

Blueprint 1

Introduction to Full Stack Development



Extract of Digital Skills: New Professions, New Educational Methods, New Jobs

A study prepared for the European Commission
DG Communications Networks, Content & Technology
by:



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INTRODUCTION

Europeans face an everchanging world with increased digitisation requiring a greater need for digital skills. SMEs represent an important source of employment and are economic motors for the EU, yet they are often at a disadvantage to upskilling their employees and/or recruiting the skills most in demand today.

It is in this context that the European Commission commissioned a Pilot Project to develop and test a structured programme to enable SME employees and unemployed persons to acquire the digital skills that are required in the modern work place. To represent diversity within the European Union, two very different European regions, the Region of Murcia in Spain and Lithuania were selected as test beds for the pilot programmes on Digital Skills.

The work undertaken has been fundamentally empirical in nature, drawing inputs from a wide range of stakeholders, including SMEs and organisations working with the unemployed. The resulting insights fed into this set of Digital Skills Blueprints. The Blueprints have been developed as aids to support not just planning, but also the implementation of digital skills centred initiatives that are oriented towards those who do not currently have ready access to the means to acquire the digital skills necessary to compete in an increasing digital economy.

This Blueprint, Blueprint 1 – Introduction to Full Stack Development, provides guidance on the content, structure and resources, required and is aimed at providing participants interested in programming with essential basic technical knowledge, enabling them to gain a rounded view of IT based projects.

WHAT IS FULL STACK DEVELOPMENT

This Full Stack course is designed for entry level participants who are interested in developing a broader understanding and knowledge of two commonly used website development concepts to deliver a visually attractive web solution that includes functional back end features.

The course is also designed as an entry for ICT career, as it helps participants to understand concepts and find a specialisation that suits them.

1.1 TARGET AUDIENCE

This course is most suitable for beginners in programming, laying down technical knowledge and better understanding of IT based projects and ecosystem itself. This course is suitable both for SME employees and unemployed people, including recent graduates or students still in training.

SME MANAGERS	EMPLOYEES
	
SELF-EMPLOYED	UNEMPLOYED
	

1.2 COMMITMENT REQUIRED

TOTAL PARTICIPANT WORKLOAD	FACE-TO-FACE CLASSES, LABS & WORKSHOPS
220 HOURS	75
WEBINARS	PERSONAL ASSIGNMENT
0	145

1.3 REQUIRED SKILLS ON ENTRY

The following skills are required for entry onto the course:

- Basic computer literacy
- User-level of English

Previous programming language experience is a bonus.

SYLLABUS

1.4 PROJECT BASED LEARNING

Learning activities revolve around a short project, which is the backbone of the training programme. The project consists of designing and implementing a website, starting from its conception, which gives participants the opportunity to delve into the front-end and back-end elements.

1.5 LEARNING OUTCOMES

- General view about the future of digital jobs, technology trends and skills required for progressive career development.
- Basic knowledge about front-end, its main features and role in web development process:
 - Understanding and applying principles of Visual Design.
 - Adding dynamic graphics to a web page using Canvas.
 - Creating a valid HTML document and using CSS to format the appearance of an HTML document.
 - Using the Document Object Model (DOM) to access the HTML elements on the page dynamically.
 - Using JavaScript objects effectively, including the window object and the navigator object.
 - Debugging JavaScript code and best practices.
- Knowledge about PHP back-end structure and role in developing back-end solutions:
 - Understand all standardized PHP programming concepts and structures.
 - Understand and build well designed databases.
 - Connect to MySQL database and perform Error Checking.
 - Use PHP to Interact with a MySQL database, web hosting & domains.
 - Use tools to create and effectively manage web pages and related databases.
 - Understand advanced PHP topics and apply the knowledge to complete task.

1.6 CORE SKILLS DEVELOPED

- HTML
- CSS
- JavaScript
- MySQL
- PHP

1.7 SUMMARY OF CONTENT

The following table provides a broad overview of the course and the methodology applied to each of the elements.

CONTENT MODULE	METHODOLOGY AND FACE-TO-FACE ACTIVITIES
1. Introduction to the course <ul style="list-style-type: none"> • Future digital skill and global trend review • Introduction to HTML and CSS • Web hosting and domains • Growth hacking 	38 hours - Face-to-face classroom 2 hours – Project presentation 60 hours - Personal work: reading materials, tutorials, videos, etc.
2. Back-end intro to PHP <ul style="list-style-type: none"> • Introduction to PHP syntax • Arrays, loops, key values, databases • PHP to MySQL database • PHP security and the web 	25 hours - Face-to-face class on facilities 40 hours - Personal work: reading materials, tutorials, videos, etc.
3. Further topics in PHP <ul style="list-style-type: none"> • Manipulating data • Registration (auth0) 	30 hours - Face-to-face classroom 25 hours - Personal work: reading materials, tutorials, videos, etc.

For the purpose of simplifying the content and avoiding unnecessary repetitions, following terms and abbreviations are used in the Implementation section:

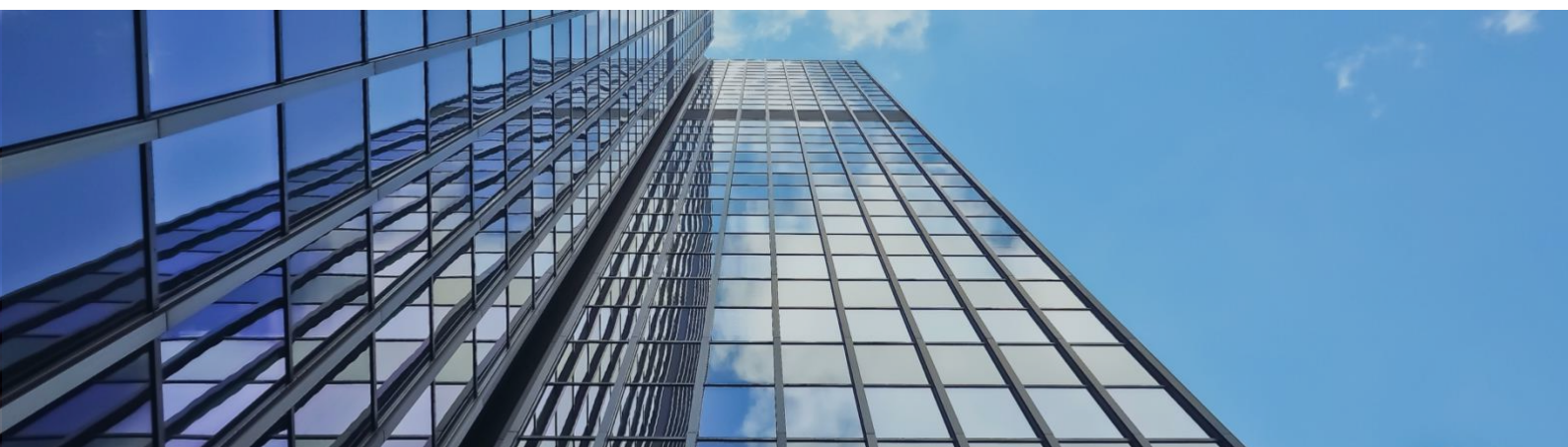
ABBREVIATION	TERM
TR/H	Trainee hours
INS/H	Instructor hours
V	Venue
TP	Training platform
WS	Work station(s)

IMPLEMENTATION

The following tables provide the adjusted framework for the implementation digital skills training in this topic. The content can be adapted to that available to the particular provider, the structure will enable policy makers and other stakeholders to plan and resource digital training initiatives. The total number of trainer hours required is 300.

Week 1. Presentation of core content, team formation and kick off

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction into the course. Future digital skill and global job trend review Introduction to current and near-future impact of blockchain, artificial intelligence, data footprint management, growth hacking and creative work approach Short review of tools we are going to explore	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	8	8
Projects presentation and projects kick-off	V: Classroom with projector and screen TP: documents, presentation, and links	Online Face-to-face	2	2
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc.	TP: documents, presentations and links	Independent work	15	N/A
Content, preparation and marking, etc.			N/A	14
			25	24



Week 2. Introduction to front-end

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to front-end development, HTML and CSS	V: Classroom with projector and screen TP: documents, presentations, and links. WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	19
			25	34

Week 3. Developing and managing a website

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Web Hosting & Domains. WordPress websites (may be another CRM) Personal project presentation (research, goals, milestones)	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	19
			25	34

Week 4. Introduction to Java

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to JavaScript variables, data types (arrays, objects, strings, numbers), function structure DOM (events, properties) Presentation of a functional pilot website	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links.	Independent work	15	N/A

Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	20
			25	35

Week 5. The back-end

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Intro to PHP Syntax (tags, echo, comments) Web Hosting & Domains Introduction to MySQL Databases	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	5	5
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	20	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			25	22

Week 6. SQL and CRUD

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
SQL Injection - How to prevent it Password encryption CRUD (Create, Read, Update, Delete) Introduction to HTTP Requests and more	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	5	5
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	20	0
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			25	22

Week 7. Sessions

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Sessions Storing information during session About Cookies in PHP (Setting & Reading Cookies)	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	9	9
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	N/A	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	15
			9	29

Week 8. Further back-end topics

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Using MySQL workbench to create database schemes Registration possibilities (auth0, OAuth2) Using Facebook and similar services for registering	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	8	8
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	16
			8	29

Week 9. APIs and junctions

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
APIs and their uses Json tokens and jsonencode, modern usage of data (CORS) between servers Junctioning front-end and back-end with json	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	8	8
Mentoring and online support.	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	13
			8	26

Week 10. Digital Marketing, social networks

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Project development	TP: documents, presentations, and links	Personal work	25	N/A
Final assessment Personal work of teachers	Review works and reporting teams		N/A	25
Content, preparation and marking, etc.			N/A	20
			25	45

ASSESSMENT OF PROGRESS

The guidelines for assessing progress are as follows:

	TOPICS	INDIVIDUAL WORK	ASSESSMENT
Week 1	Introduction of future skills and global trends	Group project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 2-4	Front-end web development, and webpage administration		
Week 5-7	Back-end introduction to PHP	Group project Individual project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 8-9	Further topics in PHP	Individual project	Online face-to-face webinars Online tutoring (aid and assessment)
Week 10	Final project	Presentation	Intensive workshop for final achievements and assessments. It complements face-to-face work.

TEACHING RESOURCES REQUIRED

For this course, trainers preferably should be middle or senior level developers, who are selected based on the following criteria:

- Level of experience working on a variety of projects in their respected fields of expertise;
- Theoretical knowledge, their ability to clearly communicate it and any relevant experience teaching;
- Core trainers
 - Front-end developer
 - Server back-end developer
- External expertise
 - Guest speakers: Full Stack developer, web hosting engineer, Big Data analyst

OTHER RESOURCES

- Digital literacy examination and assessment platform such as Codility or coding games
- PHP storm license
- Adobe photoshop and illustrator
- Local host server (XAMPP)
- Premium online tool subscriptions e.g. STREAK, SimilarWeb, Calendly, etc.
- Lab with 25 work stations for students and projectors or large screens
- LMS platform