ireland	0.26	0.33	0.37	0.42	0.43	0.52
Italy	0.56	0.51	0.48	0.46	0.47	0.45
Latvia	0.37	0.36	0.32	0.31	0.29	0.28
(RU) Lithuania	n.a.	0.71	0.45	0.37	0.26	0.34
(UAS) Lithuania	n.a.	0.41	0.37	0.16	0.22	0.14
(RU) Netherlands	0.55	0.43	0.52	0.55	0.57	0.53
(UAS) Netherlands	0.53	0.59	0.57	0.59	0.54	0.50
(RU) Norway	0.34	0.40	0.46	0.51	0.55	0.65
(UAS) Norway	0.48	0.50	0.51	0.48	0.51	0.52
Poland	0.44	0.43	0.43	0.42	0.41	(a)
(RU) Portugal	0.68	0.54	0.52	0.54	0.62	0.64
(UAS) Portugal	0.52	0.37	0.38	0.35	0.47	0.48
Romania	0.49	0.48	0.48	n.a.	(a)	(a)
Spain	n.a.	0.50	0.50	0.40	0.40	0.33
(RU) Switzerland	0.53	0.45	0.48	0.47	0.50	0.49
(UAS) Switzerland	0.54	0.58	0.55	0.55	0.58	0.58
UK	0.70	0.63	0.61	0.57	0.60	0.61

Romania: the 2015/16 ratio is not calculated due to the differences in the coverage rates. The number of first-year students for 2015/16 was collected in 2016 with a 80% coverage rate, while the number of Bachelor's degrees awarded for 2015/16 was collected in 2017 where we had a 95% rate (see more details on footnote for Table 1).

Table 8 graph: ratio number of graduates/number of new students in Informatics Bachelor's programs



5.5 Tentative extrapolation to the whole of Europe

As discussed in Section 4.5, and with the same qualifications, it is possible from the 2017/2018 data to attempt a rough extrapolation to all of Europe of the Bachelor's and Master's degrees awarded¹⁴:

- Bachelor's degrees awarded in Informatics: 160,000
- Master's degrees awarded in Informatics: 66,000.

Unlike the carefully documented measurements of the preceding tables, these numbers cannot be taken as exhibiting any degree of precision. They do, however, suggest an order of magnitude.

¹⁴ Note that Belgium, Denmark, Greece, Poland and Romania were not included in the extrapolations since the data for degrees awarded either at Research Universities or Universities or Applied Sciences was not available for 2017/2018.

6 Positions and Titles

The present section describes some of the main positions (job titles) available to academics, and corresponding employment details, in the following countries: Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Spain, Switzerland and UK.

The information generally applies to academics of all disciplines (not just Informatics) in each country, unless when remarked otherwise.

Comparing salaries across different countries is complicated by the differences in career systems, career steps and progression. This makes it particularly important to define the different titles available in the countries considered. Section 7 will present the corresponding salary levels in the corresponding countries.

6.1 A basis for multinational comparison of academic positions

Tables 9 and 10 show the academic positions whose remuneration is described in Section 7, and the approximate equivalent in the various countries considered. For professor-level positions we used as a reference the nomenclature of the American higher education system: Assistant, Associate and Full Professor, although in many European countries there is not a direct correspondence.

Table 9. Position correspondence: PhDs and Postdocs

	PhD Candidate	Postdoctoral Researcher
Austria	<i>Universitätsassistent, Forschungsassistent / Projektassistent (Prädoc)</i>	<i>Universitätsassistent, Forschungsassistent / Projektassistent (Postdoc)</i>
Belgium	<i>Doctorant/Assistant Doctorandus/Assistent</i>	<i>Post-doctorant/Assistant Doctor-assistent/ Assistent</i>
Czech Republic	<i>Doktorand</i>	<i>Postdoktorand/Asistent/ Odborný Asistent/ Vědecký a Výzkumný Pracovník</i>
Estonia	<i>Doktorant</i>	<i>Research Fellows/ Senior Research Fellows</i>
France	<i>Doctorant</i>	<i>Post-doctorant</i>
Germany	<i>Doktorand / Wissenschaftlicher Mitarbeiter</i>	<i>Postdoktorand / Wissenschaftlicher Mitarbeiter / Oberassistent / Oberingenieur</i>
Greece	<i>Υποψήφιος Διδάκτορας</i>	<i>Μεταδιδάκτορας</i>
Italy	<i>Dottorando</i>	<i>Assegnista di Ricerca</i>
Latvia	<i>Doktorants</i>	-
Lithuania	<i>Doktorantas</i>	<i>Podoktorantūros tyrėjas</i>
Netherlands	<i>Promovendus</i>	<i>Onderzoeker 4 / Docent 4</i>
Poland	<i>Doktorant</i>	<i>Asystent/Adiunkt</i>
Portugal	<i>Doutorando</i>	<i>Pós-doutorando / Investigador Junior</i>
Romania	<i>Doctorand</i>	<i>Cercetator Postdoc / Cercetator / Cercetator Principal</i>
Spain	<i>Doctorando</i>	<i>Ayudante Postdoc (1)/ Investigador Postdoc (2)</i>
Switzerland	<i>Doktorand / Wissenschaftlicher Assistent I</i>	<i>Post-Doktorand / Wissenschaftlicher Assistent II</i>
UK	<i>PhD Students/ Postgraduate Research Student</i>	<i>Research Assistant / Research Associate / Research Fellow</i>

In Austria, Belgium, Germany and Switzerland the term “Assistant” (assistant) is used for both PhD Candidates and Postdoctoral Researchers.

Table 10. Position correspondence: Professors

	Assistant Professor		Associate Professor		Full Professor	
Austria	Assistenzprofessor		Assoziierter Professor / Außerordentlicher Universitätsprofessor		Universitätsprofessor	
Belgium Wallonia	Chargé de Cours		Professeur		Professeur Ordinaire	
Belgium Flanders	Docent	Hoofddocent	Hoogleraar		Gewoon Hoogleraar	
Czech Republic	Odborný Asistent		Docent		Professor	
Estonia	Assistent	Lektor	Dotsent		Professor	
France	Maître de Conférences		Professeur des Universités			
Germany	Juniorprofessor		Außerordentlicher Professor		Ordentlicher Professor	
Greece	Λέκτορας	Επίκουρος Καθηγητής	Αναπληρωτής Καθηγητής		Καθηγητής	
Italy	Ricercatore a Tempo Determinato Tipo A/Tipo B		Professore di Seconda Fascia (Professore Associato)		Professore di Prima Fascia (Professore Ordinario)	
Latvia	Asistents	Lektors	Docents	Asociēts Profesors		Profesors
Lithuania	Asistentas		Lektorius	Docentas		Profesorius
Netherlands	Universitair Docent 2	Universitair Docent 1	Universitair Hoofddocent 2	Universitair Hoofddocent 1	Hoogleraar 2	Hoogleraar 1
Poland	Asystent		Adiunkt	Profesor uczelni		Profesor
Portugal ¹⁵	Professor Auxiliar/ Professor Adjunto		Professor Associado/ Professor Coordenador		Professor Catedrático/ Professor Coordenador Principal	
Romania	Asistent		Lector	Conferentiar		Profesor
Spain	Titular de Escuela Universitaria		Titular de Universidad / Catedrático de Escuela Universitaria		Catedrático de Universidad	
Switzerland ¹⁶	Assistenzprofessor		Außerordentliche Professor		Ordentlicher Professor	
UK	Lecturer		Senior Lecturer/Reader		Professor	

¹⁵ In Portugal there are different professor category designations for RU and UAS. The first position is applicable for RU (Universitário) and the second – for UAS (Politécnico).

¹⁶ German terms. French (*Professeurs Assistants, Professeurs Associés, Professeurs Ordinaries*) and Italian (*Professori Assistenti, Professori di Ruolo Straordinari and Professori di Ruolo Ordinari*) equivalents are used in the corresponding regions of Switzerland.

6.2 Austria

PhD Candidates (so-called *PräDoc-Assistenten*) are typically employed as university assistants (if financed by the University they are called *Universitätsassistent*) or as project assistant (financed by grants, funds or industrial cooperation) at the institute of their academic supervisor. Their employment contracts are usually issued for four years and cannot be extended (in the case of employment as *Universitätsassistent*). However, in case PhD Candidates are employed as project assistant, contract extensions might be possible, depending on their funding source. Their duties include support in teaching, administrative tasks and doing research. PhD Candidates can also be financed by scholarships which are funded by national or local authorities, industry or others. Scholarship holders are on average funded for a period of three years. They do not have any teaching or administrative duties and can focus only on their thesis. Finally, there are also self-funded PhD students, doing their research in parallel to their “normal” work.

For Postdoctoral Researchers (*PostDoc-Assistenten*) a similar system applies. Depending on their funding source they are employed as university assistant (postdoc *Universitätsassistent*) or project assistant. Contracts of postdoc *Universitätsassistenten* are fixed for four up to a maximum of six years and cannot be renewed. The contracts for project assistants may be extended up to 10 or 12 years, depending on their funding source. Funding programs for Postdoctoral Researchers also enable them to apply for funding of their own independent position as part of a grant for a research project.

Professor positions are organized in three categories: Assistant Professor (*Assistenzprofessor*), Associate Professor (*Assoziierter Professor/Außerordentlicher Universitätsprofessor*) and Full Professor (*Universitätsprofessor*). Associate Professor and Full Professor positions are permanent. The initial appointment of Assistant Professors (tenure track positions) is for six years with the possibility of promotion to a permanent position as Associate Professor after a positive evaluation. There exists a specific tenure track system for the promotion from an Assistant Professor position to an Associate Professor position (for selected Assistant Professors who obtain the so-called *Habilitation*). However, there is not such a system for the promotion from an Associate Professor position to a Full Professor position. Being appointed as Full Professor requires a specific appointment procedure and in general they have a Chair (*Lehrstuhl*). Since the year 2000 Full Professors are no longer employed as civil servants, but as University employees (the same for Associate Professors and Assistant Professors since 2004).

6.3 Belgium

PhD candidates in Belgium can have different types of positions according to the source and type of funding. Working contracts as teaching/research assistants, project assistants (*mandaatassistent*, *wetenschappelijk medewerker*, *mandat d'assistant*) and PhD scholarships (*doctoraatsbeurzen*, *boursier de doctorat*) are available. Assistant positions are temporary, the appointment is initially for two years, this period can be extended two times, lasting therefore a maximum of six years (exceptionally one extra year can be granted). Research/teaching assistants have teaching and administrative duties additionally to the work invested in their thesis. Project assistants work in one research project as part of their PhD training, contracts are usually not longer than four years and usually do not involve administrative duties but they are often asked to take on some teaching duties. PhD scholarships are offered by a number of different agencies and programs, and have usually a duration of four years. PhD students receiving a scholarship are mostly dedicated to work on their thesis and need to prepare a PhD research proposal to compete for the scholarship [BE6-BE8].

Postdoctoral positions have similar arrangements, (teaching/research, project) assistant positions are temporary, contract duration vary from university to university. Postdoctoral fellowships (*postdoctoraal onderzoeker*, *bourses de post-doctorat*) are initially for three years and can be renewed once for another three years [BE8-BE10].

Professor positions are organized differently in Flanders and Wallonia, in Wallonia there are three categories: *Chargé de Cours*, *Professeur* and *Professeur Ordinaire* [BE11] while in Flanders four university professor categories exist: *Docent*, *Hoofddocent*, *Hoogleraar* and *Gewoon Hoogleraar* [BE12].

In Wallonia *Chargé de Cours* and *Professeur* are initially non-tenured positions including an initial temporary appointment of minimum three years, after this initial temporary period, the position can become permanent upon a positive evaluation. The rank of *Professeur Ordinaire* is not available upon appointment, only by internal promotion. Request for promotion from a *Chargé de Cours* to a *Professeur* position is formally possible after eight years. Promotion from *Professeur* to *Professeur Ordinaire* is formally possible after another five years [BE11].

In Flanders most *Docent* positions, similarly to Assistant Professor, are tenure-track positions, the appointment is initially for five years, a positive assessment at the end of that period grants directly an appointment into a permanent *Hoofddocent* position in the same university [BE8]. New *Hoofddocent* (outside the internal *Docent* tenure-track path), *Hoogleraar* and *Gewoon Hoogleraar* appointments usually include a minimum three-year temporary period (*integratieperiode*) with a prospect for permanent employment based on a positive evaluation after the initial trial period. Request to promotion to a higher level is usually possible after three years of the last permanent appointment or promotion [BE13, BE14].

6.4 Czech Republic

PhD candidates in the Czech Republic are students of doctoral programs offered by University-type higher education institutions. Universities can cooperate with other research institutions, in particular with public research institutions assembled in the Czech Academy of Sciences. Depending on the source and type of funding, two forms of PhD studies are possible: full-time and part-time when employed (mostly outside the University).

Funding is provided in one of the following forms:

- Scholarships/grants: the Ministry of Education, Youth and Sports allocates state scholarship funds to universities. These funds can be complemented by universities' proper funds (e.g. stipend funds, or other);
- Employment contracts: they are offered by public research institutions and some universities to encourage students to participate in research or teaching activities. They can be also provided by grant agencies or universities within the project funding for PhD candidates involved in the project implementation.

PhD candidates have all student social and tax benefits[CZ3].

Postdoctoral researcher positions are becoming more and more common in Czech universities and research institutes. They are usually fixed-term (limited from three to four years) and involve research, teaching and supervision of students. Funding schemes for Postdoctoral Researchers are similar to the PhD candidates funding, no tuition fees are charged in any case.

Academic professor positions in the Czech Republic are organized in the following categories: *Odborný Asistent* (Assistant Professor), *Docent* (Associate Professor), *Professor* (Full Professor). At roughly the same salary level as Assistant Professor is the position of *Lektor* (Lector) who is usually involved in teaching activities only, without research obligations. *Odborný Asistent* should hold a PhD degree. *Docent* is appointed by the Rector of the University on the proposal of the Faculty Scientific Council, in front of which the candidate must defend his habilitation thesis and prove significant scientific, pedagogical and professional qualifications. Only academics with a *Docent* position can apply for a Full Professor position. They should be recommended by at least three Full Professors from the same field, and then undergo an appointment procedure (*jmenovací řízení*) assessing the candidate professional activities and results. If the assessment is positive, the Full Professor - on the proposal of the Rector - is appointed by the President of the Czech Republic [CZ1].

The employment in the positions of Assistant Professor is typically fixed-term and depends on the universities' rules. Usually it is limited to 3 years and afterwards can be extended. The third extension leads to a permanent position. Positions of Associate Professors and Full Professors are usually permanent.

6.5 Estonia

PhD Candidates in Estonia can be employed as (teaching) assistants, junior researchers or officers (for example project assistants/managers). Their duties include teaching, research and performing administrative tasks. Teaching assistants are financed by the university (teaching finances) and early-stage researchers by universities or by grants. Project assistants are financed by grants and other funds i.e. by research projects they are working on. Employment contracts can be either fixed-term or permanent¹⁷. State-funded PhD scholarships are also available.

A Postdoctoral Researcher (Research Fellow) is a researcher who has been awarded a Doctorate, or equivalent qualification, in Estonia or in a foreign country, no more than five years ago. Postdoctoral Researchers are funded by grants in support of research carried out by them or/and they are employed as research fellows, senior research fellows or research professors. Mobilitas Plus grants (European Research Foundation's finances) are available for foreign postdocs coming to Estonia and research grants funded by the state for Estonian postdocs who are going to foreign countries. Other grants from international fellowship programs are available as well¹⁷.

Professor positions in Estonia are organized in four categories: *Assistant*, *Lektor*, *Dotsent* and Professor. Professor and *Dotsent* must hold a doctoral or an equivalent qualification and have at least five years of prior relevant experience. A *Lektor* and an *Assistant* must hold at least a Master's degree or an equivalent qualification [EE2, EE3]. Until the end on 2014 all university academic positions were fixed-term and renewed every five years, from 2015 most academic positions have become permanent from the start of the employment contract [EE2, EE3]. In this new system, at every five years employees go through a compulsory attestation review, whose guidelines and parameters are defined in the Estonian Universities Act [EE3]. Internal promotion from *Assistant* to *Lektor* positions is possible after PhD defence, based on a positive performance review and the institute needs and funding. Promotions to *Dotsent* and *Professor* positions are not possible, each new position needs to be filled usually through a new open hiring process¹⁷ [EE2, EE3].

6.6 France

The employment of PhD Candidates is defined in France by a "*doctoral contract*" ruled by public law since 2009 [FR2-FR4]. It consists of a fixed-term contract for a minimum period of three years, which may be extended for a maximum of one year (usually in case of special situations such as maternity/paternity leave, long sick or accident leave, etc). The doctoral contract may define a job where only research and work for the thesis completion are involved, or include other tasks such as teaching, scientific and technical information, development of research, consultancies or expertise to companies or public authorities [FR2-FR4]. The base salary is slightly higher in the case of a contract involving complementary duties (see below). Salaries paid in research institutes or in projects involving close collaboration with industry can also vary (see below).

Postdoctoral Researchers are employed in fixed-term working contracts (*contrats temporaires de chercheur*) which vary from one to three years, can be extended, but not surpass six years on the total. Funding for postdoctoral positions come from national, European or international funding agencies or projects developed with Industry.

University professors (*Maîtres de Conférences* and *Professeur des Universités*) have permanent, tenured positions including a number of levels (*classes*) [FR2, FR5-FR7]. In the statutory group of *Maîtres de Conférences* there are two levels: *classe normale* and *hors-classe*; in the statutory group of *Professeur des Universités* there are three

¹⁷ Margit Grauen, personal communication

levels: *deuxième*, *première*, and *classe exceptionnelle* [FR5-FR7]. Promotion to a higher level, in the same category, is not granted automatically for seniority, but involves a performance review process. Promotion from a *Maîtres de Conférences* to a *Professeur des Universités* position, requires the application to a new available position through a specific process called *concours*.

6.7 Germany

PhD Candidates in Germany are typically employed as *Wissenschaftlicher Mitarbeiter* (research associate) having a fixed-term contract at the institute of their supervisor. The funding comes from the state, National Science Foundation (DFG), EU, ministries on federal or local level, industry, foundations and other sources. Duties include working on research projects, teaching, organizing seminars or performing administrative tasks [GE6-GE8], depending in part on the source of funding. In general, the working contract is for a period of three years and can be renewed for an additional maximum period of three years. Funding can also be through scholarships provided by DFG, the *Alexander von Humboldt Foundation* and the *Deutsche Akademische Austauschdienst (DAAD)* [GE6-GE8]. Scholarships are usually for no more than 3 years.

Postdoctoral Researchers are also employed as *Wissenschaftlicher Mitarbeiter* (or alternative names shown in Table 9) and have fixed-term contracts that cannot be extended for more than six years. At entry level salaries are slightly higher than for PhD positions and depend on experience and family status (see below) [GE8-GE9]. Funding programs for Postdoctoral Researchers also enable them to apply for funding of their own independent position as part of a grant for a research project. The position can be at a University or an independent research institute, which must provide the necessary basic equipment and facilities for the development of the research project [GE8-GE9].

Professor positions are organized in three categories: *Juniorprofessor*, *Außerordentlicher Professor* and *Ordentlicher Professor*. *Juniorprofessor* positions, introduced by law in 2002, are time-limited (three years), can be renewed once, and provide the opportunity to apply for a permanent position after the sixth year without passing the *Habilitation* process (which junior professors still often do). Academics in these positions, although non-permanent, do not work as research assistants for permanent professors; they have their own research group and work autonomously [GE10]. In general, there is no tenure process (although some universities offer *Juniorprofessor* positions including a tenure-track plan [GE10-GE11]), therefore at the end of his or her term a *Juniorprofessor* must apply for a new open position and go through the usual German recruitment process to reach a tenured professorship. *Außerordentlicher* and *Ordentlicher Professor* are permanent tenured positions. *Außerordentlicher Professor* has teaching duties, his/her own research group and a smaller budget when compared to *Ordentlicher Professors* who have bigger research groups and budgets and in general have a Chair (*Lehrstuhl*) [GE12].

6.8 Greece

PhD candidates in Greece are students of doctoral programs. Funding is provided in one of the following forms:

- Fellowships: several research centres and universities provide fellowships to PhD students. They are also provided by the State Scholarships Foundation (IKY) and by other public and private foundations/agencies, like Onassis Foundation, John S. Latsis Public Benefit Foundation, Bodossaki Foundation, and others (this list is not exhaustive).
- Stipends/grants: the Ministry of Culture, Education and Religious Affairs (and specifically, the General Secretariat for Research and Technology - GSRT) occasionally offers stipends and grants under certain research programs for PhD students (like *Hrakleitos*) co-funded by the European Union (European Social Fund) and National Resources.

- Employment contracts: employment contracts are offered by several research centres and universities for participation in actions funded by the European Commission and other projects funded by national funds. They are also occasionally provided by GSRT under research programs for cooperative research and innovation (like Thales and Archimedes) as well as under European Commission-funded Actions.

PhD students may also get funding through their participation in working teams of collaboration projects between universities and industry¹⁸.

Postdoctoral Researcher positions are becoming more and more common in Greek universities, research and technology centres and institutes. These are fixed term temporary positions dedicated to research (but often involving teaching responsibilities in HEIs). Funding schemes for Postdoctoral Researchers are similar to those mentioned above for PhD candidates¹⁸.

Professor positions in Greece until 2011 were organized in four categories: Lecturer (*Λέκτορας*), Assistant Professor (*Επίκουρος Καθηγητής*), Associate Professor (*Αναπληρωτής Καθηγητής*) and Professor (*Καθηγητής*). From 2011 no new Lecturer positions have been offered and the teaching academic positions were restricted to Assistant Professor (*Επίκουρος Καθηγητής*), Associate Professor (*Αναπληρωτής Καθηγητής*) and Professor (*Καθηγητής*). Professors on all ranks working in public institutions are civil servants, their salaries and career path and promotions are ruled by the national government¹⁸.

Assistant Professor positions are non-tenured and have an initial contract of four years which can be extended for another four years. After six years in an Assistant Professor position, application for promotion is possible. If not successful a new request for promotion can be issued after a period of three years. Associate and Professor are permanent tenured positions. After four years in the position, Associate Professors have the right to initiate the procedure for their promotion i.e. the publication of an open call of interest for a Professor position. The main criteria evaluated for promotion are research performance (number and quality of publications), teaching performance and key role in administrative duties. The strictness in the application of the criteria differs from department to department, from university to university and from discipline to discipline [GR2].

The serious economic crisis Greece is facing in recent years is also deeply affecting the universities and the promotion system. Since 2010 there has been no new call for faculty members in the country in any level, a situation which is endangering the national higher education system and worsening the brain drain effect, record number of Greek academics are searching for jobs in other European countries, North America and Asia [GR3, GR4].

6.9 Italy

PhD positions in Italy are funded either by national scholarships, through research grants of professors, or through industry funding programs. The contract is normally for three years and salary is fixed, not progressing along the years. Funding for more than three years can in some cases be provided through research grants. PhD Candidates can have teaching and supervision duties additionally to the thesis work, in these cases they earn a slightly higher salary, which depends on the local University rules [IT3,¹⁹].

Postdoctoral Researchers (*Assegnista di Ricerca*) are employed in temporary, fixed-term, working contracts for a minimum of one year (usually two years) that can be renewed for a maximum of two additional years. Their duties include research as well teaching and students' supervision¹⁹.

Professor positions are organized in three categories: *Ricercatore*, *Professore di Seconda Fascia* (*Professore Associato*) and *Professore di Prima Fascia* (*Professore Ordinario*).

Up to 2010, an Assistant Professor (*Ricercatore*) after three years could be confirmed to a tenured position (*Ricercatore Confermato*), without being promoted to a higher-level professorship. This situation changed in 2011

¹⁸ Panagiota Fatourou, personal communication

¹⁹ Carlo Ghezzi, personal communication

[IT4] when Assistant Professor positions started to have a limited duration (*tempo determinato*). They are of two kinds: *Tipo A* and *Tipo B*. *Ricercatore a Tempo Determinato Tipo A* is initially appointed for three years, the contract can be extended at most once for maximum of two years. *Ricercatore a Tempo Determinato Tipo B* are tenure track positions, the contract lasts at most three years, without further extensions, and can be assigned to candidates who previously had type A contracts (or similar experience nationally or abroad). After three years, type B personnel who received a national habilitation, and had positive evaluation at the end of the three years, are promoted to a tenured Associate Professor (*Professore di 2^a Fascia*) position [IT4,¹⁹].

Professore Associati and *Professore Ordinari* are since 2011 tenured positions from the initial appointment, until 2010 both types of positions were non-tenured in the first three years [IT4,¹⁹].

6.10 Latvia

PhD Candidates in Latvia are students in doctoral programs and usually receive a scholarship. In some cases, they work as researchers in HEI's projects, or in industry.

Postdoctoral Researcher positions do not exist in Latvia. After receiving a doctor degree those following an academic career (on average 50% tends to go to Industry) are immediately eligible to *docents* or even *Asociēts Profesors* positions. To become a *Profesors* (full professor) it is mandatory at least three years of experience in an *Asociēts Profesors* position, on average this tends to be much longer than three years²⁰.

Academic teaching staff positions in Latvia are organized in five categories: *Asistenti*, *Lektors*, *Docents*, *Asociēts Profesors*, *Profesors*. There is not a straight correspondence to the positions of Assistant, Associate and Full Professor. *Asistenti* and *Lektors* positions typically do not require a doctoral degree, instead a Master's degree is required. *Docents* and *Asociēts Profesors* positions typically require a doctoral degree (with rare exceptions for strong professionals from industry, teaching in professional programs). A doctoral degree and at least three years in a *Asociēts Profesors* position is a precondition for being eligible to a *Profesors* position. Additionally, minimal requirements (in teaching, research, organizational work, etc) are defined by the central government for positions of *Asociēts Profesors* and *Profesors* (e.g., at least 5 Web of Science or Scopus-indexed publications and at least 5 presentations at international conferences during the past 6 years). In all five categories, a person is elected through public competition for six years. After six years the position is declared vacant and a new competition takes place, however the person currently holding the position is eligible to apply again; in Latvia academic permanent tenured positions do not exist²⁰.

6.11 Lithuania

PhD candidates in Lithuania are students in doctoral programs and usually receive a scholarship, granted by the State, a Higher Education institution or Foundations for student support. In some cases, doctoral students may be employed as Academic Assistant (*Akademini padėjėjas*), Engineer (*Inžinierius*), Project Analyst (*Projekto analitikas*), Junior Researcher (*Jaunesnysis mokslo darbuotojas*), Project Technician (*Projekto technikas*), Laboratory Assistant (*Laborantas*), Assistant (*Asistentas*) in a full-time or part-time position at the different academic departments of the University²¹. Their duties may include teaching, research or performing administrative tasks.

A Postdoctoral Researcher is a researcher who has been awarded a Doctor degree, for no more than five years, in a Lithuanian or foreign country higher education institution and who is carrying out the research project typically lasting 24 months. In Lithuania, postdoc positions are usually funded by grants and individual fellowships provided by Lithuania's Research Council, Marie Skłodowska-Curie Actions, Lithuanian Universities and other international funding programs.

²⁰ Juris Borzovs, personal communication

²¹ Robertas Damaševičius, personal communication

Professor positions in Lithuania are organized in four categories: *Asistentas* (Assistant), *Lektorius* (Lecturer), *Docentas* (Docent), *Profesorius* (Professor). The appointment is typically fixed-term for five years. After that period, academics can reapply for the same or a higher position. The career promotion is governed by the university rules, which generally follow the requirements for academic positions set by the Lithuania's Research Council (LMT), as well as by the Law on higher education and research of the Republic of Lithuania, recommendations of the European Commission on The European Charter for Researchers and on The Code of Conduct for the Recruitment of Researchers. Lecturers and researchers (except trainees and project researchers, invited researchers and employees working under permanent employment contract) are appointed to a position by the procedure of competition. Permanent employment contract is also possible for candidates who win a competition for the same position of lecturer or researcher for the second time. The candidates, working under permanent employment contracts are reviewed every 5 years. Employment of the candidates, who do not pass reviews, is terminated²¹.

Asistentas and *Lektorius* must hold at least a Master's degree or equivalent, for *Lektorius*, it should be complemented with at least two years of experience in pedagogical work and at least one publication in an indexed international scientific journal. *Docentas* and *Profesorius* must hold a Doctor degree and have at least 3 or 5 years of prior relevant experience respectively, or proof of considerable scientific contribution (e.g. articles in peer-reviewed and international journals, science monographs, textbooks, publications for studies, presentation of scientific research at national and international conferences, experience in organization of science events, research or studies' expertise, supervision of Master's, Doctor candidates, etc.) [LT4,²¹].

6.12 The Netherlands

PhD Candidates in the Netherlands are typically employed by the university in the rank of *Promovendus* (PhD Researcher), on a fixed-term contract for three or four years (four years is standard) [NE5-NE7]. PhD positions are funded almost exclusively by projects from external sources like the Netherlands Organization for Scientific Research (NWO), the EU, foreign grants, or industry. PhD Candidates carry out their research under supervision of at least one professor and/or senior member in a research group. Progress is monitored. In addition to their research, PhD Candidates normally have a small task in teaching, supervision, or other project-related activities.

Postdoctoral Researchers at entry level are generally appointed to *Onderzoeker 4* (Researcher 4) in a temporary, fixed-term contract for up to two years. Postdoctoral Researchers are almost exclusively funded by projects. Depending on the funding, contracts may be renewable, but the total term of the employment, including any subsequent contracts in the same university, should never surpass six years [NE5-NE7].

The other dedicated or special positions for research or teaching in the Dutch system include those of *Docent* (Lecturer) and of *Onderzoeker* (Researcher) and range from *Docent 4* (Junior Lecturer) up to *Docent 1* (Coordinating Senior Lecturer) and from *Onderzoeker 4* (Junior Research Fellow) up to *Onderzoeker 1* (Coordinating Senior Researcher). The positions are often temporary but can be tenured. The researcher-positions usually require a PhD, and the lecturer-positions usually require (or lead to) a basic certificate as lecturer [NE5-NE7].

The regular (structural) positions in the Dutch system have a mix of research and teaching duties, and senior positions may include various responsibilities for projects, programs and/or groups as well. The regular positions include, in increasing level of seniority: *Universitair Docent 2* and *1* (UD2/UD1, roughly corresponding to Assistant Professor), *Universitair Hoofddocent 2* and *1* (UHD2/UHD1, roughly corresponding to Associate Professor), and *Hoogleraar 2* and *1* (H2/H1, corresponding to full professor). Only full professors hold Chairs. All positions are usually tenured or tenure-track.

6.13 Poland

Poland adopted a new law on Higher Education and Science which came into force on October 1, 2018 and brought significant changes in the functioning of universities, their financing, and scientific careers. This law replaced the

existing documents: the Law on Higher Education, the Law on the Principles of Financing Science, the Law on Academic Degrees and Title, as well as the Law on Student Loans [PL3].

PhD candidates in Poland are students enrolled in doctoral programs offered by academic universities, institutes of the Polish Academy of Science, or other research institutes or international institutes which meet the criteria to award a PhD degree. According to the new law, students enrolled in doctoral programs do not pay fees and receive a fixed monthly scholarship paid by the state. The maximum total period of receiving a doctoral scholarship cannot exceed 4 years [PL2].

Postdoctoral Researchers are typically employed in the position of an assistant (*Asystent*) or adjunct lecturer (*Adiunkt*) depending on the field of research and research achievements. In humanities, social science, and in other areas where there are few jobs and many candidates, the postdocs (if any) are employed on the *Asystent* level. By contrast, in the field of Informatics, postdocs are mainly employed on the *Adiunkt* level. Normally, the length of the contract is fixed from 1 up to 3 years²².

Academic positions in Poland are organized in four categories: *Asystent* (Assistant Lecturer), *Adiunkt* (Adjunct Lecturer), *Profesor uczelni* (Associate Professor), *Profesor* (Full Professor), with different formal requirements for each position. *Asystent* must hold at least a Master's degree (*magister*) or equivalent, *Adiunkt* must hold at least a PhD degree (*doktor*). To become a *Profesor uczelni*, an academic in Poland must get the habilitation degree (*doktor habilitowany*) which is awarded by a faculty council (*Rada Wydziału*) or a scientific council of a university or Polish Academy of Science. To become a *Profesor*, a title of professor (*profesor*) awarded by the President of Poland is required. The procedures of getting the habilitation degree and professor title are run and strictly supervised by the Council of Scientific Excellence (*Rada Doskonałości Naukowej*) [PL2]. The employment in the positions of *Asystent* and *Adiunkt* is typically fixed-term and does not exceed 8 years. Depending on the universities' rules, the length of the first contract varies from 1 to 5 years, afterwards it can be extended up to 8 years in total. The third extension leads to a permanent position. In practice, in most universities all professor positions are permanent, unless someone is employed under the replacement contract or for a project with fixe-term funding. A person holding the habilitation degree is, as a rule, employed permanently²².

6.14 Portugal

PhD candidates in Portugal are students enrolled in doctoral programs offered by traditional university institutions (*Universidade*) and polytechnic institutions (*Politécnico*). Until 2018 only traditional universities had rights to award Doctoral (PhD) degrees but in August 2018 a new decree on Degrees has been adopted which now grants polytechnic institutions the right to offer Doctoral degrees as well [PT1]. PhD studies are typically subject to tuition fees of about € 2,750 per year for the full-time study. The specific cost of tuition fees is set annually by the higher education institution and can therefore vary slightly each year [PT4]. International students (from outside the European Union) pay typically twice that value, but special situations may be considered.

To fund their studies, PhD students could get a scholarship from the Portuguese National Science and Technology Foundation (FCT) or from the research units, with a monthly value of € 1,003.26 (for 2019/2020), set by the Portuguese Government [PT5]. Students who are not able to get scholarship are sometimes supported by research projects in higher education institutions or in research and innovation institutions, but in such cases they typically do part-time PhD studies as they are required to contribute to the project activities, that may or may not overlap with the PhD goals. For the part-time studies, the total length of the program is duplicated and the tuition fees are cut down to 60%. Students normally are able to choose full-time or part-time enrolment in each year. Part-time regime is not possible for students receiving scholarships²³.

²² Leszek Pacholski, personal communication

²³ Gabriel David, personal communication.

Postdoctoral researchers are typically funded by two mechanisms. The traditional one is the post-doc scholarship [PT4] granted through a national contest, with the monthly amount of € 1,509.80 [PT5]. Some local contests at the research unit or higher education institution level are also available, following the same regulation. The maximum length of the postdoc scholarship is 6 years. Due to the excessive use of this mechanism, temporary work contracts are being promoted as an alternative by the so-called Scientific Employment Policy [PT6]. Postdocs with temporary work contracts are hired as Junior Researchers (*Investigador Júnior*) and the length of their contract does not exceed 6 years. The entry level is € 2,128.34 per month (which is subject to taxes).

Professor positions in Portuguese universities are organized in the following categories: *Professor Auxiliar*, *Professor Associado*, *Professor Catedrático*. The corresponding professor category for polytechnic institutions (*Politécnico*) are *Professor Adjunto*, *Professor Coordenador*, *Professor Coordenador Principal*. Hereinafter, we focus on universities' professor positions. The qualifications required for permanent professor positions in the universities are a PhD degree for *Professor Auxiliar*; a PhD degree awarded more than 5 years ago and relevant academic professional experience for *Professor Associado*; a PhD degree awarded more than 5 years ago and habilitation (*Agregação*) for *Professor Catedrático* [PT8]. The above positions are permanent, except the case of *Professor Auxiliar* where a 5 year experimental period applies. If the assessment of these first 5 years turns out to be negative the contract ends, otherwise it is converted into a permanent one. There is also the possibility of part-time (typically less than 60%) invited contracts (*Convidado*), usually annual, for specific needs. This applies to all the categories.

The typical first step of a PhD graduate willing to pursue an academic career is to apply to a position as a *Professor Auxiliar* in an open contest. This may happen after some years as a postdoc to improve the curriculum vitae. If the application is successful, a 5 year probation period starts, that is subject to a review at the end of the 5 year term. A positive assessment means the contract becomes permanent, meaning tenure is obtained. To go further, the professor must then apply to a *Professor Associado* position, again in an open contest. The next step is presenting the Habilitation (*Agregação*) [PT9]. This is an academic title requiring public defence in front of a jury from several universities, of the personal curriculum vitae, of a report on a course or group of related courses, and of a summary of a lecture on a subject related to the chosen area. Approval in the Habilitation corresponds to an improvement in the salary and, most importantly, enables applications for the top category of *Professor Catedrático*. This application is again to an open contest. There is no progression to higher categories through an individual assessment process, all the progressions are done through competitive processes²³.

6.15 Romania

PhD Candidates have a fixed term contract with the university for a period of three years, that can be extended for at most two years; afterwards there exists a "*grace*" period of two years. PhD Candidates can receive a doctoral grant, in this case their duties include teaching, research and administrative tasks. Doctoral grants can be funded from the state budget or private funding. PhD candidates are expected to carry out research under the supervision of a professor and an advisory board¹¹.

Postdoc positions in universities are usually funded from research projects and are temporary, usually for three years (except from large research projects that last longer). The research institutes may also employ postdoctoral researchers in permanent research positions¹¹.

Professor positions are organized in four categories: *Asistent*, *Lector*, *Conferentiar* and *Profesor*. Professors on all ranks working in public institutions are civil servants, their salaries and career path and promotions are ruled by the national government. *Asistent* are usually temporary positions (typically 3 years) and may be occupied by senior PhD Candidates or Postdoctoral Researchers. All the other positions are permanent and involve both teaching and research activities. The conditions to occupy any academic or research positions are regulated by the National Council for University Titles, Diplomas and Certificates (CNATDCU) [RO1], and may be further restricted by universities. Only professors who obtain the Habilitation title can work as a PhD supervisor¹¹.

6.16 Spain

PhD Candidates in Spain are considered both as trainee researchers and university students. The rights of doctoral students as trainee researchers are found in the bases described by the European Charter for Researchers and within the Code of Conduct for the Recruitment of Researchers, of 2005, endorsed by European universities. The position of trainee researcher is regulated in Spain through the Trainee Research Staff Statute of 2006. PhD candidates have fixed-term full time contracts lasting for one year and subject to renewal up to a maximum of four years (six for disabled students). Positions are funded by national scholarships, research grants of professors, or industry funding programs. The most common situation is national funding through Spanish grants such as FPU (*Formación de Profesorado Universitario*, 4 years) or FPI (*Formación de Personal Investigador*, 4 years) or regional grants such as Catalan grants (*FI – Formació d'investigadors*, 3 years). PhD Candidates can have teaching and supervision duties additionally to the thesis work, after the second year [²⁴, SP2].

Postdoctoral Researchers (*Ayudante Postdoc*, *Investigador Postdoc*) are employed in temporary, fixed-term, working contracts for a minimum of one year, the contract can be renewed for a maximum of four additional years. Their duties include research as well teaching and students' supervision²⁴.

Professors with permanent positions in Spain can be employed by the national Spanish Government (civil servants) or by a regional government. Civil servants positions are organized in three categories: *Titular de Escuela Universitaria*, *Titular de Universidad/Catedrático de Escuela Universitaria* and *Catedrático de Universidad*. All positions, starting before 2007, were permanent and tenured. From 2007 an educational reform has been enforced and under new contracts only *Catedrático de Universidad* and *Titular de Universidad* are tenured positions. *Catedrático de Universidad* can take positions of Department Chair, Dean (Faculty), Director (School) and Rector. To apply for a permanent position, after getting a PhD, researchers usually apply for a postdoc grant or temporary contract. During three or four years they have to teach and do research in order to pass the habilitation process, which can be either national or regional. Note that national research centres have different positions (e.g. *Científico Titular*, *Investigador Científico*), different professional tracks and only research duties²⁴.

6.17 Switzerland

PhD Candidates in Switzerland are typically employed by the universities as *Wissenschaftlicher Assistenz I* (Research Assistant I). Beyond performing research work leading to their Doctorate and attending a number of courses, PhD Candidates assist their supervisors in teaching and supervising undergraduate students and frequently perform internal tasks in their research groups. Contracts are temporary, renewed annually and with variable duration (in agreement with the group leader), on average three to four years, but never extending more than six years [SW9].

Postdoctoral Researchers are employed by the universities as *Wissenschaftlicher Assistenz II* (Research Assistant II) or *Wissenschaftliche Mitarbeitende I* and *II* (Senior Researchers and Teaching Assistants), depending on their previous experience. Duties include performing own research, teaching and supervision of students and PhD Candidates as well as internal tasks in the research group. The positions are funded by the university institutes themselves or by third parties such as the Swiss National Science Foundation or international funding organizations. Contracts are fixed-term, renewed annually, and with variable duration, on average two and a maximum of six years, in agreement with the group leader [SW10].

Professor positions are organized in three categories: *Assistenzprofessor*, *Außerordentliche Professor* and *Ordentlicher Professor*¹⁶. Among the three categories only *Assistenzprofessor* are non-tenured positions. Many appointments include a tenure-track plan, in this case an *Assistenzprofessor* is appointed for four years, with the possibility of contract renewal for a period of maximum two years. After this period, candidates with outstanding qualifications are considered for a permanent professorship (in general *Außerordentliche Professor*) through a

²⁴ Núria Castell Ariño, personal communication.

direct, multi-stage tenure procedure [SW10]. Procedures for granting tenure-track positions are determined by the individual faculties. *Assistenzprofessor* positions can also be funded by a Swiss National Science Foundation (SNF) grant, but in this case the contract does not include a tenure-track plan [SW10].

6.18 UK

PhD Candidates in the UK usually have a stipend. Optionally part-time contracts to help with teaching are also available. In general, these contracts do not surpass fifteen hours per week and most students supplement their stipend with a few hours of teaching a week. Most stipends are awarded for three or three and a half years, depending on the funding scheme. The maximum allowed time varies depending on the University, but in general it is four years. A compelling factor to enforce the maximum four years of PhD is the fact that getting government funded scholarships depends on the majority of the PhD Candidates from the institution completing their PhD in four years or less during the past five years. Funding for PhD positions in the UK are almost always provided by the national government or funding organizations. Grants fund the PhD Candidate's living expenses and whatever fees the university demands. Some grants are more generous than others regarding expenses for experimental work and the stipend paid to the student. Each funding body has its own restrictions on who is eligible to receive funding, and funds are limited, so PhD positions are competitive in almost all institutions. Funding for PhD Candidates is nearly always awarded to the department or the research supervisor, not the student. Most funding is specific to UK-citizens living in the UK. The UK research council also funds students from EU countries, but the stipend covers only university fees and not living expenses²⁵.

Postdoctoral Researchers in the UK have temporary fixed-term contracts with the universities with the contract duration depending on the funding source. Duties include performing own research, teaching and supervision of Bachelor's and Master's students. In case Postdoctoral Researchers are employed by the university for more than three years (even if having more than one single contract) they notionally become "permanent" members of staff. They might still become unemployed when the funding paying their salaries finishes, but in this case the university needs to provide some redundancy compensation. Since 2009 researchers funded by the national government have their employment governed by a scheme called "The Concordat", which essentially gives them various rights like the one to be treated as permanent staff, maternity leave, sickness leave, etc²⁵.

University professor positions in the UK are organized in three ranks: Lecturer, Senior Lecturer/Reader and Professor. All positions are permanent and don't include tenure track schemes. Lecturer positions usually start with a probationary period. The length of a probationary period can vary a lot according to the institution and the length of the contract of employment. Reader/Senior Lecturer or Professor positions do not include a probation period. Promotion to a higher rank can happen at any time in the career, whenever the candidate satisfies the promotion criteria defined by the institution. Each year there is a promotion round and the criteria for promotion for each level is published and candidates can be selected or self-nominate for a promotion. The Department first decides whether they want to support the candidate or not. Then at the faculty level a judgement is made about quality, partially in comparison with other candidates from across the departments in the faculty that year, creating therefore a ranked list with a quality cut off. For Reader and Professor this stage involves the faculty consulting independent referees about the work of the candidate. Then at the university level the ranked lists are combined into a single ranked list and as many candidates are promoted as can be afforded. Professors in the UK are said to hold a chair in a subject or subject area, so are often referred to as "The Chair in/of X" where X is their subject. Chairs may be established or personal. An established chair is one that is not tied to the individual who currently holds it. A personal chair on the other hand, is tied to the individual who has it. If they leave or retire, the chair is not guaranteed to be available for another person to take up²⁵.

²⁵ Jane Hillston, personal communication.

7 Salaries

7.1 Salaries: Overview

In this section we present the results for the salaries of PhD Candidates and Postdoctoral Researchers (Section 7.2, Table 11) and Professors at various ranks (Section 7.3, Table 12).

Considerable variations exist between different countries. Possibly even more than elsewhere in this report, any comparison across countries requires care in light of the differences in career systems, position definitions (see Section 6) and salary systems. In addition, in Germany and Switzerland, since the figures apply at the national level, there may be significant variation between regions, institutions and seniority levels. Such factors as individual contracts and bonuses can also play an important role.

All salary figures presented are **earned yearly gross salaries in Euros**, rounded to the nearest integer. Important comments on the specifics of every country and how the figures were determined follow each of the two tables. We chose to report here only earned gross values, without taking into consideration the different tax and pensions systems, and therefore without reference to final net values earned by academics and the total gross costs borne by employers.

7.2 Salaries: PhD Candidates and Postdoctoral Researchers

Table 11 presents the yearly gross salaries paid to PhD Candidates and Postdoctoral Researchers in the selected countries.

<i>Table 11. PhD Candidate and Postdoctoral Researcher salaries (yearly gross in Euros)</i>				
	PhD		Postdoc	
	<i>Min</i>	<i>Max</i>	<i>Min</i>	<i>Max</i>
Austria	40,103	47,544	53,255	62,097
Belgium	39,031	42,165	49,129	52,263
Czech Republic	4,206	22,000	9,300	24,346
Estonia	14,400	21,600	16,320	47,472
France	20,220	24,300	30,000	31,836
Germany	44,064	51,518	47,791	56,065
Greece	n.a	n.a	n.a	n.a
Italy	15,343		19,368	30,000
Latvia	1,356		-	-
Lithuania	4,742	5,472	n.a	n.a
Netherlands	27,192	34,764	36,528	42,540
Poland	7,128	11,016	14,599	n.a.
Portugal	12,039		29,797	41,331
Romania	2,400	3,254	n.a	n.a
Spain	14,400	19,000	20,000 (2)	23,000 (1)
Switzerland	62,347	69,540	75,651	79,268
UK	18,080		37,515	48,892

Austria

The indicated salaries are based on an employment contract with a working time of 40 hours per week. In Austria 14 monthly salaries are paid per year. Often PhD Candidates are employed for less working hours per week. However, in specific cases also higher salaries can be paid. Since 2011 all university employees in Austria are paid according to the Austrian Collective Agreement for University Staff (*Kollektivvertrag*) [AT4]. According to this agreement, only initial minimum salaries are defined. Usually the salaries increase with the number of years being employed. According to the indicated figures, valid from 2018, the yearly minimum salary for starting PhD Candidates is € 39,124, this amount is independent of the funding source. The minimum yearly salary for Postdoctoral Researchers is € 51,955. Salaries for Postdoctoral Researchers increase on a yearly basis. The indicated maximum salaries for both categories assume specific numbers of consecutive years (e.g., PhD 4 years and Postdoc 8 years) of employment at the Vienna University of Technology [AT5, AT6]. Note that the maximum salaries paid will vary depending on the institution. Numbers are from January 2019.

Belgium

Salaries of PhD Candidates in Belgium vary depending on the funding source, salaries paid to PhD candidates who have a contract with the university as teaching and research assistants are higher than PhD scholarships which in general do not involve teaching and service duties. However, in the case of scholarships, income taxes do not apply, only social contributions. Min and Max values shown in the table are salaries paid to assistant positions in the first and fourth year (note that assistant contracts can have a duration of maximum six years) at the *Université catholique de Louvain*, data from July 2017 [BE15, Appendix C]. National PhD scholarships are around € 24,000 per year, with small differences depending on the agency [BE15, BE16, Appendix C]. Higher scholarships can also be paid when the grant comes from EU or other international projects.

Salaries of Postdoctoral Researcher, similarly to PhD Candidates, also vary according to the type of contract and funding source, initial salaries will depend on previous research experience. Min and Max values shown in Table 11 are salaries paid to a starting Postdoctoral Researcher, Max salary considers a Postdoctoral Researcher with four years of experience at the *Université catholique de Louvain* [BE15, Appendix C]. National Postdoctoral fellowships are around € 32,000 per year with small differences depending on the agency [BE15, BE16, Appendix C]. Note that as for PhD scholarships, for Postdoctoral fellowships income taxes do not apply, only social contributions. Higher fellowships can also apply when the grant comes from EU or other international projects.

For both PhD Candidates and Postdoctoral Researchers positions there are only small variations in the salaries across the regions and universities [BE15, BE16]. Working hours for full time positions are 38 hours /week. Numbers are valid from July 2017.

Czech Republic

Funding for PhD Candidates in Czech Republic varies depending on the funding source. Full-time PhD students can receive scholarships (starting at around € 400 per month) and are free from paying tuition fees, health and social insurances. The maximum total period of receiving a doctoral scholarship is 4 years. The scholarship is increased in the final years of study and an extraordinary scholarship is usually awarded, in most higher education institutions, for significant achievements (usually publications). The university receives funding for scholarships from the state and itself determines how the scholarship is distributed among PhD students. Salaries paid to PhD candidates who have a contract with the university as teaching and research assistants are higher than PhD scholarships and depends on their workload. Funding for external PhD candidates who work outside the university varies depending on the employing institution.

Postdoctoral Researchers who stay at the university are typically employed in the position of an Assistant (*Asistent*), Assistant Professor (*Odborný asistent*) or Researcher (*Vědecký a výzkumný pracovník*) and have a fixed-term contract from 1 up to 3 years. A full time position is 40 hours per week. Their salary is significantly influenced by involvement in grants. Research results are rewarded by extraordinary funding.

In Czech Republic, universities have freedom to set their own salary regulations and therefore salaries are completely decentralized, differently than most countries included in this study. Salary values for PhD candidates and Postdoctoral researchers presented in Table 11 are based on a sample of Informatics faculties of Czech Universities, collected manually by our national contacts. The sample includes the five following faculties: Faculty of Information Technology (Czech Technical University in Prague), School of Computer Science of the Faculty of Mathematics and Physics (Charles University), Faculty of Electrical Engineering and Computer Science (VSB - Technical University of Ostrava), Department of Computer Science and Engineering of the Faculty of Applied Sciences (University of West Bohemia), and Faculty of Informatics (Masaryk University). Min and Max salaries are the lowest and highest salaries paid to individuals in the sample of institutions consulted. Max numbers include grant funds, an additional salary component which makes a significant part of the academic regular wage²⁶.

For reference the exchange rate used was 1EUR = 25.68 CZK. Numbers are valid for 2019.

Estonia

In Estonia, academic salaries are not defined at national level. Employment contracts and rules for academic professions are regulated by the Universities Act, the Organisation of Research and Development Act and the Standard of Higher Education [EE3]. There are no national salaries scales for research and teaching staff, including PhD Candidate, Postdoctoral Researcher and Professor positions. Universities have freedom to set their own salaries values and progression. Salaries will therefore vary depending on the employer university, field and institute budget. Top-level researchers from abroad often are paid competitive salaries.

Differently than most countries included in this study, salary values for PhD candidates presented in Table 11 are expert estimations of gross salaries paid to PhD candidates in the field of Informatics at Estonian Universities that ensure PhD students the income of at least 1,200 EUR per month. The maximum PhD salary depends on various factors such as project type, funding source, job type and duties, etc. but on average the maximum is around 1'800 EUR per month²⁷. In all universities, PhD students studying full time have the right to receive a monthly standard state scholarship of € 660 tax free. Those serving as teaching assistants or research fellows in the field of Informatics are typically paid salaries on top of the scholarship to reach more competitive income levels.

Salary values for Postdoctoral researchers presented in Table 11 were collected contacting directly all ICT institutes, from both Universities and UAS, in Estonia. Min and Max salaries for Postdoctoral researchers shown in Table 11 are the lowest and highest salary paid to individuals in the institutions consulted (note that the numbers are not an average of minimum and maximum salaries paid in all institutions consulted). Numbers are valid from January 2019. Working hours for full time positions are 40 hours /week.

France

Salaries of PhD Candidates in France are in general fixed and do not progress from the beginning to the end of the doctoral contract. The minimum value in the table corresponds to the amount paid to PhD Candidates developing their thesis in a University and who are fully dedicated to their research and thesis work (i.e. no teaching or additional duties). Maximum value corresponds to contracts which involve not only research and thesis work but also complementary activities like teaching, scientific and technical information, development of research, consultancies or expertise to companies or public authorities [FR2]. Another variation found are PhD Candidates who have contracts, and develop their research work, in industrial organization on the frame of the system called "*Conventions industrielles de formation par la recherche*" (CIFRE). CIFRE PhDs are paid a minimum salary of € 1,957 per month [FR2]. Research institutes which employ PhD Candidates also present slightly variations on the remuneration system, e.g., INRIA pays a gross salary of € 1,982 per month for the two first years, and € 2,085 per month for the third year [FR8]; CNRS pays € 1,757 per month (only research and thesis work) and € 2,095 per month (with complementary activities) [FR9].

²⁶ Přemek Brada, personal communication

²⁷ Jaak Vilo, personal communication

Salaries of Postdoctoral Researchers slightly vary according to the institution and research project. Table 11 shows values paid to a post-doc with a contract with CNRS (€ 2,500 per month) [FR9] and with INRIA (€ 2,653 per month) [FR8]. Initial salaries usually remain the same until the end of the contract, but might increase in a case of contract extension²⁸.

Numbers are valid for 2018. Working hours for both PhD Candidates and Postdoctoral Researchers, in full time positions, are 35 hours /week.

Germany

PhD and Postdoctoral positions remuneration is defined by the *Tarifvertrag im Öffentlichen Dienst* (TV-L) [GE7, GE13-GE15 Appendix C]. In general PhD Candidates have a salary within (or corresponding to a percentage of) the pay scale (*Tarif*) TV-L 13. The exact grade or level (*Stufe*) is defined based on previous experience, family situation, working hours and tasks defined by the working contract (teaching load, supervision and other duties). Students in Engineering, Computer Science and Applied Mathematics, high-demand occupations in Germany, in general earn the full rate of the respective TV-L 13 salary grade appointed, for a full time (39.83 hours/week) working contract involving teaching and supervision responsibilities [GE16].

Min and *Max* values shown in the table correspond respectively to the starting level (*Stufe 1*) and the level 3 (*Stufe 3*) of the full scale TV-L 13, considering a first and a third year PhD Candidate, respectively. Please note that the initial salary might change considering the level of experience and family situation of the candidate (for all grades within the TV-L 13 scale, see Appendix C and reference GE15).

Postdoctoral Researchers are often paid on the same pay scale as PhD Candidates, i.e., TV-L 13, with the entry salary starting on a higher grade according to the experience and family situation. Postdoctoral Researchers with special responsibilities, such as junior research group leaders, may be paid in a higher salary scale, e.g., TV-L 14, TV-L 15, TV-L 15Ü [GE16]. Working hours for a full time working contract is also 39.83 hours per week.

Min and *Max* values shown in the table correspond to a Postdoctoral Researcher starting at *Stufe 1* within the full *tariff* TV-L 14 and *Stufe 3* (for all levels within the TV-L 14, please see Appendix C and reference GE15). Note that this was an arbitrary choice since the initial salary varies according to previous experience. Salary values presented in Table 11 are valid for 2018 [Appendix C, GE15].

Greece

The salaries for PhD candidates and Postdoctoral Researchers for Greece unfortunately at this point could not be reported. According to our contacts in Greece, there are significant variations depending on the rules regulating each particular category of project in which the candidate/researcher is involved. Scholarships provided by the State Scholarships Foundation-IKY, are € 450 per month for PhDs and € 600 per month for Postdocs. Some research centres provide PhD scholarships which may vary from € 500 to € 800 per month¹⁸.

Italy

Salaries of PhD Candidates in Italy are nationally fixed and do not progress from the beginning to the end of the doctoral contract. Since 2008 PhD salary was fixed on € 1,137 per month (on a 12-month basis), gross value for a full-time contract, corresponding to 38 hours/week [IT5,¹⁹] and during last 10 years did not change. In 2018, the amount of PhD salary was increased and set to € 1,278.6 per month (on a 12-month basis) [IT5].

Salaries of Postdoctoral Researchers are defined by the professor/group leader opening the position. Initial salary cannot be lower than € 19,367 per year, usually maximum salary does not surpass € 30,000 per year. Values shown in Table 11 correspond to gross yearly salaries for a full time (38 hours/week) position. The salary is fixed and

²⁸ Antoine Petit, personal communication

remains the same until the end of the contract, the exact value of the initial salary depends on the researcher previous experience¹⁹.

Latvia

PhD Candidates in Latvia are students in universities doctoral programs which usually do not pay tuition fees and receive a monthly scholarship of € 113²⁰.

Postdoctoral Researcher positions do not exist in Latvia. After receiving a doctor degree those following an academic career are immediately eligible to positions of *Docents* or even *Asociēts Profesors*²⁰.

Lithuania

Typically, PhD candidates in Lithuania receive scholarships. Minimum salary corresponds to the Lithuanian state scholarship paid to PhD candidates in the first year; maximum salary to the scholarship paid in the second, third and fourth year of PhD education (the same amount during all three years) [LT5]. Numbers are valid from January 2017. Postdoc salaries are not defined since they depend on each particular grant conditions (see section 6.11).²¹

The Netherlands

Academic career regulations and salaries in the Netherlands are defined by the collective agreement (CAO) of Dutch Universities, set by the Association of Universities in the Netherlands (VSNU) [NE7].

PhD Candidates are employed as research/teaching assistants and paid according to the Scale P of the CAO table of salaries [NE7, Appendix C]. The initial salary corresponds to the salary grade P0 for a period of one year, at the end of this first year salary progresses automatically (with no performance assessment) to the grade P1. Each subsequent salary increase shall take place only after annual assessments [NE5-NE7]. Min and Max values shown in the above table correspond to the grades 0 and 3 within the scale P.

Postdoctoral Researchers are employed as research/teaching assistants and paid according to the Scale 10 of the CAO table of salaries [NE7, Appendix C]. The exact initial salary, which will correspond to a grade within Scale 10, depends on previous relevant experience and family situation. Min and Max values shown in the Table 11 correspond to the grades 3 and 6 within the Scale 10 [NE7, Appendix C].

Working hours for both PhD Candidates and Postdoctoral Researchers, in full time positions, are 38 hours /week. Salary values presented in Table 11 are valid from May 2018 [NE7].

Poland

According to the new law on Higher Education and Science that came into force from October 2018, students enrolled at doctoral programs do not pay fees and receive a fixed monthly scholarship paid 12 times per year [PL2]. The scholarship amount is 110% of the minimum salary in Poland during the first two years of study and 170% of the minimum salary during the next years of study. In 2019, the minimum salary in Poland is set to 2,250 PLN per month [PL4]. Min salary shown in Table 11 corresponds to the scholarship paid during the first two years of study, max salary to the scholarship paid during the third or fourth year of study. The numbers are valid for 2019.

In the field of Informatics, Postdoc researchers are typically employed in the position of an *Adiunkt* and have a fixed-term contract from 1 up to 3 years. Min salary shown in the table corresponds to minimum basic salary of *Adiunkt* defined in the new law on Higher Education and Science. According to it, the monthly basic salary of an *Adiunkt* cannot be lower than 73% of the *Profesor* remuneration [PL2, PL5]. Maximum values are not defined by the government and cannot be estimated with precision. In Poland, academic staff typically receives 13 monthly salaries per year (except PhD students who receive a monthly scholarship 12 times per year). The numbers are valid from October 1, 2018. For reference the exchange rate used was 1PLN = 0.24EUR.

Portugal

A student may enrol in a PhD program without getting any specific funding. However, a significant number of PhD students are funded by scholarships from the Portuguese National Science and Technology Foundation (FCT) or from higher education institutions, research Institutions or companies with the amount of € 1,003.26 per month [PT5]. Scholarships are not subject to taxes and paid 12 times per year.

Postdoctoral researchers can be funded by tax free post-doc scholarships from FCT, higher education institutions or research institutions, with the monthly amount of € 1,509.80 [PT5]. A more common source of funding is temporary work contracts as Junior Researchers (*Investigador junior*). Salaries values for Junior Researchers are fixed in the "Regulation for Scientific Employment" [PT6]. The minimum amount (€ 2,128.34 per month) corresponds to the remuneration level (*Níveis Remuneratórios*) 33 of the Single Pay Scale (*Tabela Remuneratória Única*) for the Public Administration; the maximum amount (€ 2,952.21 per month) – to the remuneration level 49 [PT7, Appendix C]. Monthly salaries are paid 14 times per year. The contracts are temporary with a maximum duration of 6 years.

Romania

Only PhD candidates that benefit from a doctoral grant receive a salary that depend on the university and progress from the first to the third year. Min and Max values shown in Table 11 are paid to a first and third year PhD Candidate. In some cases, PhD candidates may also receive extra income from research projects.

Salaries for postdoc researchers vary according to the research project and institution and minimum and maximum values are not available. Working hours for both PhD Candidates and Postdoctoral Researchers, in full time positions, are 40 hours per week.

Spain

PhD candidates are funded by national scholarships, research grants of professors, or industry funding programs. The numbers in the table refer to Spanish grants such as FPU (*Formación de Profesorado Universitario*) or FPI (*Formación de Personal Investigador*) or Catalan grants FI (*Formació d'investigadors*). These grants progress along the years, Min and Max values shown are paid in the first and third year, respectively²⁴.

Postdoctoral researchers position in Spain may adopt a variety of forms, from a postdoctoral grant to the more formal "*Ayudante Doctor*" position. In both cases the position is temporary and entails both research and teaching. Postdoctoral research can also be done under some specific grants or contracts such as "Ramon y Cajal" from Spanish Government or "Beatriu de Pinós" from Catalan Government, as well as EU grants. In some cases, an international period after getting the PhD and before application is mandatory. Min and Max salaries shown in the table are paid to *Ayudante Postdoc (1)* and *Investigador Postdoc (2)*, respectively²⁴.

Switzerland

Salaries of PhD Candidates and Postdoctoral Researchers are not uniform across the country; each University defines its own base values and increasing steps. *Min* and *Max* values shown in Table 11 are calculated averages of annual gross salaries paid to a first and a third year PhD and Postdoctoral Researcher in a full-time position (42 hours per week) and 100% employment rate at four Cantonal Universities (Bern, Geneva, Neuchatel, Zurich) and the two Federal Institutes of Technology (EPFL and ETHZ) [SW11]. Note that in general not all PhD positions correspond to a 100% employment rate, depending on the area, department, teaching and supervision duties involved, this can correspond to 75% or 50% of a full rate salary, although working hours remain at 42 hours/week. In Informatics and Engineering, considered fields of high demand in Switzerland, generally PhDs contracts correspond to a 100% position.

For reference the exchange rate used was 1EUR = 1.16CHF. Salary values presented in Table 11 are valid from January 2018 [SW11].

UK

PhD students in the UK receive a stipend, which is tax-free and covers the Universities fees and living expenses, the exact value can be defined at the University level, but most institutions pay the basic values recommended by the national government, value shown in the table. The salary is fixed and do not progress from the beginning to the end of the doctoral studies²⁵.

Postdoctoral Researchers can have positions of Research Assistants, Research Associates and Research Fellows which have different levels of responsibility and autonomy. In almost all cases in the UK, Postdoctoral Researchers will not be part of the faculty of the University but are instead paid by money that comes from research grants from national or international funding bodies²⁵. However, their pay is based on the national pay spine negotiated by JNCHES (Joint Negotiating Committee for Higher Education Staff) [UK7], see details in Section 7.3.

The initial salary will depend on previous experience and the level of responsibility and autonomy expected in the current position. Min and Max values shown in Table 11 correspond to the grade point UE7 (spinal point 30 to 39 in the national single pay spine) in the salary tables form the University of Edinburgh [UK8, Appendix C]. Please note that it is also possible to find Postdoctoral Researchers paid within the same scale points of Lecturers, Readers or even Professors, depending if they are operating more as independent researchers (rather than just following a research program designed by a member of academic staff)²⁵. Note that there might be slight differences in the way the universities internal scales define their correspondence to the national spinal scale. For reference the exchange rate used was 1GBP = 1.13EUR.

7.3 Salaries: Professors

Table 12 presents the yearly gross salaries in Euros paid to university professors in the surveyed countries. They are only meaningful in connection with the country-specific notes that follow the table. When comparing salary across countries please bear in mind that:

- Values shown are paid gross salaries. Neither employer expenses nor net salaries were considered. Bonuses for special services, performance or paid regularly at the end of the year in some countries were also not considered.
- Taxation and social welfare systems are different (in some countries people contribute from their gross salary while in others contributions are paid by the state).
- Overall salary in some countries may be higher due to optional bonuses/incentives depending on role/function.
- Career progressions are different (some are time based, others are determined by individual and/or local negotiations, others are a mix).

Table 12. Professor salaries (yearly gross in Euros)

	Assistant Professor				Associate Professor		Full Professor			
	Min		Max		Min		Max		Min	Max
Austria	62,978				68,285		96,043		71,823	99,495
Belgium Wallonia	57,834		90,665		67,659		103,101		75,742	115,536
Czech Republic	13,551		38,524		15,327		48,876		19,393	69,237
Germany	50,638		58,909		63,574		74,179		70,489	84,207
Greece	13,800		n.a		15,972		n.a		17,508	n.a
Italy	34,898				50,831		82,987		72,431	106,104
Netherlands	42,540		66,156		58,932		78,804		65,292	95,052
Portugal	44,685		56,143		50,414		59,581		65,310	75,622
Spain	30,619		n.a.		34,689		n.a.		43,582	n.a.
Switzerland	121,112		168,911		137,597		188,876		155,128	211,897
UK	46,095		61,885		58,342		69,628		67,606	113,417
Belgium Flanders	Docent		Hoofddocent		Hoogleraar		Gewoon Hoogleraar			
	50,059	73,788	57,324	90,055	67,118	102,453	75,177	114,851		
Estonia	Assistent		Lektor		Dotsent		Professor			
	15,600	36,528	16,212	54,000	21,600	66,576	24,768	72,000		
France	Maître de Conférences				Professeur des Universités					
	26,316		46,673		37,507			65,679		
Latvia	Asistenti		Lektors		Docents		Asociēti Profesors		Profesors	
	5,771	6,960	7,222	8,640	9,032	15,382	11,286	20,535	14,103	40,963
Lithuania ²⁹	Asistentas		Lektorius		Docentas		Profesorius			
	6,383	9,142	7,388	12,464	9,824	15,852	14,170	23,874		
Poland	Asystent		Adiunkt		Profesor uczelni		Profesor			
	10,000	n.a.	14,599	n.a.	16,599	n.a.	19,999	n.a.		
Romania	Asistent		Lector		Conferentiar		Profesor			
	7,484	8,144	8,489	9,914	9,378	13,262	10,915	19,349		

²⁹ Differently than for all other countries, the numbers for professor salaries in Lithuania were taken from the informal polling among state Lithuanian Universities conducted by the local news agency (see details in the explanation below).

Austria

As for the other groups of university employees, only initial minimum salaries for professors are defined by the Austrian Collective Agreement for University Staff [AT4]. These salaries increase with the number of years employed. Minimum salaries for Associate Professors and Full Professors increase every six years provided that there was at least one positive evaluation (those rules do not apply for the group of Assistant Professors). The salaries which are indicated in the table refer to a full-time employment (40 hours/week). Amounts mentioned for Assistant Professors are referring to Assistant Professors with doctoral degree. The minimum initial salary for Associate Professors is € 66,619 at the beginning of the employment contract, and € 94,223 if they have been employed for 24 years. The initial minimum salary for Full Professors is € 70,071 at the beginning of the appointment, and € 97,675 after 24 years. Maximum salaries shown are from the Vienna University of Technology [AT4, AT7]. Note that some differences might exist depending on the employer university. Number are valid from January 2018.

The pension contributions for all university employees are paid half by the university and half by the employees (the employee's share is part of the gross salary). Additional contributions to pension fund are paid by the universities for all university employees who are employed for more than 2 years.

Belgium

Professor career regulations and salaries scales and seniority grades in Belgium are defined by the law of each independent region. Full-time working hours amount to 38 hours/week.

Flanders

Salary tables, seniority and increasing steps, as well as career progression are defined at the region level. Within a given category the initial salary is determined by previous relevant experience. Min values presented in Table 12 for all four categories are gross salaries at the starting point of the salary scale [BE17, BE18, Appendix C]. Max values presented correspond to the salary paid after 24 years of seniority for a *Docent*, after 24 years of seniority for a *Hoofddocent*, after 18 years of seniority for a *Hoogleraar* and after 15 years of seniority for a *Gewoon Hoogleraar* [BE17, BE18, Appendix C]. Note that salary increases within the same category happen automatically at every three years. Numbers are valid from July 2017.

Wallonia

Salary tables, seniority and increasing steps as well as career progression are defined at the region level. Within a given category the initial salary is determined by previous relevant experience. Min values presented in Table 12 for all four categories are gross salaries at the starting point of each salary scale, therefore considering no seniority [BE15, Appendix C]. Max values presented correspond to a salary paid after 24 years of seniority for *Chargé de Cours*, after 18 years of seniority for a *Professeur* and after 15 years of seniority for a *Professeur Ordinaire* [BE15, Appendix C]. Note that salary increases within the same category happen automatically every three years. Numbers are valid from July 2017.

Czech Republic

The university salaries are not defined by the government as university employees are not civil servants. There are no national salary scales for research and teaching staff, including professor positions. Universities have freedom to set their own salary values and progression. Salaries therefore vary depending on the employer university, domain and institute budget. Staff, including professors, are divided into salary classes that take into account the difficulty of their work and the years of experience. Salaries are also affected by the employee's grant activity, as grant funds may form a significant part of his/her regular wage. Extraordinary rewards for publications and other results are usually paid once a year or semi-annually.

Differently than most countries included in this study, salary values for professor positions presented in Table 12 are based on a sample of Informatics faculties of Czech universities, collected manually by our national contacts.

The sample includes the following faculties: Faculty of Information Technology (Czech Technical University in Prague), School of Computer Science of the Faculty of Mathematics and Physics (Charles University), Faculty of Electrical Engineering and Computer Science (VSB - Technical University of Ostrava), Department of Computer Science and Engineering of the Faculty of Applied Sciences (University of West Bohemia), and Faculty of Informatics (Masaryk University). Min and Max salaries are the lowest and highest salaries paid to individuals in the sample of institutions consulted. Numbers include grant funds, an additional salary component which makes a significant part of the academic regular wage²⁶.

For reference the exchange rate used was 1EUR = 25.68 CZK. Numbers are valid for 2019.

Estonia

As described earlier, in Estonia academic salaries are not defined by the national government. There are no national salaries scales for research and teaching staff, including Professor positions. Universities have freedom to set their own salaries values and progression. Salaries will therefore vary depending on the employer university, field and institute budget. Differently than most countries included in this study, salary values presented in Table 12 were collected contacting directly the administration of all ICT institutes, from both Universities and UAS, in Estonia. Min and Max salaries shown in Table 12 for all four categories are the lowest and highest salary paid in a given institution consulted (note that the numbers are not an average of minimum and maximum salaries paid in all institutions consulted). Note that salaries shown are specific for ICT Professors. Since there are no academic salary scales, and the institutes have freedom to negotiate and define each employee's salary, the only possible way to get salaries estimation in Estonia is by direct contact with the employer institutes. Numbers were collected in 2019.

France

Professor (*Maîtres de Conférences* and *Professeur des Universités*) salaries and career progression in France are regulated by the *Ministère de l'enseignement Supérieur et de la Recherche* (Ministry of Higher Education and Research). The system is strongly centralized; salaries for a given category are exactly the same across the country and in all universities and other public HEI [FR10]. Working hours for a full time position are 35 hours/week.

Maîtres de Conférences positions are divided in two levels: a *classe normale* comprising nine pay grades and a *hors-classe* comprising seven pay grades [FR6, FR11]. *Professeur des Universités* positions are divided in three levels: a *deuxième classe* comprising seven pay grades; a *première classe* comprising three pay grades and a *classe exceptionnelle* comprising two pay grades [FR7, FR12].

Min values shown in Table 12 correspond to the salary paid at the beginning of the career in both categories (i.e. first pay grade at *classe normale* and *deuxième classe*, respectively) [FR11, FR12]. Max values correspond to the highest pay grade in the *classe normale* for *Maîtres de Conférences* and in the *première classe* for *Professeur des Universités* [FR12].

For *Maîtres de Conférences* the salary in the highest pay grade of the level *hors-classe* is € 59,719, while for *Professeur des Universités* the highest pay grade of the level *classe exceptionnelle* is € 74,452 [FR11, FR12]. Numbers are from December 2017.

In a given level, salary progression (moving to a higher pay grade) is awarded automatically after given periods of time, which are defined by the statutory regulations of the group. Promotion to a higher level, in the same category, on the contrary is not granted automatically for seniority, but involves a performance review process.

Germany

Professor salaries in Germany are since 2005 regulated by the new federal system of remuneration W (*Bundesbesoldungsordnung W*), which replaced the old C salary scheme (*Bundesbesoldungsordnung C*) [GE14, GE17-GE18]. The pay regulation W applies to professors, as well lecturers and scientific assistants, and contains the

pay grades W1, W2 und W3 which apply to *Juniorprofessor*, *Außerordentlicher Professor* and *Ordentlicher Professor*, respectively [Appendix C, GE14, GE17-GE18].

In the remuneration system W the financial rewarding for seniority is replaced by a system with a base salary added by family allowances and, in case of grades W2 and W3, performance bonuses for outstanding achievements in research, teaching, promotion of young scientists and undertaking of special administrative and management functions in the university (rector, dean, chair, etc). The criteria for the payment of performance bonuses are defined independently by each state (*Bundesländer*) and university regulations, but can vary significantly among different areas and depend on contractual negotiations [GE19].

Table 12 shows the base gross salaries in the pay grades W1, W2 and W3 (as of August 2017) without any addition of bonuses or allowances. Min and Max values shown correspond to the base salaries paid in the regions Hessen and Baden-Württemberg, respectively. The national averages of the base salaries in the different grades are: € 54,786 (W1), € 68,064 (W2) and € 76,071 (W3) [Appendix C, GE20]. Working hours for a full-time position are 40 hours/week. Number are from August 2018.

Some further peculiarities affect the salary data for Germany. Professors have a special status ("*Beamte*") in which they do not pay for their pensions; the employer also pays for health insurance, and there is a premium for families, initially small but growing with the number of children. In addition, a percentage of W2 professors, and a higher percentage of W3 professors, get a performance bonus. As a consequence, some German professors consulted for the present report consider that Table 12 underestimates the actual professor salaries by 25% to 30%.

A study published in *Forschung & Lehre* in 2017 [GE21] presents the results of a direct survey, run in June 2016, with German Professors in the different career steps (salary levels W1, W2 and W3) in all the states (*Bundesländer*). The gross values reported are average of real earned salaries (*Real gewährte Durchschnittsbesoldung*) and therefore give an estimation of the impact of research, teaching and family allowances, performance bonuses, as well as salary negotiations (existing in some of the states) on the earned salaries. According to the survey the average real monthly gross salaries are € 4,470 (W1), € 6,310 (W2), and € 8,140 (W3). For comparison, the base salaries (*Grundgehälter*) for the same period (reported on the 2016 edition of this report) were: € 4.365 (W1), € 5.422 (W2), € 6.060 (W3).

Greece

Professor salaries and career progression in Greece are regulated by the national government. The system is strongly centralized and the salaries and progression steps for the different categories are the same across the country, and in all universities or other public HEIs. On Table 12 are shown the minimum values determined by law. Maximum values are difficult to be estimated since increases for seniority, as well as a number of bonuses, can apply ¹⁸:

Bonus for preparation of teaching:

- Full Professor: 390 €/Month
- Associate Professor: 368 €/Month
- Assistant Professor: 335 €/Month

Bonus for the organization and participation to conferences and for using the library:

- Full Professor: 273 €/Month
- Associate Professor: 184 €/Month
- Assistant Professor: 128 €/Month

Bonus for research, dissemination and exploitation of research programs:

- Full Professor: 226 €/Month
- Associate Professor: 215 €/Month
- Assistant Professors: 200 €/Month

Italy

Professor salaries and career progression in Italy are regulated by the national government. The system is strongly centralized and the salaries and progression steps for the different categories are the same across the country, and in all universities or other public HEI. Payment grades and progression steps are defined by the salary tables published by the government. The last revision of the salary tables dates from December 2011, after the reform of the academic career system (see Section 6.9). Values shown in table are for the gross yearly salaries in Euros (*annuo lordo*) [Appendix C], note that professors in Italy receive a thirteenth salary.

Salaries shown in Table 12 for Assistant Professors (*Ricercatori*) consider academics taking employment after the reform, i.e. the salary is constant throughout the three-year fixed-term appointment (see Section 6.9). For Assistant Professors employed before the 2011 reform, salary grades can range from € 37,172 and € 65,078 per year corresponding to 35 years of seniority [IT6, Appendix C]. In the old system Assistant Professor positions were not fixed-term, after the first three years, tenure could be reached and a career as Assistant Professor established, without necessarily promotion to a higher-level professorship.

Min and Max values shown in Table 12 for Associate Professors (*Professori Associati*) correspond to the salary at the beginning of the career, after the 2011 reform, therefore considering a position which is tenured from the beginning of the appointment (see Section 6.9), and after 27 years of seniority in the same position [IT6, Appendix C].

Min and Max values shown in Table 12 for Full Professors (*Professori Ordinari*) correspond to the salary at the beginning of the career, after the reform, and therefore considering a position which is tenured from the beginning of the appointment (see details in Section 6.9), and after 20 years of seniority in the same position [IT6, Appendix C].

For all three categories the old salary system was based on automatic salary increase every two years, in the new system instead, every three years a professor has to apply for a salary increase and will be evaluated according to rules defined by each University [IT4]. Working hours for a full-time position are 38 hours/week.

Please note that the retirement ages, 35, 27 and 20 years of seniority for Assistant, Associate and Full Professor, respectively, were chosen as a reasonable reference, not necessarily all professors will retire exactly after this number of years in the respective positions ³⁰.

Latvia

Academics in Latvia are employed directly by the HEIs and are not civil servants. Min salaries are determined by the national government while Max salaries vary from institution to institution. HEI with a higher budget pay higher salaries. The institutional funding comes directly from the national government and is calculated based on the number of students enrolled per institution. The higher the number of students on a determined HEI, the higher the budget and therefore, higher salaries can be paid to the teaching/research staff. In practice though most HEI are able to pay only minimum salaries²⁰.

Differently than for all other countries included in this study, the numbers for maximum salaries in Latvia were collected via informal polling²⁰. The Deans of the ten HEI offering studies in Informatics were interviewed and asked for the maximum values paid to the different professor positions in their institution. Min values are determined by the national government and are essentially the same across all HEI in the country. Maximum values paid vary according to the budget of the organization, the Max values shown in Table 12 are the highest salary paid in one of the institutions consulted (note that the numbers are not an average of the salaries paid in the ten institutions). Salaries have been at this level since 2008, due to the economic recession in the country no salary increase has been applied in the last eight years²⁰.

³⁰ Enrico Nardelli, personal communication

Lithuania

In Lithuania, academic salaries are not defined at national level. According to the Law on Higher Education and Research, higher education institutions themselves have the right to determine the number of teaching, research and other staff, their rights and responsibilities, as well as salary conditions [LT4].

Differently than for all other countries included in this study, the numbers for minimum and maximum salaries in Lithuania were taken from the informal polling conducted by the local news agency DELFI among 11 Lithuanian Universities [LT6]. Representatives of the Universities from various fields of study were contacted and asked to indicate the monthly salaries paid to different professor positions before taxes. To present the annual amounts, monthly salaries were multiplied by 12. Minimum and maximum salaries shown in the Table 12 are the lowest and highest salaries paid for a respective position in one of the Universities consulted [LT6, Appendix C]. Numbers are valid from 2017.

The Netherlands

Professor career regulations and salaries in Netherlands are defined by the collective agreement (CAO) of Dutch Universities set by the Association of Universities in the Netherlands (VSNU) [NE7]. Salaries scales and grades are defined by the CAO table of salaries [Appendix C, NE7]. The full-time working hours amount to 38 hours/week.

The two positions of *Universitair Docent* (UD2 and UD1) allow a career from salary scale 10 to salary scale 11 (UD2), or from salary scale 11 to salary scale 12 (UD1). The two positions of *Universitair Hoofddocent* (UHD2 and UHD1) allow a career within salary scale 13 (UHD2) and salary scale 14 (UHD1). The two positions of *Hoogleraar* (H2 and H1) allow a career from salary scale 15 to scale 16 in position H2 and scale 17 to scale 18 in position H1, respectively [NE5-NE7]. *Hoogleraar 2* are in general the regular full professor positions in Dutch Universities, positions of *Hoogleraar 1* are only appointed in cases of special higher responsibilities³¹.

Within a given scale the initially salary grade is determined by age and experience. As a rule, salary progression within the same pay scale is granted every year after an annual performance review. Promotion to a higher pay scale in the same category (e.g. from a UHD2 (scale 13) to a UHD1 (scale 14) position) is not automatically granted on the sole basis of seniority. In this case a more thorough promotion process is established, to be promoted the candidate needs to perform conceptual and coordinating tasks in teaching and research that match the job profile of the higher position. Promotion to a different category (e.g. from a UHD1 to H2 position) is only possible via a new recruitment and selection procedure to fill a new vacant position [NE5-NE7]. This salary progression scheme is generally applied in the whole country, although there might be occasionally variations in different universities where professorships and different career tracks can be mapped slightly differently to the salary scales³¹.

Salary values presented in Table 12 are valid from May 2018 [NE7, Appendix C].

Poland

Working conditions and minimum salaries of professors employed at public universities are determined by the government. The law on Higher Education and Science defines the minimum basic salaries as well as amounts of additional and overtime payments, bonuses and special allowances, anniversary awards, etc. [PL2] Maximum salaries are not limited at both national and university level and may vary between and within universities. At private universities, working conditions and salaries are not centrally determined but negotiated between higher education institutions and individual professors. Professors might also receive additional funding from external sources, like EU funds, grants, industry contracts, etc.

Min salaries shown in Table 12 correspond to minimum salaries of professors employed at public universities taken from the law on Higher Education and Science and the ordinance of Minister of the Higher Education. According to

³¹ Jan van Leeuwen, personal communication

them, the monthly salary of *Asystent*, *Adiunkt* and *Profesor uczelni* cannot be respectively lower than 50%, 73% and 83% of the *Profesor* remuneration [PL2]. The *Profesor* minimum remuneration is set to 6,410 PLN per month from October 2018 [PL5]. In Poland 13 monthly salaries are paid per year. For reference the exchange rate used was 1 PLN = 0.24 EUR.

Maximum values cannot be estimated with precision since they are not defined by the government or higher education institutions and vary significantly between individual professors depending on amounts of salary supplements and additional payments (e.g. length-of-service allowance, functional allowances, statutory bonuses, overtime supplements, supplements for administrative duties, students' supervision, rector's awards, jubilee awards, etc.)

Portugal

Professor salaries are fixed by the Portuguese Government. The Directorate General for Administration and Public Employment (DGAEP) specifies the basic salary (index = 100) and various index levels for different academic positions [PT10, Appendix C]. The basic salary is set to € 1,636.83 per month and has not changed since 2011. For *Professor Auxiliar*, this basic salary amount is multiplied by the index ranging from 195 (minimum) to 245 (maximum); for *Professor Associado*, the index varies from 220 to 260; for *Professor Catedrático* – from 285 to 330. The progression from the min to the max values is based on annual performance assessment. The annual salary is paid in 14 monthly installments, one corresponding to the Christmas allowance and the other to the holiday allowance.

The salary of *Professor Auxiliar* and *Professor Associado* that possess Habilitation (*Agregação*) are higher. Thus, the minimum annual salary of a *Professor Auxiliar* with *Agregação* is € 50,414, while maximum is € 59,581. The minimum annual salary of *Professor Associado* with *Agregação* is € 56,143, while maximum is € 65,310.

Romania

Professors salaries are regulated by the Ministry of Education and defined based on the number of working years and performance. Performance bonuses for outstanding achievements in research, teaching, and undertaking of special administrative and management functions in the university (rector, dean, chair, etc.) are also paid. The actual salaries depend (within the legal range) on university, faculty and department financial status. The pension contributions, health insurance and social security contributions are paid partly by the university and partly by the employee¹¹.

Minimum salaries show in Table 12 for all four positions are for a member of staff in the first year of employment in the given position, without previous experience, and with standard research activity. The amount increases every year, based on two factors: number of working years and performance. Max salaries shown for *Asistent* positions are paid after three years, note that *Asistent* are temporary positions (see Section 6.15). For *Lector*, *Conferentiar* and *Profesor* positions Max values shown in Table 12 are the maximum salaries that can be reached after 40 years of experience, and outstanding research activity. The research activity is evaluated based on national standards, available for each science domain [RO1]¹¹. Salary values presented in Table 12 are valid from January 2017. The exchange rate considered was 1 EUR = 4.59 RON.

Spain

Professors in Spain are civil servants, initial minimum salaries shown in Table 12 are fixed and defined by the national government²⁴. Numbers are from 2015. Maximum values are not defined by the government and cannot be estimated with precision since it can vary according to a number of factors, as well as due to regional economical differences²⁴:

- Seniority: at every three years (*Trienios*) the salary of each category is increased by the same amount. Currently an increment of € 564 per year applies.

- *Quinquenio*: at every five years professors can apply for a salary complement according to the quality of their academic activities. The universities are in charge of the assessment and decisions. Also, additional complement can be obtained from the regional government and vary from region to region. For “*Quinquenios*” the amount increased is also different for each position.
- *Sexenio*: at every six years professors can apply for a salary complement according the quality of their research activities. In this case a Spanish agency is in charge of the assessment and decisions for the whole country. Also, additional complement can be obtained from the regional government and vary from region to region. For “*Sexenios*” the amount increased is different for each position.
- *Special duties*: there are additional salary complements depending on administrative duties (rector, vice-rector, dean, director, etc).

Switzerland

Professor salaries vary across Switzerland. Each canton defines its own base values and increasing steps; the salaries at the two Federal institutes of Technology (EPFL and ETHZ, the only two federal Universities) are defined by the federal government. In the cantonal Universities, salaries are defined by grades (*Lohnstufe*) in specific pay scales (*Lohnklasse*) [SW11]. At EPFL and ETH a minimum and a maximum salary is defined but there are no predefined grades and progression steps in between [SW11].

In Table 12, Min and Max values are averages of minimum and maximum annual gross salaries paid to professors at four Cantonal Universities (Bern, Geneva, Neuchatel, Zürich) and EPFL/ETHZ in a full-time position (42 hours/week) and 100% employment rate [SW11].

For reference the exchange rate used was 1 EUR = 1.16 CHF. Salary values presented are valid from January 2018 [SW11]. Note that since the last report there has been an increase in the salaries in CHF, however due to the exchange rates differences the numbers are lower than the ones reported in the previous edition of this report in EUR.

UK

The vast majority of professors (Lecturer, Reader, Professor) in the UK are paid according to a national pay spine negotiated by JNCHES (Joint Negotiating Committee for Higher Education Staff). JNCHES is the central committee for multi-employer negotiations and dialogue on pay and pay-related issues formed by representatives from the Universities and Colleges employers’ association and higher education staff’s unions [UK7]. Each University has its own salary grade structure but in general the correspondence to the national pay spine is uniform. Nevertheless, some slight differences may occur in the way the universities internal scales map to the national pay spine. We have used for this report the salary tables, and corresponding map to the national pay spine, from the University of Edinburgh [UK8, Appendix C]. A Lecturer position allows a career from salary defined by the grade point UE8 (spinal point 37 to 47 in the national single pay spine). A Reader position allows a career from salary defined by the grade point UE9 (spinal point 45 to spinal point 51 in the national single pay spine). A Professor position allows a career from salary defined by the grade point UE10 (spinal point 50 to 66 in the national single pay spine). It is important to keep in mind that for Full Professor positions the difference in the salaries across the country, and universities, will be more accentuated. While there is broad agreement on the implementation of the scale for Lecturer and Reader positions, the scale for Full Professors is more discretionary, with each university selecting how to implement the top portion of the scale and how far up to take it²⁵.

For reference the exchange rate used was 1GBP=1.13EUR. Salaries presented are valid from August 2018 [UK8, Appendix C].

8 Conclusion and outlook

The reports produced by Informatics Europe in 2013, 2014, 2015, 2016, 2017, 2018 and the present one provide an analytic and quantitative view of the status of Informatics Education in Europe that is not available through any other source. The data reported here show the current wide diversity across countries regarding degrees, student enrolments, and especially salaries.

The intent of this project, in line with the charter of Informatics Europe, is to obtain and publish such data for Europe as a whole, not just for specific countries. In the first editions we had a clear and explicit strategy: favour accuracy over generality. That decision was made at the time of the first report and continued as a fundamental condition. We have extended our coverage including now a number of countries which could not be included in the first editions. The extrapolation to the rest of Europe, in the case of student numbers and degrees awarded, is just a rough calculation that can give no more than an order of magnitude.

With the creation of the Informatics Higher Education Data Portal, the need and role of the report will be changing and the new editions will be adapted accordingly. In this edition we have already suppressed the publication of the list of institutions and of subjects, which are now permanently published on the online portal.

In the next years as we will be step by step migrating more of the published qualitative data to the online portal and hope that the report will be a high-weight easy to access portrait of the higher education system in Informatics in Europe.

In these efforts we will be highly dependent on contributions from members of the Informatics community who have access to reliable sources in their respective countries. We urge them to contact the authors and provide them with the relevant sources of information.

Such input is also welcome in the case of countries already covered; the authors will be grateful for any comments on the data and sources, and any correction to errors, omissions and misunderstandings that may exist in this edition. More generally, we welcome reader feedback on all aspects of this report.

Any serious policy must be based on the knowledge of facts. The European Informatics community crucially needs solid data. With the help of that community, Informatics Europe is committed to turning the collection, verification and publication of data and integral part of our work as representatives of the community in Europe.

Appendix A: Names of subjects

Informatics is known under different names in different European languages and countries, and in English as well.

The list with the subject names that were used to identify Informatics programs in the countries included in this report can be found on the Informatics Europe Higher Education Data Portal (<https://www.informatics-europe.org/data/higher-education/subjects/index.html>).

Appendix B: Institutions

The list of institutions offering Informatics higher education in the countries selected - Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Lithuania, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Switzerland, and UK – can be found on the Informatics Europe Higher Education Data Portal (<https://www.informatics-europe.org/data/higher-education/institutions/all.html>). It includes traditional Universities and University of Applied Sciences, in separate tables, for the countries where these institutions also offer undergraduate studies in Informatics. Note that Institutions' names shown in the portal are given in the local language.

This list is intended to evolve into a comprehensive record of all institutions offering undergraduate and graduate studies in Informatics in all of Europe, a goal that we feel has been achieved for the listed countries, although it is of course possible that some information was missed.

Appendix C: Salary Tables

Belgium

Fig.C1.1: Salary table Assistant positions, Université catholique de Louvain. Values valid from July 2017.

Barèmes Personnel scientifique au cadre										
anc.	8L/(020)	assistant (1)		8A/(021)	assistant (2)		8C/(023)	1er assistant (3)		anc.
	base à 100%	brut annuel	brut mensuel	base à 100%	brut annuel	brut mensuel	base à 100%	brut annuel	brut mensuel	
		indexé	indexé		indexé	indexé		indexé	indexé	
0	21333.13	35698.86	2974.91	23324.59	39031.37	3252.62	29358.99	49129.33	4094.12	0
1	22024.26	36855.40	3071.29	23948.85	40076.01	3339.67	29983.25	50173.97	4181.17	1
2	23406.52	39168.47	3264.04	25197.37	42165.28	3513.78	30607.51	51218.61	4268.22	2
3	23406.52	39168.47	3264.04	25197.37	42165.28	3513.78	31231.77	52263.24	4355.28	3
4	23406.52	39168.47	3264.04	25197.37	42165.28	3513.78	31231.77	52263.24	4355.28	4
5	24699.57	41332.26	3444.36	26156.08	43769.58	3647.47	32324.2	54091.32	4507.61	5
6	24699.57	41332.26	3444.36	26156.08	43769.58	3647.47	32324.2	54091.32	4507.61	6
7	25992.62	43496.05	3624.68	27114.79	45373.89	3781.16	33416.63	55919.39	4659.95	7
8	25992.62	43496.05	3624.68	27114.79	45373.89	3781.16	33416.63	55919.39	4659.95	8
9	27285.67	45659.84	3804.99	28073.50	46978.19	3914.85	34509.06	57747.46	4812.29	9
10	27285.67	45659.84	3804.99	28073.5	46978.19	3914.85	34509.06	57747.46	4812.29	10
11	28578.72	47823.63	3985.31	29032.21	48582.50	4048.55	35601.49	59575.53	4964.63	11
12	28578.72	47823.63	3985.31	29032.21	48582.50	4048.55	35601.49	59575.53	4964.63	12
13	29871.77	49987.42	4165.62	29990.92	50186.81	4182.24	36693.92	61403.61	5116.97	13
14	29871.77	49987.42	4165.62	29990.92	50186.81	4182.24	36693.92	61403.61	5116.97	14
15	31164.82	52151.21	4345.94	31283.97	52350.60	4362.55	37786.35	63231.68	5269.31	15
16	31164.82	52151.21	4345.94	31283.97	52350.60	4362.55	37786.35	63231.68	5269.31	16
17	32457.87	54315.00	4526.25	32577.02	54514.39	4542.87	38878.78	65059.75	5421.65	17
18	32457.87	54315.00	4526.25	32577.02	54514.39	4542.87	38878.78	65059.75	5421.65	18
19	33750.92	56478.79	4706.57	33870.07	56678.18	4723.19	39971.21	66887.82	5573.99	19
20	33750.92	56478.79	4706.57	33870.07	56678.18	4723.19	39971.21	66887.82	5573.99	20
21	35043.97	58642.58	4886.89	35163.12	58841.97	4903.50	41063.64	68715.90	5726.33	21
22	35043.97	58642.58	4886.89	35163.12	58841.97	4903.50	41063.64	68715.90	5726.33	22
23	36337.02	60806.37	5067.20	36456.17	61005.75	5083.82	41063.64	68715.90	5726.33	23
24	36337.02	60806.37	5067.20	36456.17	61005.75	5083.82	41063.64	68715.90	5726.33	24
25	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	25
26	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	26
27	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	27
28	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	28
29	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	29
30	37630.07	62970.16	5247.52	37749.22	63169.54	5264.13	41063.64	68715.90	5726.33	30

(1) pour le porteur du diplôme de Master 60 crédits

(2) pour le porteur du diplôme de licence, de docteur en médecine, chir, acc., de docteur en méd. vétérinaire, d'ir civil, bio-ingénieur, Master 120 crédits

(3) diplômes repris en (1) et (2) et titulaire du diplôme de Docteur avec thèse

Fig.C1.2: PhD scholarships and Postdoctoral fellowships, Université catholique de Louvain. Values for 2017.

MONTANTS DES BOURSES DE FORMATION COMPLEMENTAIRE ET DE DOCTORAT DURANT L'ANNEE 2017										
Source	Titre	Durée	Diplôme	Code	Montants en euros		Net		Coût	
					Brut annuel	mensuel	annuel	mensuel	annuel	mensuel

BOURSE DE FORMATION COMPLEMENTAIRE (Pas d'ONSS et pas de précompte)

UCL	Boursier de formation complémentaire	Max. 24 mois	Master 60 ou équivalent	B01	20.237,88	1.686,49	20.237,88	1.686,49	20.237,88	1.686,49
			Master 120 ou équivalent	B02	22.400,04	1.866,67	22.400,04	1.866,67	22.400,04	1.866,67

BOURSE DE DOCTORAT (Cotisations à l'ONSS et pas de précompte)

UCL	Boursier de doctorat	Max. 48 mois	Master 120 ou équiv. UE*	B41	25.789,56	2.149,13	21.979,44	1.868,23	34.122,12	2.843,51	
			Hors UE	B42	23.524,44	1.960,37	21.979,44	1.868,23	29.066,88	2.422,24	
	Aspirant UCL		Master 120 ou équiv. UE*	B61	27.366,84	2.280,57	23.790,00	1.982,50	36.209,04	3.017,42	
				Hors UE	B62	24.963,24	2.080,27	23.790,00	1.982,50	30.844,56	2.570,38

Il s'agit des Etats membres de l'Espace Economique Européen soit :

L'Allemagne, l'Autriche, la Bulgarie, Chypre, la Croatie, le Danemark, l'Espagne, l'Estonie, la Finlande, la France, la Grande-Bretagne, la Grèce, la Hongrie, l'Irlande, l'Islande, l'Italie, la Lettonie, le Liechtenstein, la Lituanie, le Luxembourg, Malte, la Norvège, les Pays-Bas, la Pologne, le Portugal, la Roumanie, la Slovaquie, la Slovénie, la Suède, la République Tchèque et l'Islande

Ainsi que de la Suisse et des Etats avec lesquels la Belgique a conclu une convention de sécurité sociale soit :

L'Algérie, l'Australie, la Bosnie, le Brésil, le Canada et le Québec, le Chili, la République Démocratique du Congo, la Corée du Sud, les Etats Unis, l'Inde, Israël, le Japon, le Kosovo, la Macédoine, le Maroc, le Monténégro, les Philippines, Saint-Marin, la Serbie, la Tunisie, la Turquie, l'Uruguay, l'Argentine et la Moldavie

MONTANTS DES BOURSES DE POST-DOCTORAT DURANT L'ANNEE 2017*										
Source	Titre	Durée	Diplôme	Code	Montants en euros		Net		Coût	
					Brut annuel	mensuel	annuel	mensuel	annuel	mensuel

BOURSE DE POST-DOCTORAT (Cotisations à l'ONSS et pas de précompte)

UCL	Boursier post-doctorat	Max. 36 mois	Docteur avec thèse Ancienneté "0" UE*	B71	32.389,08	2.699,09	28.155,84	2.346,32	42.854,04	3.571,17
			Hors UE	B72	29.544,48	2.462,04	28.155,84	2.346,32	36.505,20	3.042,10
			Ancienneté "2" UE*	B73	33.390,00	2.782,50	29.025,96	2.418,83	44.178,36	3.681,53
			Hors UE	B74	30.457,44	2.538,12	29.025,96	2.418,83	37.633,20	3.136,10
			Ancienneté "4" UE*	B75	33.847,20	2.820,60	29.423,40	2.451,95	44.783,28	3.731,94
			Hors UE	B76	30.874,56	2.572,88	29.423,40	2.451,95	38.148,60	3.179,05
			Ancienneté "6" UE*	B77	34.619,88	2.884,99	30.095,04	2.507,92	45.805,56	3.817,13
			Hors UE	B78	31.579,32	2.631,61	30.095,04	2.507,92	39.019,44	3.251,62

Il s'agit des Etats membres de l'Espace Economique Européen soit :

L'Allemagne, l'Autriche, la Bulgarie, Chypre, la Croatie, le Danemark, l'Espagne, l'Estonie, la Finlande, la France, la Grande-Bretagne, la Grèce, la Hongrie, l'Irlande, l'Islande, l'Italie, la Lettonie, le Liechtenstein, la Lituanie, le Luxembourg, Malte, la Norvège, les Pays-Bas, la Pologne, le Portugal, la Roumanie, la Slovaquie, la Slovénie, la Suède, la République Tchèque et l'Islande

Ainsi que de la Suisse et des Etats avec lesquels la Belgique a conclu une convention de sécurité sociale soit :

L'Algérie, l'Australie, la Bosnie, le Brésil, le Canada et le Québec, le Chili, la République Démocratique du Congo, la Corée du Sud, les Etats Unis, l'Inde, Israël, le Japon, le Kosovo, la Macédoine, le Maroc, le Monténégro, les Philippines, Saint-Marin, la Serbie, la Tunisie, la Turquie, l'Uruguay, l'Argentine et la Moldavie

Fig.C1.3: Salary table for Professor positions, Université catholique de Louvain. Values valid from July 2017.

Barèmes académiques indexé indexés : 1.6734							UNIVERSITE CATHOLIQUE DE LOUVAIN			
mise à jour: 01.07.2017							Service du Personnel 1, pl de l'Université 1348 Louvain-la-Neuve			
anc.	professeur ordinaire (011)			professeur (012)			chargé de cours (013)			anc.
	base à 100%	brut annuel indexé	brut mensuel indexé	base à 100%	brut annuel indexé	brut mensuel indexé	base à 100%	brut annuel indexé	brut mensuel indexé	
1	45,262.40	75,742.10	6,311.85	40,431.94	67,658.81	5,638.24	34,560.95	57,834.29	4,819.53	1
	45,262.40	75,742.10	6,311.85	40,431.94	67,658.81	5,638.24	34,560.95	57,834.29	4,819.53	
	45,262.40	75,742.10	6,311.85	40,431.94	67,658.81	5,638.24	34,560.95	57,834.29	4,819.53	
3	50,018.51	83,700.97	6,975.09	43,961.87	73,565.79	6,130.49	37,013.35	61,938.14	5,161.52	3
4	50,018.51	83,700.97	6,975.09	43,961.87	73,565.79	6,130.49	37,013.35	61,938.14	5,161.52	4
5	50,018.51	83,700.97	6,975.09	43,961.87	73,565.79	6,130.49	37,013.35	61,938.14	5,161.52	5
6	54,774.62	91,659.85	7,638.33	47,491.80	79,472.78	6,622.74	39,465.75	66,041.99	5,503.50	6
7	54,774.62	91,659.85	7,638.33	47,491.80	79,472.78	6,622.74	39,465.75	66,041.99	5,503.50	7
8	54,774.62	91,659.85	7,638.33	47,491.80	79,472.78	6,622.74	39,465.75	66,041.99	5,503.50	8
9	59,530.73	99,618.72	8,301.57	51,021.73	85,379.76	7,114.99	41,918.15	70,145.83	5,845.49	9
10	59,530.73	99,618.72	8,301.57	51,021.73	85,379.76	7,114.99	41,918.15	70,145.83	5,845.49	10
11	59,530.73	99,618.72	8,301.57	51,021.73	85,379.76	7,114.99	41,918.15	70,145.83	5,845.49	11
12	64,286.84	107,577.60	8,964.80	54,551.66	91,286.75	7,607.23	44,370.55	74,249.68	6,187.48	12
13	64,286.84	107,577.60	8,964.80	54,551.66	91,286.75	7,607.23	44,370.55	74,249.68	6,187.48	13
14	64,286.84	107,577.60	8,964.80	54,551.66	91,286.75	7,607.23	44,370.55	74,249.68	6,187.48	14
15	69,042.95	115,536.47	9,628.04	58,081.59	97,193.73	8,099.48	46,822.95	78,353.52	6,529.47	15
16	69,042.95	115,536.47	9,628.04	58,081.59	97,193.73	8,099.48	46,822.95	78,353.52	6,529.47	16
17	69,042.95	115,536.47	9,628.04	58,081.59	97,193.73	8,099.48	46,822.95	78,353.52	6,529.47	17
18	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	49,275.35	82,457.37	6,871.45	18
19	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	49,275.35	82,457.37	6,871.45	19
20	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	49,275.35	82,457.37	6,871.45	20
21	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	51,727.75	86,561.22	7,213.44	21
22	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	51,727.75	86,561.22	7,213.44	22
23	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	51,727.75	86,561.22	7,213.44	23
24	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	54,180.15	90,665.06	7,555.43	24
25	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	54,180.15	90,665.06	7,555.43	25
26	69,042.95	115,536.47	9,628.04	61,611.52	103,100.72	8,591.73	54,180.15	90,665.06	7,555.43	26

Fig.C1.4: Salary table, Professor positions (*zelfstandig academisch personeel (ZAP)*), Universiteit Hasselt. Values valid from July 2017.

ZAP : 2017

BRUTO MAANDLOON

ZAP trede	index	index	index	index	index	index
	1,6734 DOCENT 051	1,6734 DOCENT II 054	1,6734 HOOFDDOC 041	1,6734 HFDDOC II 044	1,6734 HOOGLER. 031	1,6734 GEW.HOOG. 011
0	4171,55	4219,07	4776,98	4843,86	5593,20	6264,76
1	4171,55	4219,07	4776,98	4843,86	5593,20	6264,76
2	4171,55	4219,07	4776,98	4843,86	5593,20	6264,76
3	4418,74	4518,68	5117,93	5256,40	6083,96	6925,99
4	4418,74	4518,68	5117,93	5256,40	6083,96	6925,99
5	4418,74	4518,68	5117,93	5256,40	6083,96	6925,99
6	4665,92	4818,30	5458,88	5668,95	6574,71	7587,21
7	4665,92	4818,30	5458,88	5668,95	6574,71	7587,21
8	4665,92	4818,30	5458,88	5668,95	6574,71	7587,21
9	4913,11	5117,92	5799,83	6081,50	7065,47	8248,43
10	4913,11	5117,92	5799,83	6081,50	7065,47	8248,43
11	4913,11	5117,92	5799,83	6081,50	7065,47	8248,43
12	5160,29	5417,54	6140,77	6494,05	7556,23	8909,66
13	5160,29	5417,54	6140,77	6494,05	7556,23	8909,66
14	5160,29	5417,54	6140,77	6494,05	7556,23	8909,66
15	5407,48	5717,16	6481,72	6906,59	8046,98	9570,88
16	5407,48	5717,16	6481,72	6906,59	8046,98	9570,88
17	5407,48	5717,16	6481,72	6906,59	8046,98	9570,88
18	5642,11	6016,77	6822,67	7319,14	8537,74	9570,88
19	5654,66	6016,77	6822,67	7319,14	8537,74	9570,88
20	5654,66	6016,77	6822,67	7319,14	8537,74	9570,88
21	5901,85	6316,39	7163,62	7731,69	8537,74	9570,88
22	5901,85	6316,39	7163,62	7731,69	8537,74	9570,88
23	5901,85	6316,39	7163,62	7731,69	8537,74	9570,88
24	6149,03	6616,01	7504,57	8144,24	8537,74	9570,88

Fig.C2.1: Tarifvertrag im Öffentlichen Dienst (TV-L). PhD Candidates and Postdoctoral Researchers initial salaries fall within the “Entgeltgruppe” 13.

Anlage B zum TV-L

Entgeltabelle für die Entgeltgruppen 1 bis 15

- gültig ab 1. Oktober 2018 -

Entgelt- gruppe	Grundentgelt		Entwicklungsstufen			
	Stufe 1	Stufe 2	Stufe 3	Stufe 4	Stufe 5	Stufe 6
15	4.398,75	4.877,05	5.057,19	5.696,99	6.181,49	6.366,93
14	3.982,60	4.417,39	4.672,07	5.057,19	5.647,28	5.816,70
13	3.672,02	4.075,76	4.293,17	4.715,55	5.299,43	5.458,41
12	3.309,47	3.653,37	4.162,72	4.609,96	5.187,62	5.343,25
11	3.202,32	3.522,94	3.777,60	4.162,72	4.721,77	4.863,42
10	3.089,22	3.400,58	3.653,37	3.908,04	4.392,57	4.524,35
9	2.749,89	3.029,67	3.172,55	3.560,20	3.883,21	3.999,71
8	2.583,21	2.845,15	2.964,19	3.077,31	3.202,32	3.279,70
7	2.428,44	2.672,50	2.833,23	2.952,29	3.047,55	3.130,87
6	2.386,77	2.624,88	2.743,94	2.863,01	2.940,38	3.023,72
5	2.291,51	2.517,73	2.636,79	2.749,89	2.839,19	2.898,72
4	2.184,36	2.404,64	2.553,45	2.636,79	2.720,14	2.773,70
3	2.154,60	2.368,91	2.428,44	2.523,68	2.601,07	2.666,55
2	1.999,83	2.196,27	2.255,81	2.315,33	2.452,24	2.595,13
1	Je 4 Jahre	1.797,44	1.827,18	1.862,90	1.898,63	1.987,92

Fig.C2.2: Base salaries of the federal remuneration system W (*Bundesbesoldungsordnung W*). Pay grades W1, W2 und W3 apply to *Juniorprofessor*, *Außerordentlicher Professor* and *Ordentlicher Professor*, respectively. Table provided by *Der Deutsche Hochschulverband* [GE20].

**Besoldungstabelle W-Besoldung mit Stand: August 2018
(Monatsgrundgehälter brutto in Euro)**

Besoldung	W 1	W 2	W 3
Bund ¹⁾	4.565,50	5.671,96	6.339,26
Baden-Württemberg	4.909,04	6.181,58	7.017,26
Bayern ²⁾	4.548,85	5.646,38	6.683,49
Berlin	4.435,67 *	5.599,82	6.421,59
Brandenburg **	4.393,91	5.000,31	6.043,22
Bremen **	4.363,92	4.967,98	6.006,79
Hamburg **	4.406,43	5.012,87	6.055,81
Hessen ³⁾	4.219,84	5.297,79	5.874,12
Mecklenburg-Vorpommern	4.321,14	5.601,12	6.528,99
Niedersachsen	4.412,61	5.726,01	6.229,12
Nordrhein-Westfalen	4.438,24	5.840,82	6.451,71
Rheinland-Pfalz	4.425,06	5.388,39	6.114,40
Saarland	4.236,22 ***	5.429,55	6.325,90
Sachsen ⁴⁾	4.537,88 ****	5.562,88	6.267,08
Sachsen-Anhalt	4.422,45	5.818,86	6.459,49
Schleswig-Holstein	4.370,88	5.730,76	6.489,17
Thüringen	4.444,13	5.705,57	6.098,50

Zu den Grundgehältern können je nach Besoldungsgruppe Berufungs- resp. BleibeLeistungsbezüge, besondere Leistungsbezüge, FunktionsLeistungsbezüge und die sog. Lehr- und Forschungszulagen hinzutreten.

* W 1-Grundgehalt in Höhe von 4.235,67 Euro zzgl. Zulage von 200 Euro in erster Beschäftigungsphase nach Bundesbesoldungsgesetz – Überleitungsfassung Berlin – Anlage II Bundesbesoldungsordnung W – Vorbemerkungen Nr. 1 Abs. 3.

** W 2- und W 3-Grundgehälter werden um monatlichen GrundLeistungsbezuges in Brandenburg in Höhe von 740,17 Euro, in Bremen in Höhe von 674,09 Euro und in Hamburg in Höhe von 674,64 Euro ergänzt.

*** Für nach dem 31.12.2010 neu berufene Juniorprofessorinnen/-professoren vermindert sich das Grundgehalt grundsätzlich um 370 Euro für die Dauer von 2 Jahren; Ausnahmen hiervon sind allerdings möglich bei einem Mangel an geeigneten Bewerbern. Die Vergütungsabsenkung gilt ferner nicht für Beamte, denen aus einem vor dem 1.1.2011 übertragenen Eingangsamt der Besoldungsgruppe A 9 – A 13 ein Anspruch auf Dienstbezüge zustand (vgl. § 3 b Besoldungsgesetz Saarland).

**** In W 1 wird mit der ersten Verlängerung des Beamtenverhältnisses auf Zeit gemäß § 35 Abs. 2 Sächsisches Besoldungsgesetz eine 2. Stufe erreicht. Das Grundgehalt beträgt dann 4.899,56 Euro.

The Netherlands

Fig.C3: CAO table of salaries defined by the Collective Agreement of Dutch Universities (CAO) set by the Association of Universities in the Netherlands (VSNU) [NE7]. Numbers valid from May 2018.

SALARISSCHALEN PER 01-05-2018																		FUNCTIESCHALEN					
trede	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	H2	H1	P	SA	TOIO
0	1.638	1.673	1.706	1.746	1.811	1.942	2.204	2.514	2.763	2.640	3.545	4.294	4.911	5.160	5.595	6.060	6.567	7.213	5.441	6.060	2.266		1.865
1	1.706	1.746	1.746	1.779	1.890	1.997	2.266	2.640	2.897	2.763	3.677	4.419	5.039	5.284	5.749	6.223	6.777	7.442	5.595	6.223	2.640		
2	1.779	1.811	1.811	1.851	1.997	2.138	2.390	2.763	3.044	2.897	3.796	4.542	5.160	5.441	5.903	6.393	6.993	7.677	5.749	6.393	2.763	1.997	
3	1.811	1.890	1.890	1.942	2.138	2.266	2.514	2.897	3.173	3.044	3.916	4.669	5.284	5.595	6.060	6.567	7.213	7.921	5.903	6.567	2.897	2.138	
4	1.851	1.942	1.997	2.068	2.204	2.329	2.577	2.975	3.303	3.173	4.033	4.787	5.441	5.749	6.223	6.777	7.442	8.176	6.060	6.777		2.329	
5	1.890	1.997	2.068	2.138	2.266	2.390	2.640	3.044	3.425	3.303	4.166	4.911	5.595	5.903	6.393	6.993	7.677	8.433	6.223	6.993			
6	1.942	2.068	2.138	2.204	2.329	2.452	2.700	3.106	3.545	3.425	4.294	5.039	5.749	6.060	6.567	7.213	7.921	8.703	6.393	7.213			
7		2.138	2.204	2.266	2.390	2.514	2.763	3.173	3.677	3.545	4.419	5.160	5.903	6.223	6.777	7.442	8.176	8.981	6.567	7.442			
8			2.266	2.329	2.452	2.577	2.828	3.243	3.796	3.677	4.542	5.284	5.978	6.393	6.993	7.677	8.433	9.267	6.777	7.677			
9			2.329	2.390	2.514	2.640	2.897	3.303		3.796	4.669	5.441		6.567	7.213	7.921	8.703	9.563	6.993	7.921			
10				2.452	2.577	2.700	2.975	3.358		3.916	4.787	5.513							7.213	8.176			
11										4.033	4.852								7.442	8.433			
12										4.166									7.677	8.703			
13																			7.921	8.981			
14																				9.267			
15																				9.563			

Fig. C4.1: Salaries table for Assistant Professors (*Ricercatore Universitari*). Numbers and system progression valid after the 2011 reform [IT4].

Allegato 3 - art. 3, comma 6

Trattamento economico annuo lordo - Ricercatori a tempo determinato assunti secondo il nuovo regime

Tempo pieno

Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo
20375,31	3.868,22	10.654,53	34.898,06

Fig.C4.2: Salary table for Assistant Professors (*Ricercatore Universitari*) showing a comparison of the old system for salary progression, based on biennial increase steps and the new system based on triennial increase steps [IT4].

Allegato 1 - art. 2, comma 1

c) Rimodulazione trattamento economico annuo lordo - Ricercatori Universitari
Tempo Pieno

Progressione economica per classi e scatti biennali					Rimodulazione progressione economica per classi triennali						Importi differenziali alla transizione	
Progressione economica per classi e scatti biennali	Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo (B)	Progressione economica per classi triennali	Stipendio tabellare (13 mensilità) alla transizione (C)	Stipendio tabellare (13 mensilità) a regime (D)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo regime triennale (E)	Variazione stipendio alla transizione (A-D)	Variazione lordo alla transizione (E-B)
0	20.375,31	3.868,22	10.654,53	34.898,06	0	20.375,31	20.375,31	3.868,22	10.654,53	34.898,06	0,00	0,00
0	20.375,31	3.868,22	10.654,53	34.898,06	0	20.375,31	20.375,31	3.868,22	10.654,53	34.898,06	0,00	0,00
1	22.005,34	4.512,92	10.654,53	37.172,79	1	22.005,34	20.375,31	4.512,92	10.654,53	37.172,79	1.630,03	0,00
1	22.005,34	4.512,92	10.654,53	37.172,79	0	22.005,34	23.635,35	4.512,92	10.654,53	37.172,79	-1.630,02	0,00
2	23.635,35	4.512,92	10.654,53	38.802,80	1	23.635,35	23.635,35	4.512,92	10.654,53	38.802,80	0,00	0,00
2	23.635,35	4.512,92	10.654,53	38.802,80	1	23.635,35	23.635,35	4.512,92	10.654,53	38.802,80	0,00	0,00
3	25.265,39	5.157,62	10.654,53	41.077,54	2	25.265,39	25.265,39	5.157,62	10.654,53	41.077,54	0,00	0,00
3	25.265,39	5.157,62	10.654,53	41.077,54	2	25.265,39	25.265,39	5.157,62	10.654,53	41.077,54	0,00	0,00
4	26.895,42	5.157,62	10.654,53	42.707,57	2	26.895,42	25.265,39	5.157,62	10.654,53	42.707,57	1.630,03	0,00
4	26.895,42	5.157,62	10.654,53	42.707,57	3	26.895,42	28.525,43	5.157,62	10.654,53	42.707,57	-1.630,02	0,00
5	28.525,43	5.802,32	10.654,53	44.982,28	3	28.525,43	28.525,43	5.802,32	10.654,53	44.982,28	0,00	0,00
5	28.525,43	5.802,32	10.654,53	44.982,28	3	28.525,43	28.525,43	5.802,32	10.654,53	44.982,28	0,00	0,00
6	30.155,45	6.447,03	10.654,53	47.257,01	4	30.155,45	30.155,45	6.447,03	10.654,53	47.257,01	0,00	0,00
6	30.155,45	6.447,03	10.654,53	47.257,01	4	30.155,45	30.155,45	6.447,03	10.654,53	47.257,01	0,00	0,00
7	31.964,79	6.447,03	10.654,53	49.066,35	4	31.964,79	30.155,45	6.447,03	10.654,53	49.066,35	1.809,34	0,00
7	31.964,79	6.447,03	10.654,53	49.066,35	5	31.964,79	33.774,12	6.447,03	10.654,53	49.066,35	-1.809,33	0,00
8	33.774,12	6.447,03	10.654,53	50.875,68	5	33.774,12	33.774,12	6.447,03	10.654,53	50.875,68	0,00	0,00
8	33.774,12	6.447,03	10.654,53	50.875,68	5	33.774,12	33.774,12	6.447,03	10.654,53	50.875,68	0,00	0,00
9	35.583,44	6.447,03	10.654,53	52.685,00	6	35.583,44	35.583,44	6.447,03	10.654,53	52.685,00	0,00	0,00
9	35.583,44	6.447,03	10.654,53	52.685,00	6	35.583,44	35.583,44	6.447,03	10.654,53	52.685,00	0,00	0,00
10	37.392,78	6.447,03	10.654,53	54.494,34	6	37.392,78	35.583,44	6.447,03	10.654,53	54.494,34	1.809,34	0,00
10	37.392,78	6.447,03	10.654,53	54.494,34	7	37.392,78	39.202,09	6.447,03	10.654,53	54.494,34	-1.809,31	0,00
11	39.202,09	6.447,03	10.654,53	56.303,64	7	39.202,09	39.202,09	6.447,03	10.654,53	56.303,64	0,00	0,00
11	39.202,09	6.447,03	10.654,53	56.303,64	7	39.202,09	39.202,09	6.447,03	10.654,53	56.303,64	0,00	0,00
12	41.011,43	6.447,03	10.654,53	58.112,98	8	41.011,43	41.011,43	6.447,03	10.654,53	58.112,98	0,00	0,00
12	41.011,43	6.447,03	10.654,53	58.112,98	8	41.011,43	41.011,43	6.447,03	10.654,53	58.112,98	0,00	0,00
13	42.820,75	6.447,03	10.654,53	59.922,31	8	42.820,75	41.011,43	6.447,03	10.654,53	59.922,31	1.809,33	0,00
13	42.820,75	6.447,03	10.654,53	59.922,31	9	42.820,75	44.630,07	6.447,03	10.654,53	59.922,31	-1.809,32	0,00
14	44.630,07	6.447,03	10.654,53	61.731,63	9	44.630,07	44.630,07	6.447,03	10.654,53	61.731,63	0,00	0,00
14	44.630,07	6.447,03	10.654,53	61.731,63	9	44.630,07	44.630,07	6.447,03	10.654,53	61.731,63	0,00	0,00
14	45.745,83	6.447,03	10.654,53	62.847,39	10	45.745,83	45.745,83	6.447,03	10.654,53	62.847,39	0,00	0,00
14	45.745,83	6.447,03	10.654,53	62.847,39	10	45.745,83	45.745,83	6.447,03	10.654,53	62.847,39	0,00	0,00
14	46.861,59	6.447,03	10.654,53	63.963,15	10	46.861,59	45.745,83	6.447,03	10.654,53	63.963,15	1.115,76	0,00
14	46.861,59	6.447,03	10.654,53	63.963,15	11	46.861,59	47.977,35	6.447,03	10.654,53	63.963,15	-1.115,76	0,00
14	47.977,35	6.447,03	10.654,53	65.078,90	11	47.977,35	47.977,35	6.447,03	10.654,53	65.078,90	0,00	0,00
14	47.977,35	6.447,03	10.654,53	65.078,90	11	47.977,35	47.977,35	6.447,03	10.654,53	65.078,90	0,00	0,00
14	49.093,10	6.447,03	10.654,53	66.194,66	12	49.093,10	49.093,10	6.447,03	10.654,53	66.194,66	0,00	0,00
14	49.093,10	6.447,03	10.654,53	66.194,66	12	49.093,10	49.093,10	6.447,03	10.654,53	66.194,66	0,00	0,00
14	50.208,86	6.447,03	10.654,53	67.310,42	12	50.208,86	49.093,10	6.447,03	10.654,53	67.310,42	1.115,76	0,00
14	50.208,86	6.447,03	10.654,53	67.310,42	13	50.208,86	51.324,62	6.447,03	10.654,53	67.310,42	-1.115,76	0,00
14	51.324,62	6.447,03	10.654,53	68.426,18	13	51.324,62	51.324,62	6.447,03	10.654,53	68.426,18	0,00	0,00
14	51.324,62	6.447,03	10.654,53	68.426,18	13	51.324,62	51.324,62	6.447,03	10.654,53	68.426,18	0,00	0,00

Fig.C4.3: Salary table for Associate Professors (*Professore Associati*). Numbers and system progression valid after the 2011 reform [IT4].

Allegato 2 - art. 3, comma 2

**b) Prospetto Trattamento Economico - Professori Associati (II fascia)
assunti secondo il nuovo regime**

Tempo Pieno

Progressione economica per classi triennali	Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo
0	33.089,44	6.447,03	11.294,95	50.831,42
0	33.089,44	6.447,03	11.294,95	50.831,42
0	33.089,44	6.447,03	11.294,95	50.831,42
1	35.371,47	7.368,04	11.294,95	54.034,47
1	35.371,47	7.368,04	11.294,95	54.034,47
1	35.371,47	7.368,04	11.294,95	54.034,47
2	39.935,55	7.982,04	11.294,95	59.212,54
2	39.935,55	7.982,04	11.294,95	59.212,54
2	39.935,55	7.982,04	11.294,95	59.212,54
3	42.217,55	9.210,04	11.294,95	62.722,55
3	42.217,55	9.210,04	11.294,95	62.722,55
3	42.217,55	9.210,04	11.294,95	62.722,55
4	47.283,68	9.210,04	11.294,95	67.788,67
4	47.283,68	9.210,04	11.294,95	67.788,67
4	47.283,68	9.210,04	11.294,95	67.788,67
5	49.816,73	9.210,04	11.294,95	70.321,72
5	49.816,73	9.210,04	11.294,95	70.321,72
5	49.816,73	9.210,04	11.294,95	70.321,72
6	54.882,82	9.210,04	11.294,95	75.387,81
6	54.882,82	9.210,04	11.294,95	75.387,81
6	54.882,82	9.210,04	11.294,95	75.387,81
7	57.415,88	9.210,04	11.294,95	77.920,87
7	57.415,88	9.210,04	11.294,95	77.920,87
7	57.415,88	9.210,04	11.294,95	77.920,87
8	62.482,00	9.210,04	11.294,95	82.986,99
8	62.482,00	9.210,04	11.294,95	82.986,99
8	62.482,00	9.210,04	11.294,95	82.986,99
9	64.044,05	9.210,04	11.294,95	84.549,04
9	64.044,05	9.210,04	11.294,95	84.549,04
9	64.044,05	9.210,04	11.294,95	84.549,04
10	67.168,14	9.210,04	11.294,95	87.673,13
10	67.168,14	9.210,04	11.294,95	87.673,13
10	67.168,14	9.210,04	11.294,95	87.673,13
11	68.730,19	9.210,04	11.294,95	89.235,18
11	68.730,19	9.210,04	11.294,95	89.235,18
11	68.730,19	9.210,04	11.294,95	89.235,18
12	71.854,28	9.210,04	11.294,95	92.359,28
12	71.854,28	9.210,04	11.294,95	92.359,28
12	71.854,28	9.210,04	11.294,95	92.359,28

Fig.C4.4: Salary tables for Associate Professors (*Professore Associati*) showing a comparison between the old system for salary progression, based on biennial increase steps and the new system, based on triennial increase steps [IT4].

Allegato 1 - art. 2, comma 1

b) Rimodulazione trattamento economico annuo lordo - Professori Associati (II fascia)

Tempo Pieno

Progressione economica per classi e scatti biennali					Rimodulazione progressione economica per classi triennali						Importi differenziali alla transizione	
Progressione economica per classi e scatti biennali	Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo (B)	Progressione economica per classi triennali	Stipendio tabellare (13 mensilità) alla transizione (C)	Stipendio tabellare (13 mensilità) a regime (D)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo regime triennale	Variazione stipendio alla transizione (A-D)	Variazione lordo alla transizione (E-B)
0	28.525,38	5.526,04	11.294,95	45.346,37	0	28.525,38	28.525,38	5.526,04	11.294,95	45.346,37	0,00	0,00
0	28.525,38	5.526,04	11.294,95	45.346,37	0	28.525,38	28.525,38	5.526,04	11.294,95	45.346,37	0,00	0,00
1	30.807,41	6.447,03	11.294,95	48.549,39	0	30.807,41	28.525,38	6.447,03	11.294,95	48.549,39	2.282,03	0,00
1	30.807,41	6.447,03	11.294,95	48.549,39	1	30.807,41	33.089,44	6.447,03	11.294,95	48.549,39	-2.282,03	0,00
2	33.089,44	6.447,03	11.294,95	50.831,42	1	33.089,44	33.089,44	6.447,03	11.294,95	50.831,42	0,00	0,00
2	33.089,44	6.447,03	11.294,95	50.831,42	1	33.089,44	33.089,44	6.447,03	11.294,95	50.831,42	0,00	0,00
3	35.371,47	7.368,04	11.294,95	54.034,47	2	35.371,47	35.371,47	7.368,04	11.294,95	54.034,47	0,00	0,00
3	35.371,47	7.368,04	11.294,95	54.034,47	2	35.371,47	35.371,47	7.368,04	11.294,95	54.034,47	0,00	0,00
4	37.653,50	7.368,04	11.294,95	56.316,50	2	37.653,50	35.371,47	7.368,04	11.294,95	56.316,50	2.282,03	0,00
4	37.653,50	7.368,04	11.294,95	56.316,50	3	37.653,50	39.935,55	7.368,04	11.294,95	56.316,50	-2.282,04	0,00
5	39.935,55	8.289,04	11.294,95	59.519,54	3	39.935,55	39.935,55	8.289,04	11.294,95	59.519,54	0,00	0,00
5	39.935,55	8.289,04	11.294,95	59.519,54	3	39.935,55	39.935,55	8.289,04	11.294,95	59.519,54	0,00	0,00
6	42.217,55	9.210,04	11.294,95	62.722,55	4	42.217,55	42.217,55	9.210,04	11.294,95	62.722,55	0,00	0,00
6	42.217,55	9.210,04	11.294,95	62.722,55	4	42.217,55	42.217,55	9.210,04	11.294,95	62.722,55	0,00	0,00
7	44.750,63	9.210,04	11.294,95	65.255,62	4	44.750,63	42.217,55	9.210,04	11.294,95	65.255,62	2.533,07	0,00
7	44.750,63	9.210,04	11.294,95	65.255,62	5	44.750,63	47.283,68	9.210,04	11.294,95	65.255,62	-2.533,05	0,00
8	47.283,68	9.210,04	11.294,95	67.788,67	5	47.283,68	47.283,68	9.210,04	11.294,95	67.788,67	0,00	0,00
8	47.283,68	9.210,04	11.294,95	67.788,67	5	47.283,68	47.283,68	9.210,04	11.294,95	67.788,67	0,00	0,00
9	49.816,73	9.210,04	11.294,95	70.321,72	6	49.816,73	49.816,73	9.210,04	11.294,95	70.321,72	0,00	0,00
9	49.816,73	9.210,04	11.294,95	70.321,72	6	49.816,73	49.816,73	9.210,04	11.294,95	70.321,72	0,00	0,00
10	52.349,79	9.210,04	11.294,95	72.854,78	6	52.349,79	49.816,73	9.210,04	11.294,95	72.854,78	2.533,06	0,00
10	52.349,79	9.210,04	11.294,95	72.854,78	7	52.349,79	54.882,82	9.210,04	11.294,95	72.854,78	-2.533,03	0,00
11	54.882,82	9.210,04	11.294,95	75.387,81	7	54.882,82	54.882,82	9.210,04	11.294,95	75.387,81	0,00	0,00
11	54.882,82	9.210,04	11.294,95	75.387,81	7	54.882,82	54.882,82	9.210,04	11.294,95	75.387,81	0,00	0,00
12	57.415,88	9.210,04	11.294,95	77.920,87	8	57.415,88	57.415,88	9.210,04	11.294,95	77.920,87	0,00	0,00
12	57.415,88	9.210,04	11.294,95	77.920,87	8	57.415,88	57.415,88	9.210,04	11.294,95	77.920,87	0,00	0,00
13	59.948,93	9.210,04	11.294,95	80.453,92	8	59.948,93	57.415,88	9.210,04	11.294,95	80.453,92	2.533,05	0,00
13	59.948,93	9.210,04	11.294,95	80.453,92	9	59.948,93	62.482,00	9.210,04	11.294,95	80.453,92	-2.533,07	0,00
14	62.482,00	9.210,04	11.294,95	82.986,99	9	62.482,00	62.482,00	9.210,04	11.294,95	82.986,99	0,00	0,00
14	62.482,00	9.210,04	11.294,95	82.986,99	9	62.482,00	62.482,00	9.210,04	11.294,95	82.986,99	0,00	0,00
14	64.044,05	9.210,04	11.294,95	84.549,04	10	64.044,05	64.044,05	9.210,04	11.294,95	84.549,04	0,00	0,00
14	64.044,05	9.210,04	11.294,95	84.549,04	10	64.044,05	64.044,05	9.210,04	11.294,95	84.549,04	0,00	0,00
14	65.606,09	9.210,04	11.294,95	86.111,09	10	65.606,09	64.044,05	9.210,04	11.294,95	86.111,09	1.562,05	0,00
14	65.606,09	9.210,04	11.294,95	86.111,09	11	65.606,09	67.168,14	9.210,04	11.294,95	86.111,09	-1.562,05	0,00
14	67.168,14	9.210,04	11.294,95	87.673,13	11	67.168,14	67.168,14	9.210,04	11.294,95	87.673,13	0,00	0,00
14	67.168,14	9.210,04	11.294,95	87.673,13	11	67.168,14	67.168,14	9.210,04	11.294,95	87.673,13	0,00	0,00
14	68.730,19	9.210,04	11.294,95	89.235,18	12	68.730,19	68.730,19	9.210,04	11.294,95	89.235,18	0,00	0,00
14	68.730,19	9.210,04	11.294,95	89.235,18	12	68.730,19	68.730,19	9.210,04	11.294,95	89.235,18	0,00	0,00
14	70.292,24	9.210,04	11.294,95	90.797,23	12	70.292,24	68.730,19	9.210,04	11.294,95	90.797,23	1.562,05	0,00
14	70.292,24	9.210,04	11.294,95	90.797,23	13	70.292,24	71.854,28	9.210,04	11.294,95	90.797,23	-1.562,05	0,00
14	71.854,28	9.210,04	11.294,95	92.359,28	13	71.854,28	71.854,28	9.210,04	11.294,95	92.359,28	0,00	0,00
14	71.854,28	9.210,04	11.294,95	92.359,28	13	71.854,28	71.854,28	9.210,04	11.294,95	92.359,28	0,00	0,00

Fig.C4.5: Salary table for Full Professors (*Professore Ordinari*). Numbers and system progression valid after the 2011 reform [IT4]

Allegato 2 - art. 3, comma 2

**a) Trattamento Economico annuo lordo - Professori Ordinari (I fascia)
assunti secondo il nuovo regime**

Tempo Pieno

Progressione economica per classi triennali	Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo
0	49.808,74	10.525,78	12.096,12	72.430,64
0	49.808,74	10.525,78	12.096,12	72.430,64
0	49.808,74	10.525,78	12.096,12	72.430,64
1	56.235,67	11.402,92	12.096,12	79.734,71
1	56.235,67	11.402,92	12.096,12	79.734,71
1	56.235,67	11.402,92	12.096,12	79.734,71
2	59.449,13	13.157,21	12.096,12	84.702,46
2	59.449,13	13.157,21	12.096,12	84.702,46
2	59.449,13	13.157,21	12.096,12	84.702,46
3	66.583,04	13.157,21	12.096,12	91.836,37
3	66.583,04	13.157,21	12.096,12	91.836,37
3	66.583,04	13.157,21	12.096,12	91.836,37
4	70.149,99	13.157,21	12.096,12	95.403,32
4	70.149,99	13.157,21	12.096,12	95.403,32
4	70.149,99	13.157,21	12.096,12	95.403,32
5	77.283,88	13.157,21	12.096,12	102.537,21
5	77.283,88	13.157,21	12.096,12	102.537,21
5	77.283,88	13.157,21	12.096,12	102.537,21
6	80.850,82	13.157,21	12.096,12	106.104,15
6	80.850,82	13.157,21	12.096,12	106.104,15
6	80.850,82	13.157,21	12.096,12	106.104,15
7	87.984,73	13.157,21	12.096,12	113.238,06
7	87.984,73	13.157,21	12.096,12	113.238,06
7	87.984,73	13.157,21	12.096,12	113.238,06
8	90.184,35	13.157,21	12.096,12	115.437,68
8	90.184,35	13.157,21	12.096,12	115.437,68
8	90.184,35	13.157,21	12.096,12	115.437,68
9	94.583,59	13.157,21	12.096,12	119.836,92
9	94.583,59	13.157,21	12.096,12	119.836,92
9	94.583,59	13.157,21	12.096,12	119.836,92
10	96.783,21	13.157,21	12.096,12	122.036,54
10	96.783,21	13.157,21	12.096,12	122.036,54
10	96.783,21	13.157,21	12.096,12	122.036,54
11	101.182,46	13.157,21	12.096,12	126.435,79
11	101.182,46	13.157,21	12.096,12	126.435,79
11	101.182,46	13.157,21	12.096,12	126.435,79

Fig.C4.6: Salary tables for Full Professors (*Professore Ordinario*) showing a comparison between the old system for salary progression, based on biennial increase steps, and the new system, based on triennial increase steps [IT4].

Allegato 1 - art. 2, comma 1

a) Rimodulazione trattamento economico annuo lordo - Professori Ordinari (I fascia)

Tempo Pieno

Progressione economica per classi e scatti biennali					Rimodulazione progressione economica per classi triennali						Importi differenziali alla transizione	
Progressione economica per classi e scatti biennali	Stipendio tabellare (13 mensilità)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo (B)	Progressione economica per classi triennali	Stipendio tabellare (13 mensilità) alla transizione (C)	Stipendio tabellare (13 mensilità) a regime (D)	Assegno aggiuntivo (12 mensilità)	Indennità integrativa speciale (13 mensilità)	Totale annuo lordo regime triennale (E)	Variazione stipendio alla transizione (A-D)	Variazione lordo alla transizione (E-B)
0	40.168,34	7.894,33	12.096,12	60.158,79	0	40.168,34	40.168,34	7.894,33	12.096,12	60.158,79	0,00	0,00
0	40.168,34	7.894,33	12.096,12	60.158,79	0	40.168,34	40.168,34	7.894,33	12.096,12	60.158,79	0,00	0,00
1	43.381,82	9.210,04	12.096,12	64.687,98	0	43.381,82	40.168,34	9.210,04	12.096,12	64.687,98	3.213,48	0,00
1	43.381,82	9.210,04	12.096,12	64.687,98	1	43.381,82	46.595,27	9.210,04	12.096,12	64.687,98	-3.213,45	0,00
2	46.595,27	9.210,04	12.096,12	67.901,43	1	46.595,27	46.595,27	9.210,04	12.096,12	67.901,43	0,00	0,00
2	46.595,27	9.210,04	12.096,12	67.901,43	1	46.595,27	46.595,27	9.210,04	12.096,12	67.901,43	0,00	0,00
3	49.808,74	10.525,78	12.096,12	72.430,64	2	49.808,74	49.808,74	10.525,78	12.096,12	72.430,64	0,00	0,00
3	49.808,74	10.525,78	12.096,12	72.430,64	2	49.808,74	49.808,74	10.525,78	12.096,12	72.430,64	0,00	0,00
4	53.022,20	10.525,78	12.096,12	75.644,10	2	53.022,20	49.808,74	10.525,78	12.096,12	75.644,10	3.213,46	0,00
4	53.022,20	10.525,78	12.096,12	75.644,10	3	53.022,20	56.235,67	10.525,78	12.096,12	75.644,10	-3.213,47	0,00
5	56.235,67	11.841,49	12.096,12	80.173,28	3	56.235,67	56.235,67	11.841,49	12.096,12	80.173,28	0,00	0,00
5	56.235,67	11.841,49	12.096,12	80.173,28	3	56.235,67	56.235,67	11.841,49	12.096,12	80.173,28	0,00	0,00
6	59.449,13	13.157,21	12.096,12	84.702,46	4	59.449,13	59.449,13	13.157,21	12.096,12	84.702,46	0,00	0,00
6	59.449,13	13.157,21	12.096,12	84.702,46	4	59.449,13	59.449,13	13.157,21	12.096,12	84.702,46	0,00	0,00
7	63.016,08	13.157,21	12.096,12	88.269,41	4	63.016,08	59.449,13	13.157,21	12.096,12	88.269,41	3.566,95	0,00
7	63.016,08	13.157,21	12.096,12	88.269,41	5	63.016,08	66.583,04	13.157,21	12.096,12	88.269,41	-3.566,96	0,00
8	66.583,04	13.157,21	12.096,12	91.836,37	5	66.583,04	66.583,04	13.157,21	12.096,12	91.836,37	0,00	0,00
8	66.583,04	13.157,21	12.096,12	91.836,37	5	66.583,04	66.583,04	13.157,21	12.096,12	91.836,37	0,00	0,00
9	70.149,99	13.157,21	12.096,12	95.403,32	6	70.149,99	70.149,99	13.157,21	12.096,12	95.403,32	0,00	0,00
9	70.149,99	13.157,21	12.096,12	95.403,32	6	70.149,99	70.149,99	13.157,21	12.096,12	95.403,32	0,00	0,00
10	73.716,92	13.157,21	12.096,12	98.970,25	6	73.716,92	70.149,99	13.157,21	12.096,12	98.970,25	3.566,93	0,00
10	73.716,92	13.157,21	12.096,12	98.970,25	7	73.716,92	77.283,88	13.157,21	12.096,12	98.970,25	-3.566,96	0,00
11	77.283,88	13.157,21	12.096,12	102.537,21	7	77.283,88	77.283,88	13.157,21	12.096,12	102.537,21	0,00	0,00
11	77.283,88	13.157,21	12.096,12	102.537,21	7	77.283,88	77.283,88	13.157,21	12.096,12	102.537,21	0,00	0,00
12	80.850,82	13.157,21	12.096,12	106.104,15	8	80.850,82	80.850,82	13.157,21	12.096,12	106.104,15	0,00	0,00
12	80.850,82	13.157,21	12.096,12	106.104,15	8	80.850,82	80.850,82	13.157,21	12.096,12	106.104,15	0,00	0,00
13	84.417,79	13.157,21	12.096,12	109.671,12	8	84.417,79	80.850,82	13.157,21	12.096,12	109.671,12	3.566,96	0,00
13	84.417,79	13.157,21	12.096,12	109.671,12	9	84.417,79	87.984,73	13.157,21	12.096,12	109.671,12	-3.566,94	0,00
14	87.984,73	13.157,21	12.096,12	113.238,06	9	87.984,73	87.984,73	13.157,21	12.096,12	113.238,06	0,00	0,00
14	87.984,73	13.157,21	12.096,12	113.238,06	9	87.984,73	87.984,73	13.157,21	12.096,12	113.238,06	0,00	0,00
14	90.184,35	13.157,21	12.096,12	115.437,68	10	90.184,35	90.184,35	13.157,21	12.096,12	115.437,68	0,00	0,00
14	90.184,35	13.157,21	12.096,12	115.437,68	10	90.184,35	90.184,35	13.157,21	12.096,12	115.437,68	0,00	0,00
14	92.383,97	13.157,21	12.096,12	117.637,30	10	92.383,97	90.184,35	13.157,21	12.096,12	117.637,30	2.199,62	0,00
14	92.383,97	13.157,21	12.096,12	117.637,30	11	92.383,97	94.583,59	13.157,21	12.096,12	117.637,30	-2.199,62	0,00
14	94.583,59	13.157,21	12.096,12	119.836,92	11	94.583,59	94.583,59	13.157,21	12.096,12	119.836,92	0,00	0,00
14	94.583,59	13.157,21	12.096,12	119.836,92	11	94.583,59	94.583,59	13.157,21	12.096,12	119.836,92	0,00	0,00
14	96.783,21	13.157,21	12.096,12	122.036,54	12	96.783,21	96.783,21	13.157,21	12.096,12	122.036,54	0,00	0,00
14	96.783,21	13.157,21	12.096,12	122.036,54	12	96.783,21	96.783,21	13.157,21	12.096,12	122.036,54	0,00	0,00
14	98.982,83	13.157,21	12.096,12	124.236,16	12	98.982,83	96.783,21	13.157,21	12.096,12	124.236,16	2.199,62	0,00
14	98.982,83	13.157,21	12.096,12	124.236,16	13	98.982,83	101.182,46	13.157,21	12.096,12	124.236,16	-2.199,62	0,00
14	101.182,46	13.157,21	12.096,12	126.435,79	13	101.182,46	101.182,46	13.157,21	12.096,12	126.435,79	0,00	0,00
14	101.182,46	13.157,21	12.096,12	126.435,79	13	101.182,46	101.182,46	13.157,21	12.096,12	126.435,79	0,00	0,00

Lithuania

Fig.C5: Monthly salaries paid to different professor positions before taxes at 11 state Universities. DELFI informal poling [LT6].

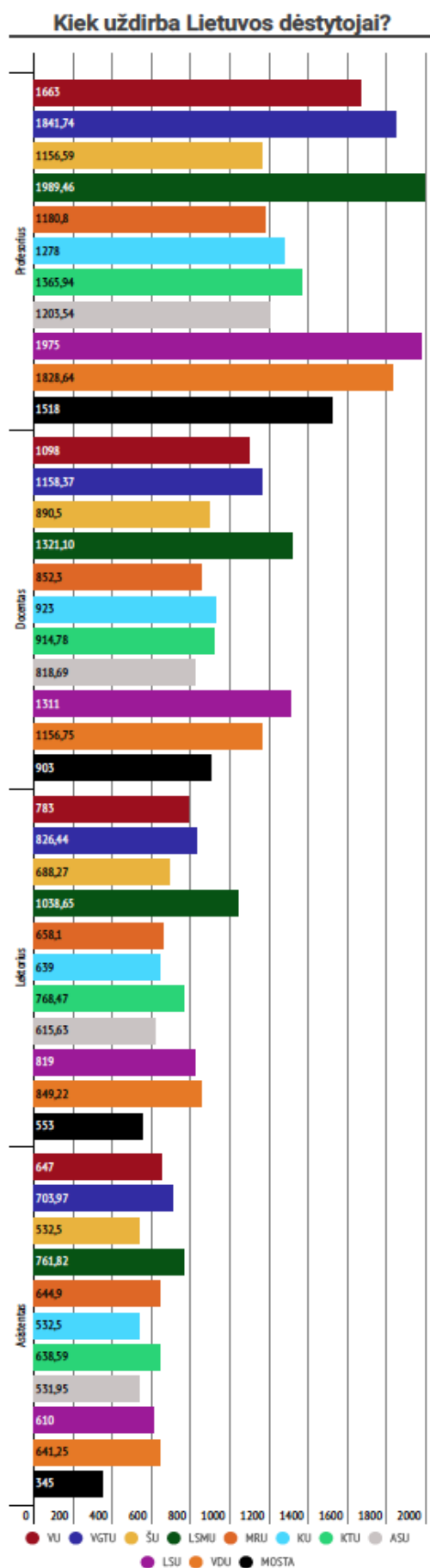


Fig.C6.1: Single Salary Scale for the Public Administration [PT7]. Valid from 1 January 2009.**TABELA REMUNERATÓRIA ÚNICA**

Portaria n.º 1553-C/2008, 31/12 (*)

Níveis Remuneratórios	Montante pecuniário 2009 (Euros)	Níveis Remuneratórios	Montante pecuniário 2009 (Euros)	Níveis Remuneratórios	Montante pecuniário 2009 (Euros)	Níveis Remuneratórios	Montante pecuniário 2009 (Euros)	Níveis Remuneratórios	Montante pecuniário 2009 (Euros)
1	RMMG (a)	26	1 767,89	51	3 055,19	76	4 342,49	101	5 629,79
2	532,08	27	1 819,38	52	3 106,68	77	4 393,98	102	5 681,28
3	583,58	28	1 870,88	53	3 158,18	78	4 445,48	103	5 732,78
4	635,07	29	1 922,37	54	3 209,67	79	4 496,97	104	5 784,27
5	683,13	30	1 973,86	55	3 261,16	80	4 548,46	105	5 835,76
6	738,05	31	2 025,35	56	3 312,65	81	4 599,95	106	5 887,25
7	789,54	32	2 076,84	57	3 364,14	82	4 651,44	107	5 938,74
8	837,60	33	2 128,34	58	3 415,64	83	4 702,94	108	5 990,24
9	892,53	34	2 179,83	59	3 467,13	84	4 754,43	109	6 041,73
10	944,02	35	2 231,32	60	3 518,62	85	4 805,92	110	6 093,22
11	995,51	36	2 282,81	61	3 570,11	86	4 857,41	111	6 144,71
12	1 047,00	37	2 334,30	62	3 621,60	87	4 908,90	112	6 196,20
13	1 098,50	38	2 385,80	63	3 673,10	88	4 960,40	113	6 247,70
14	1 149,99	39	2 437,29	64	3 724,59	89	5 011,89	114	6 299,19
15	1 201,48	40	2 488,78	65	3 776,08	90	5 063,38	115	6 350,68
16	1 252,97	41	2 540,27	66	3 827,57	91	5 114,87		
17	1 304,46	42	2 591,76	67	3 879,06	92	5 166,36		
18	1 355,96	43	2 643,26	68	3 930,56	93	5 217,86		
19	1 407,45	44	2 694,75	69	3 982,05	94	5 269,35		
20	1 458,94	45	2 746,24	70	4 033,54	95	5 320,84		
21	1 510,43	46	2 797,73	71	4 085,03	96	5 372,33		
22	1 561,92	47	2 849,22	72	4 136,52	97	5 423,82		
23	1 613,42	48	2 900,72	73	4 188,02	98	5 475,32		
24	1 664,91	49	2 952,21	74	4 239,51	99	5 526,81		
25	1 716,40	50	3 003,70	75	4 291,00	100	5 578,30		

(a) Retribuição mínima mensal garantida (RMMG).

(*) Data de entrada em vigor: 1 de Janeiro de 2009.

Fig.C6.2: Salary Scales for different professor positions [PT10]. Valid from 2011.**CARREIRAS ESPECIAIS SEM APLICAÇÃO DA TABELA REMUNERATÓRIA ÚNICA (TRU)**

(Sobre estas remunerações e demais prestações pecuniárias identificadas na alínea a) do n.º 4 do artigo 19.º da Lei n.º 55-A/2010, de 31/12 - OE/2011 - incide a redução remuneratória prevista no mesmo artigo)

DOCENTE UNIVERSITÁRIO (1)

Ind. 100: 1.636,83 €

Reitoria

Reitor	375
	6.138,11
Vice-Reitor	360
	5.892,59

Docente Universitário

Professor Catedrático	285	300	310	330
	4.664,97	4.910,49	5.074,17	5.401,54
Professor Associado c/agregação	245	255	265	285
	4.010,23	4.173,92	4.337,60	4.664,97
Professor Associado/	220	230	250	260
Professor Auxiliar c/agregação	3.601,03	3.764,71	4.092,08	4.255,76
Professor Auxiliar	195	210	230	245
	3.191,82	3.437,34	3.764,71	4.010,23
Leitor	140	145	155	
	2.291,56	2.373,40	2.537,09	

Fig.C7: Salary scale and grade structure for academic positions at the University of Edinburgh.

National Spinal Point	Full-Time Salary from 1st August 2018	University of Edinburgh Grade Structure	
		Normal Grade Point Contribution Point	Normal Grade Point Contribution Point
2	£15,842	UE01	UE02
3	£16,146		
4	£16,460	UE03	UE02
5	£16,766		
6	£17,079		UE04
7	£17,408		
8	£17,751	UE05	UE04
9	£18,189		
10	£18,688		UE06
11	£19,202		
12	£19,730	UE07	UE08
13	£20,275		
14	£20,836		UE10
15	£21,414		
16	£22,017	UE09	UE10
17	£22,659		
18	£23,334		UE10
19	£24,029		
20	£24,771	UE10	UE10
21	£25,482		
22	£26,243		UE10
23	£27,025		
24	£27,830	UE10	UE10
25	£28,660		
26	£29,515		UE10
27	£30,395		
28	£31,302	UE10	UE10
29	£32,236		
30	£33,199		UE10
31	£34,189		
32	£35,211	UE10	UE10
33	£36,261		
34	£37,345		UE10
35	£38,460		
36	£39,609	UE10	UE10
37	£40,792		
38	£42,036		UE10
39	£43,267		
40	£44,559	UE10	UE10
41	£45,892		
42	£47,263		UE10
43	£48,677		
44	£50,132	UE10	UE10
45	£51,630		
46	£53,174		UE10
47	£54,765		
48	£56,403	UE10	UE10
49	£58,089		
50	£59,828		UE10
51	£61,618		
52	£63,448	UE10	UE10
53	£65,510		
54	£67,561		UE10
55	£69,753		
56	£71,942	UE10	UE10
57	£74,276		
58	£76,609		UE10
59	£79,286		
60	£81,960	UE10	UE10
61	£84,822		
62	£87,186		UE10
63	£91,212		
64	£94,733	UE10	UE10
65	£97,551		
66	£100,369		

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