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Dissemination level	<input type="checkbox"/> Department / <input type="checkbox"/> Local <input type="checkbox"/> National <input type="checkbox"/> Faculty <input type="checkbox"/> Regional <input checked="" type="checkbox"/> International <input type="checkbox"/> Institution	
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1	14.3.2018	A. Tonello	UNI-KLU	Super draft
2	31.3.2020	S. Rimac- Drlje, Z. Krpić	FERIT	First version
3	27.4.2020	D. Righini	UNI-KLU	Second version
4	14.1.2020	E.Schneider	UNI-KLU	Final corrections

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1 Introduction

This deliverable “Web portal linking ICT study programs of both EU and WB universities and enrollment procedures” reports the development of the web portal linking ICT study programmes and enrolment procedures of both EU and WB HEI partners.

2 Objectives of the Deliverable

The objective of this deliverable are:

- The creation of Web portal linking ICT study programs of both EU and WB universities and enrollment procedures.
- The description of the aforementioned web portal.

3 Description of the Web Portal

Within the defined BENEFIT framework aimed at boosting University-Enterprise cooperation and modernization of telecommunications engineering in the WB region and wider, FERIT coordinates tasks related to design of the Central web platform and the Study programmes web portal. The tasks related to the implementation of the web portal linking modernized ICT study programmes, as well as its connection to the Central project web platform presented in Fig. 1, are conducted by FERIT.

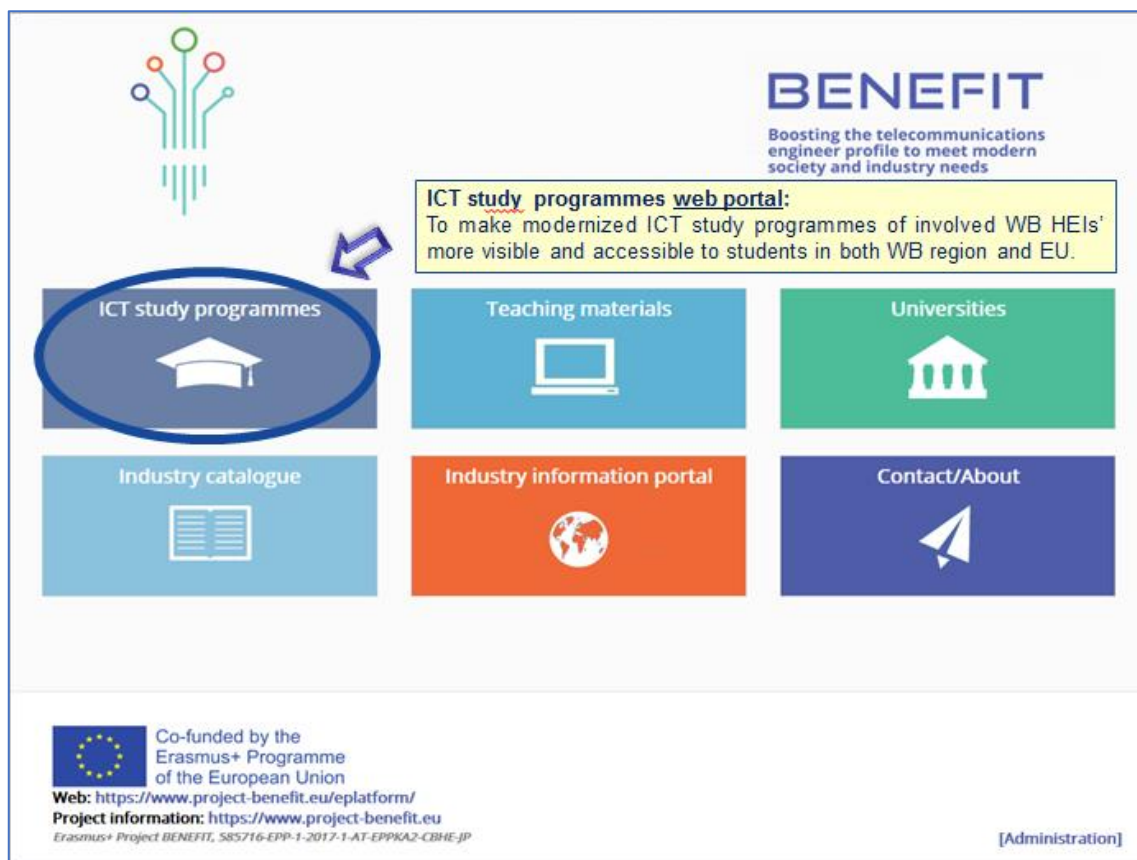


Figure 1. The link to the ICT study programmes web portal

The web platform is designed to link and promote telecommunications engineering study programmes of the 1st and 2nd cycle.

The linked courses are classified in the two groups:

- enhanced courses;
- novel courses.

The content uploaded on the web portal is based on the activities of WP2 and WP3 of the BENEFIT project. In detail, the content of the web portal was developed following these procedures:

- identification of modified classes in each HEI study program
- identification of new classes in each HEI study program
- estimation of necessary storage space for class content and teaching material

Fig. 2 shows the basic structure of the ICT Study programmes web portal. The content of the web portal is continuously updated with the modernized courses developed by the WB HEIs partners.

The ICT Study programmes web portal is designed with a space dedicated for each partner University. The web space is designed to advertise the study programmes and courses in the domain of telecommunications engineering.

Each partner University defined a responsible group of persons allowed to edit the profile information of the institution as well as all related and linkable content.

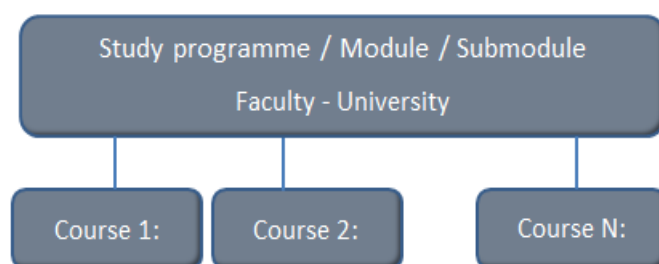


Figure 2. *The structure of the ICT Study programmes web portal*

Fig. 3 and Fig. 4 show respectively the list of study programmes and a list of courses currently available in the web platform.



BENEFIT

Boosting the telecommunications engineer profile to meet modern society and industry needs

[ICT study programmes](#)[Teaching materials](#)[Universities](#)[Industry catalogue](#)[Industry information portal](#)[About](#)

All BSc programmes

BSc - Electrical Engineering and Computer Engineering - module Telecommunications and Information Technology, submodules Audio and Video Communications, Microwave Engineering, Radio Communications and System Engineering
School of Electrical Engineering - University of Belgrade

BSc - Electronics and Telecommunications
Faculty of Electrical Engineering - University of Banja Luka

BSc - Electrical engineering and computing (Telecommunications) - Radiocommunication Technology and Design
Faculty of Electronic Engineering - University of Nis

BSc - Electrical engineering and computing (Telecommunications) - Telecommunications and Signal Processing
Faculty of Electronic Engineering - University of Nis

BSc - Power, Electronic and Telecommunication Engineering - Information and Communication Technology and Signal Processing
Faculty of Technical Sciences - University of Novi Sad

BSc - Telecommunications
Faculty of Electrical Engineering - University of Sarajevo

BSc - Electrical and Computer Engineering - Telecommunications
Faculty of Electrical Engineering - University of Tuzla

BSc - Bachelor study programme in Information technology
Faculty of Technical Sciences - University of Klagenfurt

BSc - Undergraduate study programme in Electrical Engineering; Branch: Information and Communication Technologies
Faculty for the Electrical Engineering - University of Ljubljana

BSc - Undergraduate study programme in Electrical Engineering; Branch: Communications and Informatics
Faculty of Electrical Engineering, Computer Science and Information Technology - University of Osijek

All MSc programmes

MSc - Electrical Engineering and Computer Engineering - System Engineering and Radio Communications
School of Electrical Engineering - University of Belgrade

MSc - Master academic studies Telecommunications - Radiocommunication Engineering and Technologies
Faculty of Electronic Engineering - University of Nis

MSc - Master academic studies Telecommunications - Telecommunications and Signal Processing
Faculty of Electronic Engineering - University of Nis

MSc - Power, Electronic and Telecommunication Engineering - Information and Communication Technology
Faculty of Technical Sciences - University of Novi Sad

MSc - Telecommunications
Faculty of Electrical Engineering - University of Sarajevo

MSc - Electrical and Computer Engineering - Telecommunications
Faculty of Electrical Engineering - University of Tuzla

MSc - Master study programme in Information and Communication Engineering
Faculty of Technical Sciences - University of Klagenfurt

MSc - Graduate study programme in Electrical Engineering; Branch: Information and Communication Technologies
Faculty for the Electrical Engineering - University of Ljubljana

MSc - Graduate study programme in Communications and Informatics; Elective block: Network Technologies
Faculty of Electrical Engineering, Computer Science and Information Technology - University of Osijek

MSc - Graduate study programme in Communications and Informatics; Elective block: Communication Technologies
Faculty of Electrical Engineering, Computer Science and Information Technology - University of Osijek



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Web: <https://www.project-benefit.eu/eplatform/>

Project information: <https://www.project-benefit.eu>

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[Administration]

Figure 3. The list of the modernized ICT study programmes



Figure 4. The list of the modernized courses

The web platform is created using applied web programming solutions. A web database is established to organize the ICT study programmes. The structure of the study programmes database is shown below.

The first level of the database contains the 'Universities' entry table, with the following classes:

- Unique id + short identifier (primary key, integer)
- Contact info (text)
- Description (text) – fixed number of characters
- Contact Name (string)
- Contact person e-mail (short string) – alias for username for login entry*
- Initial password (encrypted string, will be replaced with actual password)
- Actual password (encrypted string)
- Logo image placeholder (url string or actual image upload of the logo)

The second level contains the 'Faculty' entry table:

- Unique id + short identifier (primary key, integer)
- Contact info (text)
- Description (text) – a limited number of characters
- Contact Name (string)
- Contact person e-mail (short string) – alias for username for login entry*
- Initial password (encrypted string, will be replaced with actual password)
- Actual password (encrypted string)
- Logo image placeholder (url string or actual image upload of the logo)

The third level contains the 'Study programme/Module / Submodule' information:

- Unique id (integer)

- University identifier (linked to the first entry of university table, integer)
- Title of the study programme (text)
- Year of the study programme (date)
- Textual description of the study programme (text) – alimited max. number of characters

The fourth level contains the 'Course' information (each study programme is related to a number of courses):

- Unique id (integer)
- Study programme identifier (linked to the first entry of the second table, integer)
- Title of the course (text)
- Description of the course (text)
- Enrollment information (text)

The fifth level contains the 'Repository' information:

- Unique id (integer)
- Relation to the course (the first entry of the third table, integer)
- Title (text)
- Description (text)

The sixth level contains the 'File' information:

- Unique id (integer)
- Relation to repository entry (the first entry in the fourth table)
- Type of file (document type or audio type, short text)
- Title (text)
- Description (optional entry, text)

Fig. 5 shows the relation between tables using MySQL.

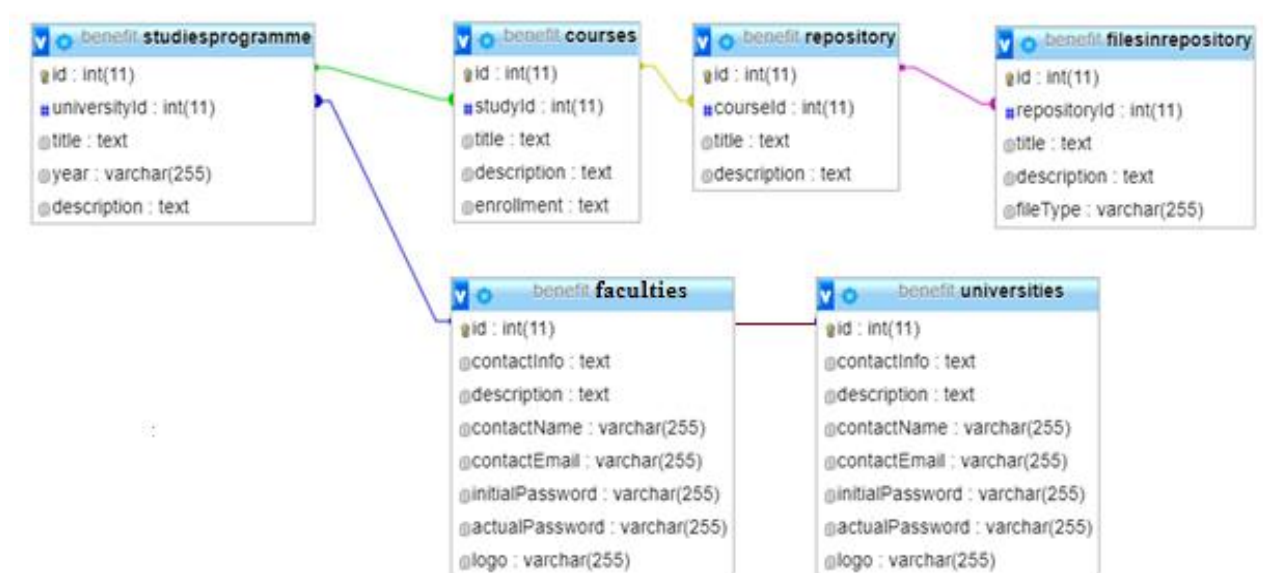


Figure 5. The structure of the relation table

The programming techniques used for creating the web platform are described in more detail hereafter.

4 Programming techniques used for creating the web platform of the Study programmes web portal

The programming techniques used for creating the web platform consist of separate functional and logically distributed programming files that combine the needs of primary functionality and relations to the database tables. The chosen programming language is PHP (Hypertext Preprocessor).

The Web platform was planned and developed specifically for the needs of the BENEFIT project. The programmes are divided in bachelor (BSc) and master (MSc) programmes and are separated by the group identifier in the same database table. Specific study programmes and courses can be protected with password. A procedure to define the administrative rights to this content was conceived. For each level of administration rights, an individual programming file handles the functionality of editing, adding and deleting content on the study programmes portal.

The administration of the content can be assigned to more than one person. For this purpose, a part of the portal is handling the accounts of trusted contacts for each university and institution.

The master user, currently owned by FERIT (developer of the web portal), is the only user able to create accounts with institution administration rights.

The administrators can consecutively give rights to specific parts of the web portal to other colleagues.

The administrators can:

- Edit the information about the university
- Edit the information about their institution that is related to the university
- Define and edit study courses
- Add, modify and structure study courses
- Add and edit teachers to any course that belongs to their university
- Modify teaching material of all courses that belongs to their institution

Fig. 6 shows the administration of courses for defining teachers.

Figure 6. Example of the adding and editing teachers for one course

The login process requires Username and password. The Username is defined by the administrator that creates the new account. While, new accounts receive a randomly generated password that must be changed after the first log in.

Fig. 7 shows the example of the login procedure of a new administrator (institutional or teaching). While, Fig. 8 shows the procedure of defining a new administrative password with rules that secure the length and strength of the newly chosen password.

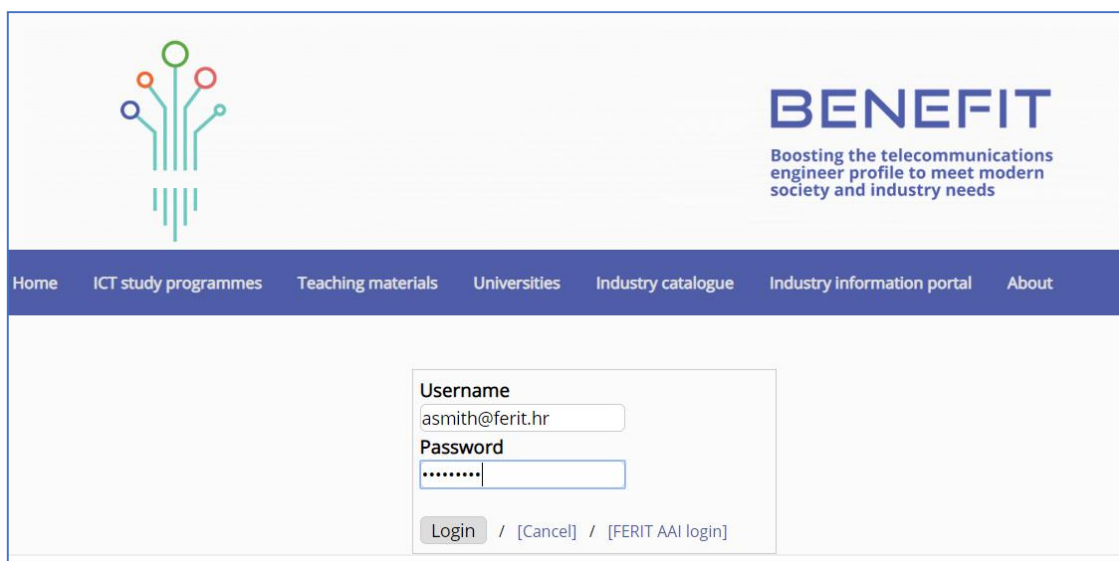


Figure 7. Example of logging into the administration

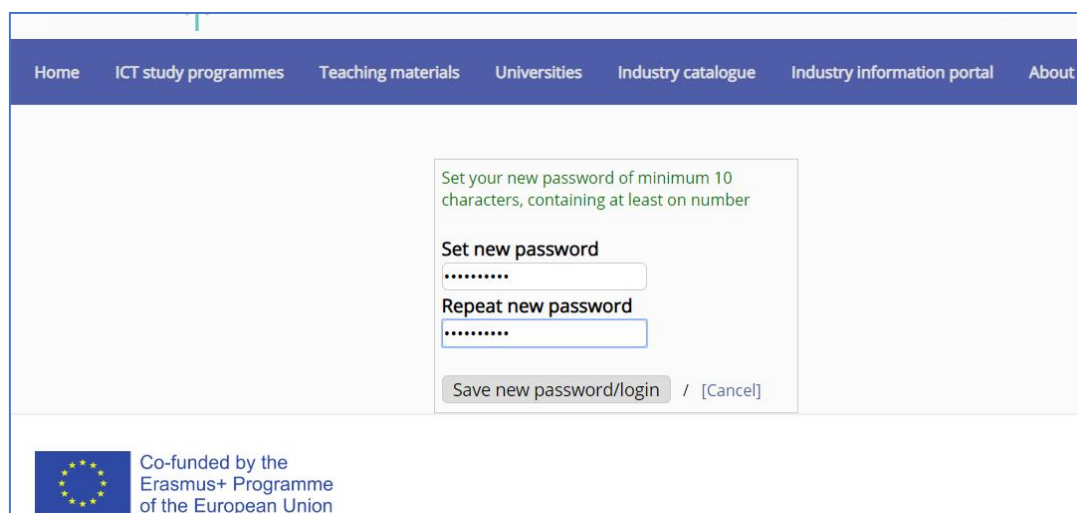


Figure 8. Example of creation individual logging password

Each study programme description and institution information can be edited with a rich-text editor, where text, images, tables and links, can be included. The rich-text editor uses a free online editor, programmed in JavaScript. The content edited with this tool is stored in the database.

Each content is freely open to style and structure at any given needs with no structural limitations. Fig. 9 shows the content of a study programme of FERIT.

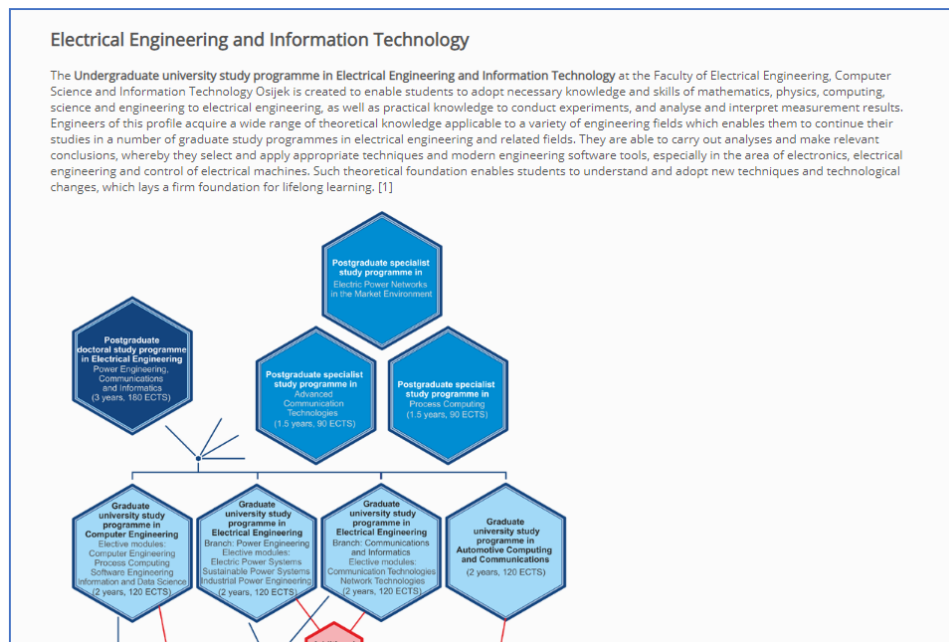


Figure 9. Example of rich text describing study programme

The same rich-text editor is used for updating the information of the universities.

The relations between database tables are managed by programming scripts. In principle every partner university can customize its own script, with specific format of study programmes, courses and teaching material.

The account creation and usage rights are managed by three programming scripts: institutional accounts, teacher accounts and company account.

The following files specify the procedures described in this section:

- accounts.php
- courses.php
- docs.php
- docs_load.php
- docs_upload.php
- functions.php
- html.php
- index.php
- institution.php
- login.php
- materials.php
- teachers.php
- universities.php

The file names are assigned based on the programming functions contained. The inclusion of all files is collected in index.php. The inclusion of some files requires specific administrative rights, such as docs_upload.php or teachers.php that requires institution administrator rights. The institution accounts can be edited through the file accounts.php only by the super user.

Fig. 10 shows an example of the script which is displaying teaching materials separated by BSc and MSc grade.

```

echo "<div class='tekst'>";

$SQL=("select *,benefit_courses.name,benefit_upload.id as uid,
benefit_programmes.name as programname, benefit_schools.name as schoolname, benefit_uni.name as uniname
from benefit_upload
left join benefit_courses on benefit_upload.course=benefit_courses.id
left join benefit_programmes on benefit_courses.idprogramme=benefit_programmes.id
left join benefit_schools on benefit_programmes.idschool=benefit_schools.id
left join benefit_uni on benefit_schools.iduni=benefit_uni.id
order by benefit_upload.id desc");

$Grades=array('BSc'=>'left','MSc'=>'right');

foreach($Grades as $G=>$class){
echo "<div class='$class' style='width:43%;$left'>";
echo "<h2>Teaching materials ($G) <br /><br /></h2>";
$MatSQL=@mysqli_query($conn,$SQL);
while($Mat=@mysqli_fetch_array($MatSQL))
{ if($Mat["grade"]=="$G")
echo "<a href='?courses=$Mat[course]&entry=$Mat[uid]#view' name='m$Mat[uid]#>$Mat[name] - $Mat[naslov]
<i>$Mat[schoolname] - $Mat[uniname]</i></a>"; }
echo "</div>";
}

echo "</div>";

?>

```

Figure 10. Example of programming script (list of course materials)