European Schools

Office of the Secretary-General
Pedagogical Development Unit

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ICTC Syllabus – S1 - S7

JOINT TEACHING COMMITTEE

Meeting on 13 and 14 February 2014 – Brussels

Proposal : Entry into force on 1 September 2014 for years S1-S3

The part of the syllabus for years S4-S7 is only presented for information.
Only the adoption for years S1-S3 is proposed.

Table of Contents

1. General Objectives of the European Schools

The European Schools have the two objectives of providing formal education and of encouraging pupils' personal development in a wider social and cultural context. Formal education involves the acquisition of competences – knowledge, skills and attitudes across a range of domains. Personal development takes place in a variety of spiritual, moral, social and cultural contexts. It involves an awareness of appropriate behaviour, an understanding of the environment in which pupils live, and a development of their individual identity.

These two objectives are nurtured in the context of an enhanced awareness of the richness of European culture. Awareness and experience of a shared European life should lead pupils towards a greater respect for the traditions of each individual country and region in Europe, while developing and preserving their own national identities.

The pupils of the European Schools are future citizens of Europe and the world. As such, they need a range of competences if they are to meet the challenges of a rapidly-changing world. In 2006 the European Council and European Parliament adopted a European Framework for Key Competences for Lifelong Learning. It identifies eight key competences which all individuals need for personal fulfilment and development, for active citizenship, for social inclusion and for employment:

1. communication in the mother tongue
2. communication in foreign languages
3. mathematical competence and basic competences in science and
1. technology
4. digital competence
5. learning to learn
6. social and civic competences
7. sense of initiative and entrepreneurship
8. cultural awareness and expression

The European Schools' syllabuses seek to develop all of these key competences in the pupils.

2. Introduction:

IT is possibly the fastest developing commodity in the last decades. Computers (in all shapes and sizes) and the Internet have acquired a very important role in most domains of our every day's life. In the same way, education is not imaginable anymore without a strong presence of IT tools and resources.

The European Schools ICT steering committee, throughout its latest ICT-plan, has proposed to create this working group in order to:

1. Update the secondary school ICT syllabus (2000-D-218) so as to integrate the very many developments in ICT in the last decade.
2. Establish a list of recommendations as how to integrate IT tools and resources in order to teach and learn in the most efficient way.

First of all, we strongly recommend reviewing the status of the subject within the European Schools curriculum in the light of the growing importance of ICT.
Before being presented to the Board of Governors this document needs to be approved by the Board of Inspectors at its next meeting.

3. Didactic principles

3.1. General principles

The secondary cycle of the European Schools needs to perform the dual task of providing formal, subject-based education and of encouraging pupils' personal development in a wider social and cultural context.

On one hand, formal education involves understanding concepts and processes. It aims at acquiring knowledge and skills in order to be able to apply what has been learnt within each subject area and across subjects.

On the other hand, pupils will learn to describe, analyse, interpret, have a critical view and apply their acquired knowledge and skills in a creative and original way in a wide range of social, scientific and cultural contexts.

Computer use involves questions of law, ethics and democracy, such as copyright, freedom of speech and freedom of information and people's right to privacy. For the future computer users will be required both a creative approach to computer technology for use and that awareness of legal and democratic aspects of the technology.

In a European School we aim at integrating both personal and academic aspects of education by developing the awareness of our pupils in what regards to their own local identity and to understand and treasure the richness of European cultures. This results in a constellation of behaviours and attitudes that demonstrate clear respect for the traditions of others while at the same time showing pride of their own identities.

3.2. Subject-specific principles

Since the world of ICT is changing so rapidly, one of the two main goals of this new syllabus are, on one hand, to provide the pupils with the basic knowledge and fundamental skills and, on the other hand, to empower them to become independent and autonomous learners. In this sense, pupils should acquire a range of skills that will allow them to continue learning by themselves.

- The pupils will be able to use the information and communication technologies as tools to research, select, process and distribute information.
- The pupils will be able to critically differentiate the varying quality and sources of information. They will learn to use information in a respectful way, quote and refer to sources.
- The pupils understand the fundamental functionality of hard- and software.
- The pupils will be able to develop skills in how to continue to learn and how to apply themselves with new tools in ICT for solving problems in general.

This syllabus aims to improve the teaching of ICT because it's a guideline through the topics of the important present technologies and it will give a vision of future developments.
To meet those aims it's important to update this syllabus regularly.

A very important issue of the ICT course is to provide the training students need to use new technologies in the daily school life which can't be included in other subjects!

4. Learning objectives

4.1. Year 1 and 2

In this two years the students have:

- to get to know and get comfortable with the computers and the schools ICT-environment

- to use the operating system and the applications as tools

- to work with files, folders and different storages

- to use the most common software types like word processing, spread sheet and presentation tools

- to use the internet as a source of knowledge and communication

- to get to know the ethics, risks and chances of modern technologies

4.2 Year 3

In S3 ICT is an <u>optional</u> course. The aim of this course is to add some abilities for students who want to know more about ICT. The students will get to know how to manipulate simple objects in computers. So they will learn the basics of web design and programming.

4.3 Year 4 and 5

In these two years the students will go deeper into the topics, which were taught in years 1-3 and will use more advanced features of applications. They will understand more and more the connections between those applications and how they can learn things by themselves using ICT.

Also there are some new topics like databases, and computer graphics. At this stage it is very important to make the students aware of things like data security and copyright, that they can take the right decisions when they use modern technologies in everyday life.

4.4 Year 6 and 7

In this cycle the students who choose ICT are willing to take compute science in University. So the aim is to go much deeper in detail and to understand the principles which lie behind all modern technologies. So one main topic is object oriented programming. In this cycle the teacher can choose between nine topics depending at the abilities of the students and the schools ICT infrastructure. So there are many options to make this course profitable for the students.

5. Program for year 1 and 2 (32 periods per year)

TOPIC (number of periods is only a guideline)	KNOWLEDGE & SKILLS	POSSIBLE PEDAGOGICAL APPROACHES
Getting started with the school ICT environment (2 periods)	**The student must be able to use:** • Devices • The school network • Login and password • Email address • Personal file storage	Show the different devices used in school (pc, tablet, printer, scanner, etc…) Explain the different part of the network (wifi, intranet, learning platforms)
Getting to know your operating system (2 periods)	**The student must be able to:** • use input devices • Open/close windows • Manage Files and folders • Find and open standard applications	
Internet (4 periods)	**The student must be able to:** • Use and compare different browsers • How to navigate and search • Be aware of ethics, risks and security • Understand what is social networking	Show difference between browsers Intelligent searching, organizing sources **Of course this needs to be integrated in every topic of the syllabus!!!**
Presentation tools (10 periods)	**The student must be able to:** • Open/close the tool	

	- Create the layout of a slide - Insert text - Insert graphical objects - Insert multimedia objects - Change animation and transition of slides - Prepare, rehearse and run a presentation	Timelines, key cards, hand-out's, practicing presentations, gestures and presence
Word processing (10 periods)	**The student must be able to:** - Open and close the tool - Create/Save and organise a document. - Use tables - Format text - Format sections - Insert graphical objects - Use dictionary and thesaurus - Format/Print pages	Only print out on paper when it´s really necessary!!! (Use print preview, page layout, print to PDF instead)
Spread sheets (6 periods)	**The student must be able to:** - Open and close the tool - Understand the terminology of spread sheets - Perform simple calculations	(cell, column, row, address, …)

	• Use simple functions • Format tables • Simple diagrams	
Multimedia (10 periods)	**The student must be able to:** • Edit pictures • Edit sound • Edit video	Common formats, picture viewing tools, working with editing tools, resizing tools … Common formats, sound playback tools, sound editing tools. Common formats, media players, video editing tools, etc…
Projects (10 periods)		To go deeper in the topics above and/or combine them. Cross-over projects with other subjects and/or language sections. Introductions to other topics (not mentioned above) ICT oriented school trips
Testing periods (8 periods)		Can be a test of a topic above or an evaluation of a project.

6.   Program for year 3 (64 periods)

TOPIC (number of periods is only a guideline)	KNOWLEDGE & SKILLS The student must be able to:	POSSIBLE PEDAGOGICAL APPROACHES
Introduction to web design (20 periods)	• Build a simple web site • Create a web site layout • Implement a menu structure • Insert content	Use drag and drop web design tools WYSIWYG editors Text, table, picture, link, video, etc…
Introduction to programming (20 periods)	**Use** • simple algorithms • sequences • simple structures	Game oriented programming environment Robotics
Projects (16 periods)		To go deeper in the topics above and/or combine them. Cross-over projects with other subjects and/or language sections. Introductions to other topics (not mentioned above) ICT oriented school trips
Testing periods (8 periods)		Can be a test of a topic above or an evaluation of a project.

7. Program for year 4 and 5 (64 periods per year)

TOPIC (number of periods is only a guideline)	KNOWLEDGE & SKILLS The student must be able to:	POSSIBLE PEDAGOGICAL APPROACHES
Spread sheets (20 periods)	• Use data types • Format the table • Use conditional formatting • protect cells • address cells • Use functions • combine functions • Use conditional functions • Visualise data • compare and interpret different types of diagrams • analyse the data shown in diagrams	Formatting cells, rows, columns, sheets, maps, pages relative and absolute addressing, addressing with names different function types, parameters, output of functions *IF*–function, counting functions
Word processing (8 periods)	**Use** • templates • tab stops • mail merge	Document templates, style templates
Introduction to	**Use**	

programming (16 periods)	• sequential instructions • different data types • variables • simple structures	Use visual tools which provides a playful introduction to programming Conditions, loops, arrays
Databases (20 periods)	• Create tables • Make queries • Use forms • Make reports • Import/export data	
Computer graphics (20 periods)	• Use graphical 2D software • Open and save pictures • Use different file formats • Manipulate pictures • Use selection tools • Use filters • Draw and manipulate objects • Use layers • Animate pictures • Use 3D-Visualization tools	compressed formats, raw formats red eye, lighting, resolution, colouring, effects free selection, cropping pictures e.g. blur, textures create, delete, change the order, merge and change properties e.g. animated gifs, flash create, move, rotate, select, merge objects adding textures and shapes
ICT and Society (6 periods)	**The student must:** • Be aware of data security	Data encryption

	• Be able to find the right sources of information • Be aware of copyright and alternative concepts • Understand social networks • Know about new developments in ICT • Be aware of chances and risks of modern technologies	Advanced use of search engines, Critically compare different sources, Copyleft, creative commons e.g. with students presentations
Web design (16 periods)	**The student must:** • Know the basic terms of the Internet • Use (an) editing tool(s) • Create websites • Organise the web content • Manage the layout of a website • Build a menu structure	URL, Server, DNS, Coding tools, WYSIWYG-Editors basics of HTML and CSS, text, pictures, links files and folders positioning of elements, fonts, font size, colours, columns, headlines, paragraphs
Projects (16 periods)		To go deeper in the topics above and/or combine them. Cross-over projects with other subjects and/or language sections. Introductions to other topics (not mentioned above) ICT oriented school trips
Testing (6 periods)		Can be a test of a topic above or an evaluation of a project.

8.   Program for year 6 and 7 (60 periods per year)

In this block the teacher has to choose at least 4 of the given topics and can define the level of detail of the knowledge and skills. Cross-topic-projects are of course possible and encouraged. All projects should be adapted to the different levels of the students.
According to the abilities of the students, the teacher can choose from the given knowledge and skills for each topic.

TOPIC (number of periods is only a guideline)	KNOWLEDGE & SKILLS	POSSIBLE PEDAGOGICAL APPROACHES
Principles of computer science	**The student must be able to understand:** • bits and bytes • propositional logic • von-Neumann-architecture • computability • algorithms • formal languages, syntax and semantics	the binary system, calculations and logical operations lambda calculus, Turing machine, finite state machine
Networks	**The student must know about:** • hardware of a network • topologies • protocols • network layers • different connection types • different operating systems • client-server-network vs. peer-to-peer-network • network security	switch, hub, router, NAS star, mesh, tree, ring, bus, line, fully connected IP, FTP, TCP ISO-OSI-Model RJ45, WLAN, Infrared, Bluetooth, mobile internet, etc… encryption, firewall, VLAN
Object oriented programming	**The student must:**	

	• Know different programming paradigms	Object oriented, functional, logical, procedural, event driven, multi paradigm languages
	• Use a programming environment	Visual, textual
	• Know and use data types	
	• Understand and use variables	Visibility of variables
	• Use basic structures	Loops, conditions, arrays
	• Use Nassi Shneiderman diagrams or other visualization tools	Flow charts, UML
	• Understand advanced concepts	Trees, classes, methods, inheritance, information hiding, recursion
	• Be able to implement and analyse algorithms	e.g. sorting algorithms
Advanced web design	**The student must be able to:**	
	• Build interactive web pages	e.g. with PHP and SQL...
	• Use content management systems	installing and setting up, adding content, managing users
	• Publish on the www	must be controlled by the teacher
	• Make web applications	e.g. with JavaScript...
Multimedia	**The student must do:**	
	• advanced multimedia projects	Posters, videos, audio stories, podcasts, 3D etc.
Advanced word processing	**The student must be able to insert:**	
	• Table of contents	Organise the content in large documents

	• List of figures • List of tables • Footnotes • Macros	
Advanced spreadsheets	**The student must be able to use:** • pivot tables • macros • advanced functions • form control • spread sheet for problem solving	List box, radio button, scrollbar, checkbox For example scientific, mathematics, economics and others …
Advanced database	**The student must be able to use:** • data types • relationships • data modelling • programming language to manage data	Entity-relationship-model e.g. with SQL, Visual FoxPro
Desktop publishing	**The student must be able to use:** • typography • fonts and font styles • justification • titles, subtitles, headlines • paragraphs • columns • pictures, graphics and diagrams	History of typography

	• marginalia • page layout • book design • golden ratio • projects	How to set elements on a page e.g. student newspaper

9. ICT in the European Schools.

a.   Primary School

There is currently no timetable set aside for computer science at the kindergarten and primary school.
However, many competences in the school directly or indirectly induce the use of ICT in classrooms.
It is therefore necessary to agree on some basic principles that will enable teachers to integrate ICT tools to their teaching methods and do so daily and multidisciplinary.

These principles will be addressed under the five following skills:
1 º - to be familiar with an IT work environment;
2 º - to create, produce, to deal with and use data;
3 º - to search and gather information;
4 º - to communicate and exchange;
5 º - to adopt a responsible attitude, to be aware of the dangers of the Internet.

b.   Secondary School

ICT is taught through vehicular languages or language of the host country.

ICT is a 1 period a week compulsory course in years 1 and 2.

In year 3 ICT becomes a 2 period optional course.

In the years 4 – 5 ICT is a 2-period optional course.

In the orientation cycle (years 6 and 7) we feel the need to create a new 4 period optional course alongside with the existing 2 period complementary course, to facilitate access to university studies with a relevant ICT component such as telecommunication, computer science, engineering,..
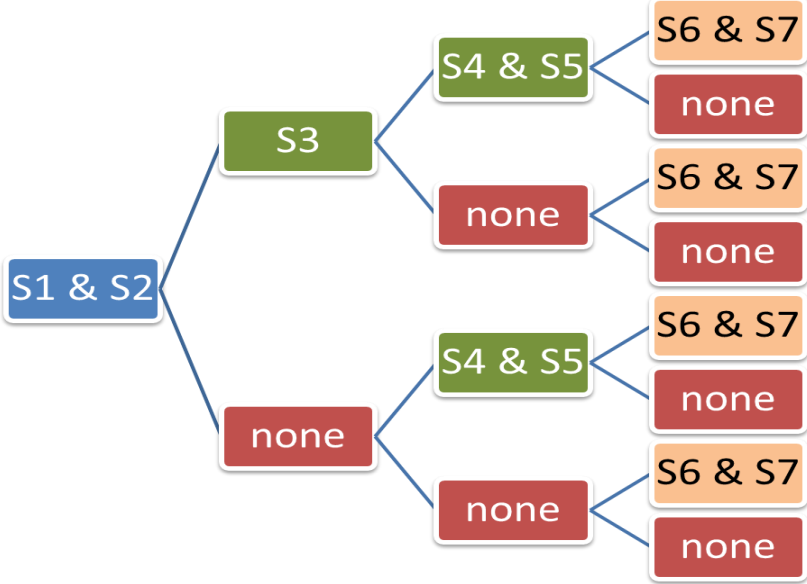
ICT becomes an optional course like the other 4 period courses and keeps the minimum number of periods the same and gives the students a wider range of options to choose from.

If a school has the infrastructure and the competences to organize a 4 period ICT course it has to be able to organize the exams for those 2 years.

10. Recommendations for an ICT lab

- 1 computer for every pupil
- 1 computer for the teacher
- Internet connection
- Beamer (with interactive board) and/or monitoring software.
- Each pupil should have a username, password, email account and storage space.