Support to strengthening the higher education system in Azerbaijan

Twinning project AZ/14/ENI/OT/01/17 (AZ/49)

Mission Report

Short-Term Mission on Activity 1.1. Improvement of concept and methodology for competence-based education standards

(September 10 – 14, 2018)

1. Name and Function of the Expert:

Full name of expert

Ms. Eliane Kotler, France Signature

Full name of expert

Ms. Asnate Kazoka, Latvia Signature

2. Objective and Tasks of the Mission:

The mission is carried out within the framework of:

COMPONENT 1: **SELECTED NATIONAL EDUCATION STANDARDS ARE ALIGNED TO INCLUDE A COMPETENCE-BASED FOCUS**

Activity 1.1. Improvement of concept and methodology for competence-based education standards

Benchmarks for this activity are:

- Report on diagnostic of current situation of BC;
- Data on best practices of European competence-based education standards.
- Concept and methodology for transforming education standards to be competence-based further improved

3. Time schedule of mission:

Date and Time	Activity
Monday 10 September 2018	**09:30-12:30** **The STEs meet with the Twinning team to discuss the agenda of the mission** **13:00 – 14:00** **LUNCH** **15:00-17:00** **Meeting with the staff of the Science, Higher and Secondary Professional Education Department, MoE** **Stakeholders:** *Mr. Yashar Omarov*, RTA Counterpart, Senior Advisor at Science, Higher and Secondary Professional Education Department, MoE; *Ms. Vusala Gurbanova*, Leading Advisor at Science, Higher and Secondary Professional Education Department, MoE, CL I; *Mr. Azad Akhundov*, Senior Advisor at Science, Higher and Secondary Professional Education Department, MoE, CL II
Tuesday 11 September 2018	**10:00 – 12:30** **Meeting with members of the Working Group on Natural Sciences at the Baku State University (BSU)** **Stakeholders:** *Mr. Aydin Kazimzade*, Vice Rector for Science and Innovations, BSU; *Mr. Akif Guliyev*, Dean of Biology Faculty, BSU; *Mr. Nizamaddin Isgandarov*, Dean of Math And Mechanics Faculty, BSU; *Mr. Adil Khasayev*, Head of Career, Internship and Graduates Center, BSU; *Mr. Javanshir Kazimov*, Deputy Dean of Math and Cybernetics Faculty, BSU; *Mr. Bilal Kazimov*, Head of Department at Math and Mechanics Institute of the Academy of Sciences **13:00 – 14:00** **LUNCH** **15:00 – 17:00** **Meeting at SINAM, one of the largest IT companies in Azerbaijan** **Stakeholders:** *Mr. Abulfat Rahmanov*, Director; *Mr. Dmitry Gakh*, Project Manager; *Mr. Vusal Abbasov*, Business Development Manager; *Mr. Sergey Andrushenko*, Leading Researcher; *Mr. Hamid Abbasov*, leading programmer.

Wednesday 12 September 2018	**10:00 – 12:00** **Baku Engineering University** **Stakeholders:** *Mr. Babak Abbasov*, Head of Computer and Information Technologies Chair **13:00 – 14:00** **LUNCH** **15:00 – 17:00** **Meeting at the Ministry of Transport, Communication and High Technologies of Azerbaijan** **Stakeholders:** *Ms. Lala Karimova*, leading advisor at the Department for Innovative Development of Information Society and Electronic Management; *Mr. Elvin Seyfullayev*, Senior Advisor at the Department for Management of Human Resources and Civil Service; *Mr. Vugar Guliyev*, Head of Human Resources Department, Baktelecom, state IT company under the Ministry; *Ms. Farida Fataliyeva*, Lawyer at Baktelecom; *Mr. Rashad Azizov*, Head of the Department for Innovative Development of Information Society and Electronic Management.
Thursday 13 September 2018	**10:00-13:00** **Meeting at the Azerbaijan State Oil and Industry University (ASOIU)** **Stakeholders:** Mr. Kamil Karimov, math teacher; Mr. Yaqub Sardarov, computer engineering teacher; Mr. Tofiq Ibrahimzade, teacher; Mr. Vagif Karimov, math teacher; Mr. Rauf Mayilov, Associate professor, teacher at Control Systems and Engineering Faculty; Mr. Samad Yusifov, Dean of IT Faculty; Mr. Gasim Mammadov, Vice Rector for Education **13:00-14:00** **LUNCH** **15:00-17:00** **Deskwork** STEs work on their mission report
Friday 14 September 2018	**10:00-12:30** **Meeting at the Azerbaijan Technical University** **Stakeholders:** *Mr. Vahid Farhadov*, Head of Automatics and Management Chair; *Mr. Zafar Jafarov*, Head of Information Technologies and Programming Chair; *Mr. Vidadi Musayev*, Head of Computer Networks and Systems Chair; *Mr. Eldar Gojayev*, Professor, Head of Physics Chair; *Mr. Mehman Hasanov*, Associate Professor, Head of Multichannel Telecommunication Systems Chair; *Ms. Marziya Aghayeva*, Director of International Relations Department; *Mr.*

	Suhbi Namazov, Vice Rector for International Relations; *Mr. Farhad Isayev*, officer at the International Relations Department. **13:00 – 14:00** **LUNCH** **14:30-16:30** Meeting with the staff of the Science, Higher and Secondary Professional Education Department of MoE to report about observations and results of the week.

4. Mission report:

4.1 Complementary information to diagnostic of current situation already developed during the 1st mission within this Activity

The analysis of current official texts shows that the main tools for the implementation of the competence-based education are already in place. Key legislative documents are compliant with European standards and Bologna principles[1]. All the stakeholders we met, Ministry, National WG, Labor market /companies (SINAM, Ministry of Transport, Communication and High Technologies) are aware of the necessity to find a way to work together, and expressed the will to collaborate in the creation, design and revision of programmes.

However, there seems to be somewhat of a gap between the official texts, the stakeholders' declarations and what is actually implemented on the ground, in one word, between policy and practice.

The competences of the graduates only partially meet the needs of companies, in particular due to the fact that the programs taught are not always updated and the methods of assessment do not exactly fit the desired goals.

On the other hand, the higher education institutions look very uneven, so the following remarks have to be adapted to each of the particular case, according to the current state of implementation of reforms in the European Higher Education Area.

4.2. A concept and methodology for transforming education standards to be competence-based

The competence-based approach appears as an answer to the needs of the economic world, a support for graduates looking for a job, a support for international mobility and a tool for recognition of prior learning (RPL). It invites to think of the renewal of the conception and the design of the study programmes.

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[1] Among these documents, cf. :

- the AzQF (July 18, 2018) : "All qualifications are described in terms of knowledge, skills and autonomy/responsibility and referenced to the AzQF" (1.3.5), "The objective of the AzQF… take into account the demands of the society and labour market when defining qualifications, and hence improve national economic performance and facilitate communication and movement between education and training sectors and the labour market" (3.1.3)
- The "Action Plan for the implementation of the State Strategy for the development of education in the Republic of Azerbaijan" (January 19, 2015)
- The Overview of HE System
- The National State Standards in the field of physics
- The Occupational Standards for secondary education

We suggest to refer to the Tuning concepts and methodology explained in the first mission report of Activity 1.1 implemented in May 2018.

Competence and competence-based study programmes: definitions

Competences :

The two definitions on which there is a consensus are the Tuning definition and the ECTS revised users guide one:

- ***Tuning definition****:*

« Competences represent a dynamic combination of cognitive and metacognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values. Fostering these competences is the object of all educational programmes. Competences are developed in all course units and assessed at different stages of a programme. Some competences are subject-area related (specific to a field of study), others are generic (common to any degree course). It is normally the case that competence development proceeds in an integrated and cyclical manner throughout a programme. »[2]

- ***ECTS Users' guide definition:***

"The European Qualifications Framework (EQF) defines competence as the ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the EQF competence is described in terms of responsibility and autonomy. Fostering competences is the object of all educational programmes. Competences are developed in all course units and assessed at different stages of a programme. Some competences are subject-area related (specific to a field of study), others are generic (common to any degree course). It is normally the case that competence development proceeds in an integrated and cyclical manner throughout a programme."[3]

Moreover, **the competence definition used in the AZQF** is drawn from this last definition:

"The ability of an individual to perform a job properly; the ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development; the ability to perform activities to the standards required in employment, using an appropriate mix of knowledge, skills and attitude" (AZQF)

The Tuning definition as well as the ECTS Users' Guide emphasise the fact that there are two kind of competences: subject related competences and transferable or generic competences.

Competence based education:

Competence based education is a style of education that focuses on **what you can achieve in the workplace** after completing a course, or because of your workplace training and experience.

[2] *Introduction to Tuning*, p. 139. http://tuning.unideusto.org/tuningeu

[3] *ECTS Users'Guide,* 2015, p. 67.

The competences-based approach appears as an answer to the needs of the economic world, a support for graduates looking for a job, a support for international mobility and a tool for RPL. It invites to think of the renewal of the conception and the design of the diplomas.

The way how curricula is presented in the competence-based approach:

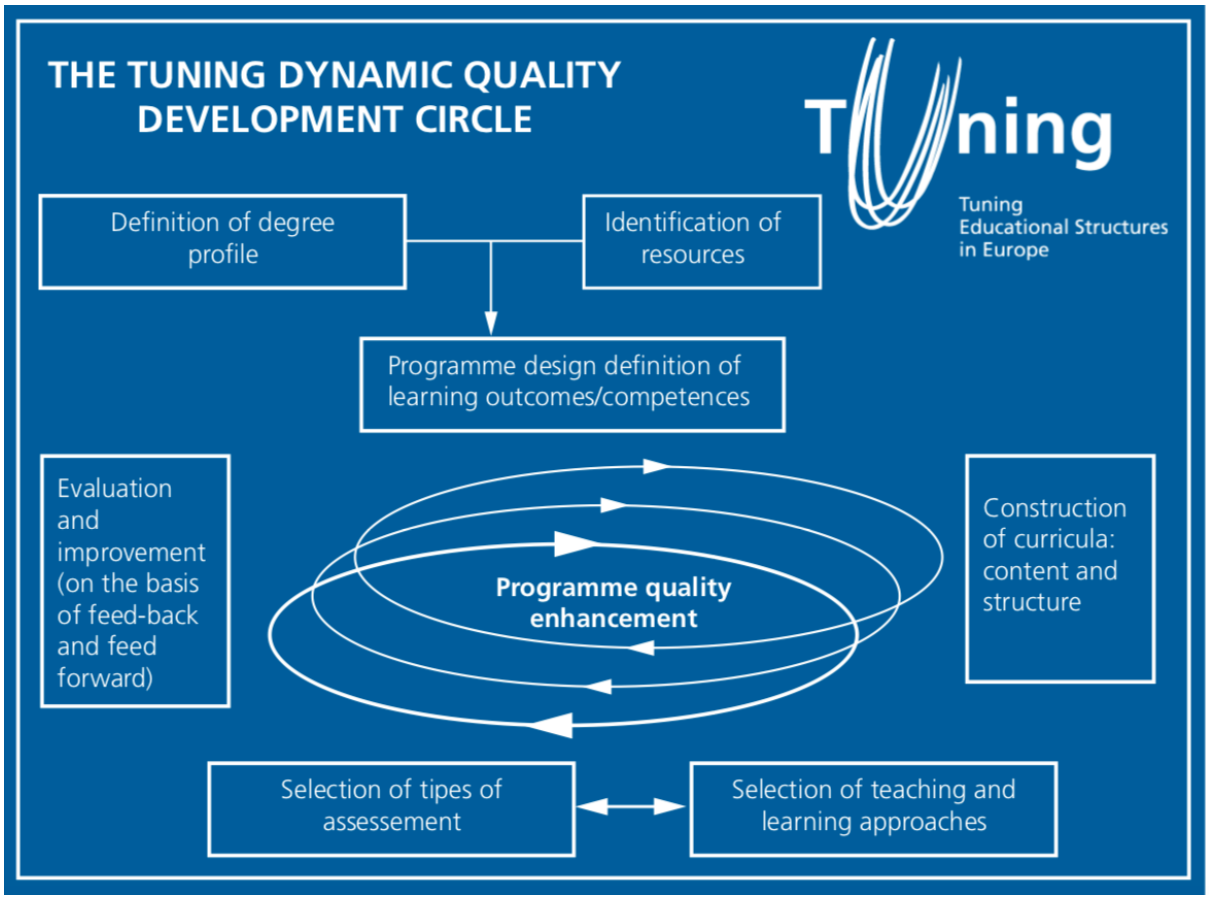
- reader-friendly;
- a detailed version meant for the academic staff;
- discussion of the curricula between academic staff and other stakeholders (Ministry, representatives of the labour market, representatives of students);
- programmes should comply with Azerbaijani qualification framework, be based on Dublin descriptors and be clearly distinguished between bachelor and master level.

Methodology and guidelines for developing competence-based study programmes and monitoring them

Based on the previously defined concept of competence-based education the following sections provide the methodology and guidelines for developing competence-based study programmes in Azerbaijan.

General Methodology

The starting point would be the Tuning development circle with its different steps.



The important questions that have to be answered when designing a study programme (from Tuning methodology):

- Has the social need for the study programme on a regional/national/European level been identified?
- Has this been done on the basis of a consultation of stakeholders: employers, professionals and professional bodies?
- What is the point of view of academics (they should be involved in the design of programmes)?
- Are the necessary resources for the study programme available?
- Are the programmes designed in terms of ECTS-credits based on student workload?
- Are the objectives of the programme described in terms of learning outcomes /competences (knowledge, understanding, skills and abilities) that have to be met.
- Generic and subject specific competences have to be defined
- A translation into the curriculum: content (topics to be covered) and structure (modules and credits) has to be made
- As well as a translation into educational units and activities to achieve the defined learning outcomes.
- The approaches to teaching and learning (types of methods, techniques and formats) have to be specified or renewed, as well as the methods of assessment (when required, the development of teaching material)
- An evaluation system has to be developed to enhance its quality constantly.

There must be a clear balance between the **generic competences** and **subject-related competences.**

Generic competences

Be careful: they should highlight the differences between the bachelor level and the master level. So far, we recommended that the same working group elaborates the generic competences for both levels.

Subject related competences

When a new study programme is created it is relatively easy to describe it in terms of competences because this description is the starting point of the design of the study programme. But when a study programme is already existing, it is necessary to survey the labor market representatives to know if the competences acquired by graduates match with the needs they express.

If the competences required by the labor market do not match the competences acquired by the graduates, the content of the study program should be revised.

It is the case for the study programmes in the IT field.

When formulating the competences associated to a study programme, **the level of studies** has to be taken into account. The so called “Dublin Descriptors” could be useful:

Cycle	Level description
1st (bachelor)	(includes) some aspects of forefront knowledge (of their field)
2nd (master)	(provides) basis (or opportunity) for originality

3rd (doctoral)	(contributes through) original research (that extends front of knowledge)

Template of a study programme

It should include four parts:

- A description of the competences (generic and specific ones);
- A list of jobs or sectors of activities the graduates can apply for;
- The curriculum;
- The way of assessment of learning outcomes / competences.

From theory to practice

What documents should be provided?

2 documents should be provided

- One for students, their parents, the employers
  - Rather short (5-6 pages)
    - Example of the Tuning fiche : example of a competence based curriculum in the field of physics (annex 1)
    - The FR experience :
      - The upstream work
        - FR experience PPT doc. (annex 2)
      - An example : the BA fiche for IT (annex 3)
    - Example of the Latvian bachelor and master study programme for IT (annex 4)
  - These documents should be the first part of the **Diploma Supplement** (the second part is the transcript of records with ECTS)
- One for academic staff :
  - It is a complete document with the detailed content of the programme for each year of study, each semester, the lecture hours, the hours of practical work, the training periods, the total number of hours, the teaching staff (academic, professional), how competences are assessed, the different pathways, etc.

We would like to emphasis that the **Diploma Supplement** has to be delivered free of charge to each graduate in a widely spoken language.

In order to ensure the success of the project, the implementation of a competence based approach requires different changes and the creation of new structures.

GUIDELINES and RECOMMENDATIONS

In order to ensure a meaningful implementation of the competence-based approach, a formal communication structure between the Ministry of Education, national working groups for designing programme standards and the representatives of labour market has to be established and implemented. The elements of competence-based study programmes have to be stipulated in the national regulatory documents. Those documents have to be communicated to the relevant stakeholders and complemented by concrete measures of implementation. The implementation of competence-based approach must be supported by additional financial sources, for example, for improving the teaching competencies.

A road map with a defined timeline should be established and a regular follow-up on the implementation of the road map should be foreseen.

In order to implement the competence-based approach it is crucial to address and take into account the following elements:

1. **Involvement of stakeholders and relationship between stakeholders**
2. **Structure and management of the higher education institutions**
3. **Content of study programmes**

Based on the information obtained by the experts during the desk research and meetings with the representatives of stakeholders, the following activities for the implementation of competence-based approach are proposed:

1. Involvement of stakeholders and communication between stakeholders

For the policy makers:

- the composition of the national working groups for designing standards should be thought over and participation of labour market representatives should be ensured in all working groups, especially the ones in priority sectors;
- Ministry of Education should initiate regular meetings with the employer representatives in order to discuss the current trends in the labour market and initiate the development/ revision of study programme standards;
- ministries that are responsible for certain areas should be involved in designing the qualifications and the professional standards in those areas, for example, Ministry of Transport, Communication and High Technologies should be involved in designing the qualifications related to Information Technologies;

For the higher education institutions:

- employer representatives should be involved in the governing bodies of the higher education institutions;
- employer representatives should be involved in those bodies of the higher education institutions that are related to the design, revision and monitoring of study programmes;
- the higher education institutions should facilitate a meeting between the management of the higher education institution, academic staff and employer representatives in order to discuss the quality of graduates prepared in different study areas. Such meetings should take place once or twice a year.

2. Structure and management of higher education institutions

For the policy makers:

- the Ministry of Education should encourage the higher education institutions to revise the governance structures in order to involve employer representatives and to monitor the involvement;

- the Ministry of Education should initiate the creation on a united database for monitoring the employability of higher education graduates, for example, in cooperation with the State Revenue Service;
- the teachers should be recruited on the basis of updated competences and a continuing training should be provided, especially training by regular participation of academic staff in research activities

For the higher education institutions

- the higher education institutions should create internal units that are responsible for the internal revision of the study programmes and include representatives of students, graduates and employers;
- the higher education institutions should design a strategy for teacher development to ensure sufficient training for the teachers and the use of innovative teaching methods;
- the higher education institutions should design and implement a policy of human resource development according to which the teachers are recruited on the basis of updated competences.
- the higher education institutions should develop student support centres or similar structural units that would provide career support and guidance counselling and collect information about the graduates, internship offers and job surveys, design/perform surveys for the employers and graduates;
- the higher education institutions should establish alumni associations in order to collect up-to-date information about the graduates.
- The higher education institutions should provide all information needed by students (competences associated to the diploma they apply for, rate of employment of graduates) by a better use of their Web Site

3. Content of study programmes

When designing the content of study programmes, four levels must be clearly distinguished, and the framework set by those levels should be defined accordingly:

- state standard (the general outline for the study programme);
- state standard for study programme (the minimum requirements);
- study programme;
- study courses.

The state standards should clearly:

- define and include the principles of recognition of prior learning that allow for recognition of formal, non-formal and informal learning;
- define and include the principles of life-long learning;
- indicate the need of a diploma supplement;
- illustrate differences between different levels of study programmes according to the European Qualifications Framework;
- state the research competencies that should be acquired on the certain study level;
- state the need of the transferable skills within the higher education curricula.

The state standards for study programmes should clearly:

- define only the general outline for the study programme;
- emphasis the balance between generic and subject-specific competencies;
- emphasis the need of generic competencies that foster the development on entrepreneurship, management, critical thinking and analysis skills;
- include a clear reference to student-centered teaching and learning methods;

- include a designated space that allows the possibility for specialisation, especially on the master's level.

The study programmes:

- must be designed according to the new tendencies in the subject area, research and labour market;
- must be designed according to the specific focus of the higher education institutions;
- should include several specialisations, especially on the master's level;
- should involve employers that are responsible for designing/teaching certain courses.

The study courses:

- are aligned with the general learning outcomes of the study programme and help to achieve the aim defined for the study programme;
- are arranged in a logical structure (within the study programme) that allows for a gradual development of competencies;
- are regularly updated and discussed/approve in the internal structures of the higher education institution.

In the process of designing and revising the content of study programmes the following two levels of responsibilities must be defined and separated.

For the policy makers:

- there must be a clear division between the state standards (the general outline), state standards for study programmes (the minimum requirements) and the autonomy of higher education institutions;
- the national standards should clearly distinguish between the bachelor level and master's level in regard to the generic and the subject related competences and highlight the differences
- to ensure that the generic competences (pre-professional and cross-boundary) and subject related competences defined on the state standard level are balanced
- to update (revise) the state standards in order to reflect the general tendencies of the labour market
- to generalise the state standards in order to allow space for the higher education institutions to create specialisations, especially on the master's level
- the national standards should allow for more interdisciplinarity of study programmes, for example, e-law, e-medicine
- to generalise the state standards in order to allow the higher education institutions the possibility to take into account the specific context and competencies of each higher education institution as well as the scientific environment of each institution when designing study programmes
- to stipulate the need of Diploma Supplement on the national level

For the higher education institutions:

- to update (revise) the study programmes in order to ensure that the generic competences (pre-professional and cross-boundary) and subject related competences are well balanced;
- to provide a Diploma Supplement free of charge to all graduates;
- to introduce assessment methods that reflect the achievement of certain competencies (as an opposite to learning by heart);

- to ensure that the practical training provided in the study programmes supports and complements the theoretical courses throughout the curricula and is performed with an up-to-date equipment;
- to involve employer representatives in the design and delivery of certain practically oriented study courses

General recommendations

- The political discourse should be transformed into operability.
- The implementation of CBA requires a joint work of several services and types of staff within university, like Career Center, Faculty, study programmes staff, etc.
- A road map should be established with a time-table and a self evaluation of the changing may be every 2 years.
- It also appears throughout the mission that stronger financial incentives for academic staff salaries and allocation of more resources for their continuous training would further contribute to improvement of the overall context for the implementation of new practices in higher education institutions.
- We are aware the road ahead is very long but you have the tools to succeed in your improvement approach and at least we would highlight the main points of our recommendations: associate representatives of the Labor Market, provide trainings sessions for the Academic staff

  We would like to thank for their warm welcome the persons from the Ministry, from the National WG, the academic staff from different universities, from the labor market. We appreciated the quality of our exchanges, without hiding anything under the curtain.

Sources

APEC : https://fr.slideshare.net/Apecfr/apec-universit-de-grenoble-alpes-guide-pratique-dune-dmarche-comptence

The Bucharest Communiqué

CEDEFOP Publication : Application of Learning Outcomes approaches across Europe (2016) : http://dx.doi.org/10.2801/735711

The Dublin Descriptors

The ECTS revised Guide (2015)

The French national qualifications framework: http://www.rncp.cncp.gouv.fr/grand-public/qualificationsFramework

Tuning Academy project: http://tuningacademy.org/

Annex 1. TUNING fiche for the short presentation of a study programme of B. Sc. In Physics

This is a concrete but fictive example of how Tuning methodology can help formulating degree programme profiles; the template is complete, but it may be reduced[4]. **In any case, Tuning recommends that the presentation of a degree programme profile does not surpass 2 A4 pages.**

BACHELOR OF PHYSICS GENERAL STUDIES		
Type of degree & length		*Single degree / 240 ECTS (= 8 semesters)*
Institution		*Title of HEI: to be completed*
Accreditation. Organisations(s)		*Ministry of Education, Department of Accreditation and Nostrification*
Period of Reference		*The study program is validated for x years starting from 2018*
		QF for EHEA: 1st cycle; EQF level 6 *NQF level: to be completed*
A	**Purpose**	
	The purpose of this bachelor programme is to provide education in physics, by considering various types of jobs and careers. Prepare students with a special interest in specialty of Physics in pursuit of higher education areas.	
B	**Characteristics**	
1	Discipline(s)/ Subject areas	The main discipline is general physics. The partition is: physics, mathematics, computer science, chemistry, other (50: 18: 8: 7: 17)=B. Physics@Uni. Strasbourg
2	General/ Specialist Focus	General education in experimental and theoretical physics.
3	Orientation	Based on previous research and exposed to current research but with specializations considering opportunities specific to job / career: (subjects of theoretical physics and applied physics) physics, biophysics, medical physics, informatics.
4	Distinctive Features	
C	**Employability and further Education**	
	Employability	Positions in companies / businesses and institutions (research / quality assurance, trade) in the areas of technology and Informatics, biomedical and pharmaceutical, the sector of the environment. Positions in financial institutions. Positions in education.
	Further Education	Master's programmes in Physics (theoretical physics, applied physics), interdisciplinary programs related to Physics (Biophysics, medical physics, geophysics), master's programmes in engineering / physics technology or computer science.

[4] From Tuning, *A guide to formulating degree programme profiles*, Bilbao, Groningen and the Hague, 2010, p. 80-82.

D	Educational style	
	Learning/ teaching approaches	Lectures, classes of lab, tutorials, individual study based on text books and reading notes, individual consultations with teachers, internship in a research lab on a given topic.
	Assessment method	Written tests, oral tests, lab reports, oral presentations, ongoing evaluation, public presentation and defence of the internship project
E	**Programme competences**	
1	GENERIC The programme includes the generic competences (or key skills) expected of first cycle graduates. The students should be able to: • Establish their role and mission within an organization to adapt and take initiatives. • Identify the process of production, dissemination and enhancement of knowledge. • Respect the principles of ethics, ethical and environmental responsibility. • Working as part of a team while being independent and responsible with respect to a project. • Identify the professional fields potentially in relation to the achievements of the bachelor curriculum. • Characterize and enhance their identity, their skills and their professional project according to a context. • Able to step back from a situation, self-evaluate and questioning himself in order to improve knowledge Transverse and language competences • Use digital tools of reference and the rules of computer security to acquire, process, produce and disseminate information as well as to collaborate internally and externally. • Identify and select various specialized resources to document a subject. • Analyse and summarize data for their treatment. • Develop an argument with critical mind. • Use easily the different registers of written and oral Azeri expression. • Understand, speak and write currently in at least one foreign language.	
2	SUBJECT SPECIFIC Within the context of the student's field of professional practice, the graduate is able to demonstrate capability in: • Mobilize the basic concepts in order to: simulate, analyse and solve simple problems • Address a complex problem and solve it step by step • Identify the different steps of an experimental approach and perform it. • Use the measurement devices and measurement techniques commonly used in the lab and in different areas of physics. • Interpret the experimental data in order to be able to simulate them. • Probe a model upon comparing its predictions to experimental results and assess its validity range. • Identify the sources of errors for an experimental result in order to assess its uncertainty range.	

	• Suggest analogies, estimate orders of magnitude, and be able to understand their meaning. • Use the main mathematical tools relevant for physics. • Handle the basic mechanisms at the microscopic scale, simulate the macroscopic phenomena, and make the bridge between macro and micro. • Make a sound use of some data acquisition and analysis software • Use an up-to-date programming language • Identify the currently used techniques in the areas of: fluid mechanics and solid state mechanics, materials science, chemistry, geosciences, thermodynamics and thermal engineering, computer sciences, astronomy / **Note: this should be related to each HEIs specific fields, e.g. excellence fields** • Identify the peculiar regulations and implement the main preventive measures regarding health and safety system.
F	**Programme learning outcomes**
	Within the context of the student's field of professional practice, the graduate is able to demonstrate capability in: • Knowledge of basic mathematics and related subjects (including mathematical methods for physics; computing; numerical analysis) • Knowledge of basic physics (introduction to physics; mechanics, vibrations and waves, acoustics, optics, thermodynamics, electromagnetism; quantum physics) • Knowledge of experimental methods (asking the right questions, measurement theory and treatment of experimental errors, instrumentation) and awareness about professional integrity and how to avoid plagiarism • Knowledge of basic elements in theoretical physics (analytical mechanics; classical electromagnetism, relativity, etc.; quantum mechanics / theory; statistical physics) • Knowledge of elements of applied physics and related subjects (chemistry; electronics & related; etc.) • Knowledge of basic elements in modern physics (atomic, nuclear and sub-nuclear, solid state, astrophysics) • Small intermediate or final physics project(s) • Other essential elements, in varying amount depending on the institution (e.g. Knowledge of topics «chosen from list(s)D; presenting a lab report, taking active part in a seminar) • Some knowledge/abilities in non-standard subjects, in varying amount depending on the institution (e.g. vocational training, skills development, placement, etc.)

Annex 2 Competence based approach: implementation: the FR experience

Competence based approach : a new organization

- **Context**
  - Need of innovation in order to remain competitive in the current globalized economic and social context
  - Unemployment
- Different laws (2013→2016)

- From knowledge acquisition to assessment of Learning Outcomes and competences
- A cooperative project involving social and economical partners (22 January 2014 : NQF for HE) : Representatives from the Labour Market are involved in the design and evaluation of programs. (Education Code, art. L. 611-2).

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Ministry, Institutions, Labour market

- **Ministry**
  - Writing and publication of National Standards
  - Based on the August 1st 2011 and July 22nd 2013 laws about the Bachelor diploma and the Master diploma

    Each national diploma should be defined in terms of competences
- **Institutions**
  - Adding competences corresponding to their specificities
- **Labour market**
  - HE is represented at the CNEFOP
  - Links with the OPCA
  - Creation of the National sector Councils (CNEE)

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CNEFOP /OPCA

CNEFOP : National council for employment, vocational studies and carrier guidance

- Created in 2014
- Composition :
  - 12 Ministry, among them:
    - Ministry for employment vocational training
    - Ministry of education
  - Regions
  - Social partners
- A consultation body for the legislation concerning the questions of employment and vocational studies education
- A forum of dialogue, follow-up, monitoring and evaluation of employment policies and RPL policies

OPCA : approved joint-management collection bodies

- In charge to collect fundings in order to finance training for employees

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CNEE

National council for education and economy

- Aim to organize at a national level a dialogue between HE and economical sectors about the competency frameworks and HE diplomas standards
- Equal number of representatives from the economical world and from HEI
- A forward thinking on HE programs according to the social and economical needs
- A reflection on how to respect QA in internships

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National Standard Bachelor and Master level

- **Starting point**
  - Competency framework at a Bachelor level
  - Standards published previously by Institutions level 6
  - Standards published by institutions level 7
  - Examples of Sectors of activities and jobs
- **Principles**
  - 45 BA diplomas (instead of 1420 previously)
  - 251 MA diplomas (instead of 6000 previously)
- Only 1 standard for the same diploma at a national level
- Today : the 45 Bachelor diplomas are written

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Generic competences for all BA diplomas (1)

Generic competences : pre-professional skills

- To be able to positionne oneself within a company in order to adapt and be pro-active
- Identify the knowledge production, diffusion and valuation process
- Respect the ethic and environmental responsability principles
- Be able to work in autonomy, as well as in team to make a project successful
- identify the professional sectors according to the LO of the diploma
- Be able to highlight acquired competences when applying for a job
- Be able to step back

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Generic competences for all BA diplomas (2)

Generic competences : linguistic and digital

- Use digital tools and acknowledge security rules in order to communicate
- Be able to use appropriate sources according to a given topic
- Analyse and sum up datas to be used
- Develop arguments in a critical way
- Be able to write and speak easily in local language
- Be fluent in at least one foreign language

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An example : BA Life and Earth Sciences specific competences

Subject related competences

- Support to the achievement of a naturalist and scientific project
- Implementation of measures and treatment
- Realization of thin sections of rocks, biochemical assays, dissecting, harvesting
- Implementation of an experimental approach
- Writing a report on technical activity
- Observation of natural objects
- Analyse of research documents

- And 12 competences more …

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An example : B. Life and Earth Sciences

- Sectors of activities
  - Agriculture, foresting and fishing
  - Mining
  - Manufacturig industries
  - Water supply, waste management and clean-up (dépollution)

Jobs open to graduates

- Specialized activities in the scientific and technological field
  - Scientific
  - Technician
  - Assisting engineer
  - In charge of studies in the fiels of environment and geology

- **Job files corresponding**
  - Protection of natural heritage
  - Geological studies
  - Technical intervention in studies, research and development
  - Technical intervention in EHS Environment, Health and Safety

Conditions of success of the approach

- The project should
  - Be undertaken at the Ministry level
  - Bring together all stakeholders and, at the institutions level, associate students
  - Integrate Recognition of Prior Learning

- Dissemination
  - The standards have to appear on the web site of Institutions

Support to strengthening the higher education system in Azerbaijan
This project is funded by the European Union

The description of Bachelor Programme in IT at the University Paris 8 (France)

NB: such kind of diploma description ('diploma fiche')is systematically available on official web sites of all French universities. It enables to any interested person to get a clear idea of a study programme.

Here we kept the French language version and added (in orange colour) its translation into English.

PRESENTATION GENERALE / GENERAL PRESENTATION

Cette licence vise le double objectif de poursuite d'études et de formation professionnelle. À l'issue de cette licence, les étudiants ont acquis les compétences d'informaticiens, d'analystes-programmeurs et de développeurs, et sont capables d'utiliser les environnements de programmation pour apporter des solutions efficaces à des problèmes réels. Ils peuvent aussi continuer des études dans le cadre d'un master, soit en Informatique, soit en Mathématiques, selon le parcours choisi. Dans tous les cas, les étudiants auront acquis une culture et une expérience fiables leur permettant de s'adapter aux évolutions des sciences et techniques au cours de leur vie professionnelle.

This study programme serves the dual purpose of pursuing studies and professional training. After successfully completing their exam, the graduates have acquired the competences of IT specialist, programmer/analyst and developer; they are able to provide effective solutions to real problems. They may apply for master studies in the field of IT or math according to the path they have chosen during their BA studies. In any case, the graduates will have acquired a reliable culture and experience which allows them to adapt to scientific and technical developments during their professional life.

L'approche générale de la licence est d'aller de la pratique à la théorie et de la théorie à la pratique. Les étudiants doivent passer beaucoup de temps à tester sur machine les théories rencontrées et à étudier les principes rencontrés dans la pratique informatique.

The principle of the programme is a back and forth between theory and practice. Students have to spend time to test on computers the theory they learnt and to learn the theory corresponding to the practice they have encountered while practicing on computers.

POURSUITES D'ETUDES ET DEBOUCHES PROFESSIONNELS / PURSUIT OF STUDIES AND JOB OPPORTUNITIES

- Masters Informatiques, afin de poursuivre la formation jusqu'au niveau permettant d'accéder au métier d'informaticien expert : ingénieur réseau, ingénieur système, ingénieur logiciel, ingénieur de la connaissance, architecte système et chef de projets. En particulier : informatique des systèmes embarqués et informatique et sciences humaines.
- Masters in IT, in order to become an expert IT specialist, a network engineer, a system engineer, a software engineer, a knowledge engineer, system architect and project manager. In particular, embedded computing and computer science and human sciences.
- Masters de mathématiques, notamment mathématiques fondamentales et protection de l'information.
- Masters in math, especially deep math and information security
- Métiers d'informaticien d'étude : informaticien analyste, informaticien d'application, informaticien chargé d'études, informaticien de développement, programmeur industriel,

programmeur logiciel de base, programmeur de maintenance, technicien spécialisé en sécurité informatique.

- Professions as a computer scientist: computer analyst, application computer scientist, computer scientist, development computer programmer, industrial programmer, industrial programmer, basic software programmer, maintenance programmer, technician specialized in IT security.

CONDITIONS D'ACCES / ACCESS CONDITIONS

L1 : baccalauréat ou equivalent, **L2 :** sur dossier, **L3 :** sur dossier

MODALITES D'ADMISSION POUR L'ANNEE 2018-2019 / HOW TO APPLY FOR THE UPCOMING YEAR

Pour connaître la procédure qui correspond à votre profil, connectez-vous au site internet de Paris 8 à l'adresse suivante : https://appscol.univ-paris8.fr/infoDevu

See the website

ORGANISATION DE L'ENSEIGNEMENT / ORGANIZING THE TEACHING

Basée sur une spécialisation progressive, la licence Informatique permet à l'étudiant des choix de cours libres et de mineures (interne et externe) variées.

Based on a progressive specialization, the IT BA allows the student to make choices among different free and minor study subjects/ courses.

Les étudiants sont invités à choisir entre la mineure interne et une mineure externe, toutes les disciplines de Paris 8 pouvant être choisies, notamment Mathématiques, Arts, Sciences humaines et sociales.

Students are invited to choose a minor subject within the IT department or outside, among the different subjects taught in the university, especially math, arts, human and social science

Un autre parcours Micro-informatique et Machines Embarquées (MIME) est possible en L3.

Another pathway, Micro-informatics and embedded machines is possible in the third year

Résumé du référentiel d'emploi ou éléments de compétence acquis / Summary of the occupational standard and the elements of competences acquired

La licence d'informatique forme à l'acquisition de compétences d'informaticiens, d'analystes-programmeurs et de développeurs, utilisées dans les environnements de programmation pour apporter des solutions efficaces à des problèmes réels.

The BA program in IT is a training program for developing competences for computer scientists, programmer-analysts and developers; these competences are used in the field of computer programming with the aim to provide effective solutions to real-world problems.

Compétences disciplinaires : Specific competences

- Conception et évaluation des systèmes informatiques
- Design and evaluation of computer systems

- Développement des systèmes et des produits informatiques
- Development of the IT systems and products

- Gestion et exploitation des systèmes d'information
- Management and exploitation of information systems

- Appliquer des approches raisonnées de résolution de problèmes complexes par décompositions et/ou approximations successives et mettre en œuvre des méthodes d'analyse pour concevoir des applications et algorithmes à partir d'un cahier des charges partiellement donné.
- Application of a reasoned approach for solving complex problems by decomposition and/ or successive approximations and implement analysis methods for designing applications and algorithms from a particular set of specifications
-
- Se servir aisément de plusieurs styles/paradigmes algorithmiques et de programmation (approches impérative, fonctionnelle, objet et multitâche) ainsi que plusieurs langages de programmation.
- Being able to use different algorithms and programming paradigms (functional and multi-tasking approach) and several computer languages
-
- Concevoir le traitement informatisé d'informations de différentes natures, telles que des données, des images et des textes.
- Design the computerized processing of information of different natures (data, images, texts).

- Choisir, sur des critères objectifs, les structures de données et construire les algorithmes les mieux adaptés à un problème donné.
- Based on objective criteria, choose the data structures and build algorithms that will fit the needs

- Caractériser le rôle des tests et des preuves de correction dans le développement des logiciels et mettre en œuvre des tests élémentaires et des invariants de boucle.
- Characterize the role of the tests and the proofs of correction in software development and implement elementary tests as well as loop-invariants.

- Analyser et interpréter les résultats produits par l'exécution d'un programme.
- Analyse and interpret the results of a program execution.

- Expliquer et documenter la mise en œuvre d'une solution technique.
- Explain and document the implementation of a technical solution

- Concevoir, implémenter et exploiter des bases de données.
- Design, implement and exploit data bases

- Identifier les concepts fondamentaux de complexité, calculabilité, décidabilité, vérification : apprécier la complexité et les limites de validité d'une solution.
- Identify the main concepts of complexity, computability, capacity of decision, verification : evaluate the degree of complexity and limits of validity of a solution

- Caractériser les outils logiques et algébriques fondamentaux (théorie des langages et de la compilation, logique et raisonnement, ordres, induction) et leurs implications dans la programmation et la modélisation.
- Characterize the fundamental logical and algebraic tools (theory of languages and compilation, logic and reasoning, orders, induction) and their implications on programming and modeling

- Construire et rédiger une démonstration mathématique synthétique et rigoureuse.
- Build and write a rigorous and synthetic mathematical demonstration

- Caractériser les techniques de gestion de l'aléatoire (probabilités et statistique) et leurs rôles dans le traitement de certaines données.
- Characterize the randomness management techiques (probability and statistics) and their roles in processing of certain data

- Utiliser un logiciel de calcul formel ou scientifique.
- Use a software of formal or scientific calculation

- Identifier et caractériser les principaux éléments fonctionnels et l'architecture matérielle d'un ordinateur, interpréter les informations techniques fournies par les constructeurs, écrire des routines simples en langage machine.
- Identify and characterize the main elements and the hardware of a computer, interpret the technical information given by hardware manufacturers and write simple engineering routines in machine language

- Caractériser le fonctionnement des systèmes et des réseaux, ainsi que les pratiques, outils et techniques visant à assurer la sécurité des systèmes informatiques pendant leur développement et leur utilisation.
- Characterize the operation of systems and networks, as well as practices, tools and techniquest to ensure information security of computer systems during development and use.

Compétences transversales / Generic competences :

- Situer son rôle et sa mission au sein d'une organisation pour s'adapter et prendre des initiatives.
- Be able to positionne oneself within an organisation in order to adapt and be pro-active

- Identifier le processus de production, de diffusion et de valorisation des savoirs.
- Identify the process of knowledge production, dissemination and exploitation process

- Respecter les principes d'éthique, de déontologie et de responsabilité environnementale.
- Respect the ethic, deontology and environmental responsability principles

- Travailler en équipe autant qu'en autonomie et responsabilité au service d'un projet.
- Be able to work in autonomy, as well as in team to make a project successful

- Identifier et situer les champs professionnels potentiellement en relation avec les acquis de la mention ainsi que les parcours possibles pour y accéder.
- Identify the professional sectors according to the learning outcomes of the programme as well as the possible paths to access them

- Caractériser et valoriser son identité, ses compétences et son projet professionnel en fonction d'un contexte.
- Be able to highlight your identity, your skills and acquired competences when applying for a job

- Prendre du recul face à une situation
- Be able to step back

- Utiliser les outils numériques de référence et les règles de sécurité informatique pour acquérir, traiter, produire et diffuser de l'information ainsi que pour collaborer en interne et en externe.
- Use digital reference tools and computer security rules to acquire, process, produce and disseminate information and to collaborate internally and externally

- Identifier et sélectionner diverses ressources spécialisées pour documenter un sujet.
- Be able to use appropriate sources for documenting a given topic

- Analyser et synthétiser des données en vue de leur exploitation.
- Analyse and synthesize data for exploitation

- Développer une argumentation avec esprit critique.
- Develop arguments in a critical way

- Se servir aisément des différents registres d'expression écrite et orale de la langue française.
- Be able to write and speak easily in local language

- Comprendre au moins une langue étrangère et s'exprimer aisément à l'oral et à l'écrit dans cette langue
- Be fluent in at least one foreign language

Secteurs d'activité ou types d'emplois accessibles par le détenteur de ce diplôme, ce titre ou ce certificat

- **Sectors of activities or jobs the graduates can apply for**

- J : Information et communication / Information and communication

- M : Activités spécialisées, scientifiques et techniques / Scientific and technological activities

- N : Activités de services administratifs et de soutien / Administrative and support service activities

- Analyste, concepteur et développeur d'applications informatiques / Application analyst, designer and developer
- Consultant technique / Technical consultant
- Architecte de systèmes d'information / Information system architect
- Administrateur de bases de données / Database administrator

- Administrateur réseau et gestionnaire de parc informatique / Network administrator and IT manager
- Support technique hotline micro-informatique (matériel/logiciel) / Technical support in microcomputing (hardware/software)
- Technicien/technicienne en production et exploitation de systèmes d'information / Production and operation technician of information systems
- Analyste-programmeur/analyste-programmeuse informatique / IT analyst-programmer
- Testeur/testeuse informatique / IT tester
- Développeur/développeuse web / Web developer
- Assistant/assistante chef de projet / Assistant project manager
- Rédacteur technique / Technical writer

Par ailleurs, de nombreux concours de la fonction publique sont accessibles avec le grade de licence/ Graduates can also pass civil service examinations

Codes des fiches ROME les plus proches / Codes of occupational standards as according to the national employement classification:

- M1801 : Administration de systèmes d'information / Information system administration
- M1802 : Expertise et support en systèmes d'information / Expertise and support in information systems
- M1805 : Études et développement informatique / IT design and development
- M1810 : Production et exploitation de systèmes d'information / Information system production and operation
- I1401 : Maintenance informatique et bureautique / Computer and office maintenance

ORGANISATION ET CONTENU DE L'ENSEIGNEMENT

Organization and content of teaching

Basée sur une spécialisation progressive, la licence Informatique permet à l'étudiant des choix de cours libres et de mineures (interne et externe) variées.
Les étudiants sont invités à choisir entre la mineure interne et une mineure externe, toutes les disciplines de Paris 8 pouvant être choisies, notamment Mathématiques, Arts, Sciences Humaines et Sociales.

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Un autre parcours Micro-Informatique et Machines Embarquées (MIME) est possible en L3.

Another specialization pathway "Micro-informatics and on-board machines" is possible in the third year

Licence 1ère année : BA 1st year	
Semestre 1	**Semestre 2**

UE Informatique 1 (10 ECTS) - Méthodologie de la programmation - Programmation fonctionnelle **UE Mathématiques** (10 ECTS) - Introduction aux mathématiques générales - Introduction à la logique **UE Découverte d'un champ disciplinaire 1** (6 ECTS) - EC découverte - EC découverte ou EC de remédiation **UE Compétences transversales 1** (4 ECTS) - Préparation au C2i - EC découverte en STS au choix parmi ·Introduction à l'Histoire des sciences ·Pratique, installation et utilisation de machines	**UE Informatique 2** (18 ECTS) - Programmation Impérative - Programmation logique - Architecture des ordinateurs 1 **UE Découverte / Transversale** (6 ECTS) - Utilisation d'ordinateurs en réseau **UE Compétences transversales 2** (6 ECTS) - Langue vivante 1 - EC libre
1st semester	**2nd semester**
Unit Computer science (1) (10 ECTS) - Programming methodology- functional programming **Unit Math (10 ECTS)** - Introduction to general mathematical models - Introduction to logic **Unit discovery of a new field (6 ECTS)** **Unit generic competences (4 ECTS).** Choose among: - Use of digital tools - Introduction to history of science - Installation and use of computers	**Unit Computer science 2 (18 ECTS)** - Imperative programming language - Logic programming - Computers architecture (1) **Unit discovery / generic (6 ECTS)** - Use of networked computers **Unit generic competences (6 ECTS)** - Foreign language - Elective unit
Licence 2e année : BA 2nd year	
Semestre 3	**Semestre 4**
UE Informatique 3 (18 ECTS) - Algorithmique/Structures de données 1 - 2EC auchoixsur4 ·Systèmes d'exploitation ·Programmation impérative 2 ·Programmation objet ·Fondements de l'intelligence artificielle **UE Transversale 2** (6 ECTS) - EC libre 2 - Langue vivante 2	**UE Informatique 4** (15 ECTS) - Algorithmique/Structures de données 2 - 2ECauchoixsur4 · Réseaux ·Bases de données 1 ·Programmation graphique ·Architecture des ordinateurs 2 **UE Pré-professionnalisation** (9 ECTS) - Réalisation de programmes - Conférences - PEC/Licence pro - Préparation à la mobilité

<table>
<tr><td>UE Informatique approfondie 1

(6 ECTS)
- Programmation impérative 2 - Programmation objet</td><td>UE Mineure externe 1 Maths, Arts ou SHS (6 ECTS)</td><td>UE Informatique approfondie 2

(6 ECTS)
- Bases de données 1
- Programmation graphique</td><td>UE Mineure externe 2 Maths, Arts ou SHS (6 ECTS)

- Mineure 3 - Mineure 4</td></tr>
<tr><td colspan="2">Semestre 3 : 3rd semester</td><td colspan="2">Semestre 4 : 4th semester</td></tr>
<tr><td colspan="2">Unit Computer science 3 (18 ECTS)
- Algorithmics/structures of data 1

– 2 elective units out of 4:
- Operating systems
- Imperative programming
- Object programming
- Basics of artificial intelligence

Unit generic competences 2 (6 ECTS) – Foreign language 2</td><td colspan="2">Unit Computer science 4 (15 ECTS)
- Algorithmics/ structures of data

- 2 elective units out of 4 :
- Networks
- Data bases1
- Graphical programming
- Computers architecture 2
Unit generic competences (9 ECTS) – Implementation of programmes
- Lectures
- Competences portfolio /Vocational BA
- Training for mobility</td></tr>
<tr><td>Unit Sound IT 1 (6 ECTS)

- Imperative programming 2

- Object programming</td><td>Unit: external minor 1 :
Math, Arts or human science (6 ECTS)</td><td>Unit sound IT 2

(6 ECTS)
- Data bases 1
- Graphical programming</td><td>Unit External minor 2
Maths, Arts or Human Science (6 ECTS)</td></tr>
<tr><td colspan="4">Licence 3e année / BA 3rd year</td></tr>
<tr><td colspan="4">Cours au choix pour chacun des semestres / Elective courses for both semesters</td></tr>
<tr><td colspan="4">Thème : Technologies de l’image et des jeux
- Programmation de cartes graphiques - Intelligence artificielle
- Synthèse d'images
- Traitement du signal et des images
- Algorithmique combinatoire
Thème : Recherche et extraction d’information
- Ingénierie des langues
- Fouille de données
- Base de données 2
- Programmation pour l'intelligence artificielle
Thème : Sécurité et logiciel libre</td></tr>
</table>

- Compréhension de programmes
- Développement de logiciels libres - Droit et informatique
- Réseaux : modèles et applications

Thème : Programmation avancée

- Algorithmique avancée
- Interprétation et compilation
- Systèmes temps réel
- Machines parallèles
- Langages de programmation spécialisés

Topic : Picture and games technologies

- Graphics cards programming
- Artificial intelligence
- Synthesis of images
- Signal and image processing
- Combinatorial algorithms

Topic : Information search and retrieval system

- Languages engineering
- Data mining
- Data bases 2
- Programming for artificial intelligence

Topic : Security and open source software

- Program understanding
- Development of free software
- Law and IT
- Networks: models and applications

Topic : advance programming

- Advanced algorithms
- Interpretation and compilation
- Real time systems
- Parallel machines
- Specialized programming languages

<table>
<tr><th colspan="2">Semestre 5 /5th semester</th><th colspan="2">Semestre 6 / 6th semester</th></tr>
<tr><td colspan="2">UE Informatique 5 (16 ECTS) - 4ECde la liste

UE Transversale 3 (8 ECTS)
- Anglais technique
- Introduction à l’histoire de l'informatique</td><td colspan="2">UE informatique professionnalisée et professionnelle (16 ECTS)

4 cours au choix sur une liste

UE Stage (minimum 160 h.) (8 ECTS)</td></tr>
<tr><td>UE Informatique approfondie 3

(6 ECTS)
- Réalisation d’applications
- Réalisation d’applications :</td><td>UE Mineure externe 3 Maths, Arts ou SHS (6 ECTS)</td><td>UE Informatique approfondie 4

(6 ECTS)
- Réalisation d’applications
- Réalisation d’applications :</td><td>UE Mineure externe 4 Maths, Arts ou SHS (6 ECTS)</td></tr>
</table>

projet		projet	
Unit IT 5 (16 ECTS) 4 elective courses (list) **Unit generic competences 3 (8 ECTS)** - Technical English - Introduction to IT history		**Unit Specialized and professional IT** (16 ECTS) – 4 elective courses (list) **Unit Internship (minimum 160 hours)** (8 ECTS)	
Unit Sound IT 3 (6 ECTS) **Applied projects**	**Unit external Minor 3** **Math, Arts, Human Science (6 ECTS)**	**Unit Sound IT 4 (6 ECTS)** **Applied projects**	**Unit External Minor 4** **Math, Arts, or Human Science (6 ECTS)**

Licence 3 : parcours MIME / 3rd year / Pathway : Micro-informatics and on-board machines

Semestre 5 / 5th semester	**Semestre 6 / 6th semester**
UE Programmation avancée (6 ECTS) - Programmation objet multi-plateforme - Programmation et interfaces des systèmes Android **UE Base de données et réseaux mobiles** (12 ECTS) - Réseaux de capteurs sans fil - Développement iOS - Architectures des systèmes embarqués - Réseaux informatiques **UE Transversale : Conduite de projets professionnels** (6 ECTS) - Gestion de projets informatiques - Réalisation de projets 1 **UE Mineure 1 : Programmation fondamentale** (6 ECTS) - Programmation impérative classique - Programmation temps-réel et inter-systèmes	**UE Interfaces et vision numérique** (5 ECTS) - Interfaces et réseaux mobiles - Vision numérique et interaction **UE Connaissances fondamentales** (9 ECTS) - Anglais technique pour informaticien - Réalisation de projets 2 - Bases de données mobiles **UE Stage en entreprise** (10 ECTS) - Stage en entreprise (minimum 280h, soit 2 mois) **UE Mineure 2 : Architecture des systèmes interactifs** (6 ECTS) - Interfaces de dialogue Homme/Machine - Programmation des microcontrôleurs
Unit advanced programming (6ECTS) - Object cross-platform programs - Programming and Interface of Androïd systems **Unit data base and mobile network (12 ECTS)** - Wireless sensor networks - IOS development - Embedded systems architecture	**Unit Interface and digital vision (5 ECTS)** - Interface and mobile networks - Digital vision and interaction **Unit fundamental knowledge (9 ECTS)** - Technical English for IT - Projects implementation (2) - Mobile data bases **Unit Internship (10 ECTS)** - Internship in a company (280h. minimum , ie 2 months)

Unit generic competences (6 ECTS) - Professional project management - Projects implementation (1) **Unit Minor 1: Fundamental programming (6 ECTS)** - Classical imperative programming - Real time and intersystem programming	**Unit Minor 2 : Interactive systems architecture (6 ECTS)** - Man/machine dialogue - Microcontroller programming

MODALITES DE CONTROLE DES CONNAISSANCES knowledge assessment

Chaque cours donne lieu à l'attribution d'une note fondée sur le contrôle continu, la réalisation de projets, l'examen écrit ou oral, selon la nature de l'enseignement ; lorsque la note est supérieure ou égale à 10, les ECTS correspondant sont attribués à l'étudiant. À l'intérieur de chaque UE, la compensation s'applique avec calcul de moyenne pondérée. Tous les ECTS de l'UE sont crédités lorsque la moyenne obtenue est supérieure ou égale à 10.

A mark is given to each course, based on continuous monitoring, the implementation of projects, a written or oral exam, according to the subject. When the mark is 10 or more, the corresponding ECTS are awarded to the student. Within each unit, the final score is the average of the marks of the different components. The total ECTS are awarded when the average score is 10 or more.

ECHANGES INTERNATIONAUX : International mobility

Dans le cadre ERASMUS/SOCRATES, la Licence d'Informatique de l'Université Paris 8 propose des échanges avec des universités européennes :

In the Erasmus+ / Socrates framework, there are agreements with the following European universities:

- Universidad de Sevilla (Séville)
- Universitat Autònoma de Barcelona (Barcelone)
- University of Macedonia (Thessalonique)
- Humboldt Universität zu Berlin (Berlin)
- Tbilisi Ivane Javakhishvili State University (Tbilissi)

Annex 4

STUDY PROGRAMME DESCRIPTION.
BACHELOR STUDY PROGRAMME "COMPUTER SCIENCE"
Ventspils University College

Aim of the study programme:
To prepare highly qualified specialists in computer science with essential knowledge in fields of computer science, higher mathematics and basic knowledge of engineering that would allow to adjust to requirements of the labour market, as well as to prepare the students for higher level professional programmes, masters' studies, scientific work and further self-education.

Tasks of the study programme:

- Provide students with the necessary theoretical and practical knowledge in computer science;
- Teach students to independently learn, evaluate and use newest achievements of the computer science field;
- Develop scientific analytical skills, ability to solve problems, promote students' participation in scientific and practical problem solving;
- To motivate and promote students' needs for further education, as well as, motivate them to continue in both: professional and academic masters and doctoral studies;
- Ensure for study process to represent the current requirements of labour market and provide highly qualified academic staff;
- Ensure for study environment and conditions to promote creativity

Expected results of the study programme

Expected result – well prepared specialists in computer science with Natural Science Bachelors' degree in Computer Science and academic knowledge, skills and competences according to European Qualifications Framework (EQF) level six.

Knowledge:

- Able to demonstrate versatile real, theoretical and natural knowledge necessary for personal growth and development, civil participation, social integration and continuation of education
- Able to understand in detail and demonstrate various knowledge of real, principal, processual and conceptual knowledge in computer science field in ordinary and extraordinary situation;
- Has good knowledge of technologies and methods to complete academic or work tasks in the field;
- Has knowledge of basic legal aspects of the field;
- Understands technical standards and documentation.

Skills:

- Able to plan and organise work, use various methods, technologies, software development tools to complete tasks and solve problems;
- Able to find, evaluate and use information for completion of professional tasks and problem solving
- Able to communicate in at least two languages in spoken and written forms in professional field and outside;
- Able to independently work, learn and improve in order to adjust for requirements
- of the labour market;
- Able to cooperate with specialists of other fields;
- Able to strategically and analytically formulate and solve problems of computer
- science field;
- Able to project, program, inspect and analyse information systems;
- Able to work with professional software;
- Able to adapt to work safety, fire safety and environment safety regulations;
- Able to develop, realise and manage projects.

Competences:

- Student is motivated to create career, continue education, attend lifelong learning in democratic, knowledge oriented, multilinguistic and multicultural society in Europe and other world;
- Able to plan and perform academic or professional tasks independently, in team or as a manager of the team;
- Able to take responsibilities for quality and quantity of academic and professional work results;
- Able to work and perform duties according to quality standards, independently looking for and introducing innovations to improve current work and resources.

For a detailed curricula please look at http://svr.aic.lv/Forms/Accreditation.aspx?id=deeebb9f-58d3-4341-9b03-63cf731e0fca

STUDY PROGRAMME DESCRIPTION.
MASTER STUDY PROGRAMME "COMPUTER SCIENCE"
Ventspils University College

Aim of the study programme:
To prepare professionals in digital signal processing specializing in 1) digital processing of signals and images and 2) development of software and information systems, with deep knowledge of higher mathematics and basics of natural sciences and engineering; to prepare students for independet scientific research work as well as provide students with deaper knowledge of computer vision, enabling them to work in the perspective fields of the computer science

Tasks of the study programme:

- To provide students with necessary conditions and possibilities for acquiring skills for their scientific and professional work;
- To motivate and facilitate the students' satisfaction of the need for further education including the motivation to continue learning on the level of doctoral programmes;
- To develop the analytical, teaching and independent problem solving skills of the students, facilitate their participation in working on scientific problems.

Expected results of the study programme

Expected result – The expected result is a prepared specialist in computer sciences (in the *digital signal processing* subfield) with a master degree of natural sciences and knowledge, skills and competences corresponding to the level 7 of the European Qualifications Framework (EQF).

Knowledge:

- The student is able to show not only general knowledge of facts, theories and regularities but also deep or extended knowledge and understanding of the signal and image processing, computer science, higher mathematics and ICT fields, providing a basis for research work;
- Is able to single handedly use the theory, methods and problem solving skills for research work or performance of highly qualified professional functions in computer science field in standard and non-standard situations;
- Has knowledge of documentations and technical standards as well as the appropriate legal basics of the field.

Skills:

- Can independently define and critically analyze complicated scientific and professional issues;
- Can justify decisions and, if necessary, perform additional analysis;
- Can integrate the knowledge of different fields;
- Can contribute to creation of new knowledge and development of research or professional methods;
- Can demonstrate understanding and ethical responsibility for the influence of the professional activity on the environment and society;

- Can reasonably explain and debate about complicated or systemic aspects of the computer science with both professionals and non-professionals;
- Can work independently, further the improvement of one's competences and specialization in order to adjust for professional activity in inconsistent labour market conditions;
- Can cooperate with experts from other fields;
- Is capable of developing, implementing and managing projects;
- Is able to apply work and fire safety, as well as environmental protection regulations.

Competences:

- Is interested in further self development, career and continuation of education in a knowledge-oriented, democratic, multi-cultural and language society in Europe and the whole world;
- Is capable of and ready to perform tasks individually and in groups;
- Is capable of taking responsibility for own or group results and perform their analysis;
- Is capable of doing a job well and performing duties, continuously searching for and implementing innovations in order to improve research work or professional activity and resources.

For a detailed curricula please look at http://svr.aic.lv/Forms/Accreditation.aspx?id=deeebb9f-58d3-4341-9b03-63cf731e0fca