

## Web Applications I – Exam # 1 (deadline 2022-06-22 at 23:59)

# “StudyPlan”

FINAL VERSION - edits are in red.

Design and implement a web application to manage the study plan of a university student.

The application must satisfy the following requirements.

The university offers a series of courses. Each course is characterized by a unique 7-characters code, a name, and the (integer) number of credits.

A student's study plan is a subset of the courses offered by the university. The total number of credits of the courses inserted in the study plan can range from 60 to 80 credits (extremes included) for the full-time option, or from 20 to 40 credits (extremes included) for the part-time option.

A course can have one or more constraints for its insertion in the study plan:

- A course can be *incompatible* with one or more courses. They cannot be selected together.
- A course can have one mandatory *preparatory* course, which must be already present in the study plan.
- A course can have a maximum number of *students* able to add it into the study plan.

In the homepage of the application, unauthenticated (**anonymous**) users see all the courses that the university offers. This list of courses must be displayed in alphabetical order (by course name). For each course, the list shows its description: the code, the name, the number of credits, the number of students that already chose the course and, if present, the maximum number of students that can select it. Each course description may be expanded/contracted by the user, to show any incompatible and/or preparatory courses (**display at least their code**). Many courses may be in the expanded state at the same time.

Once logged in (logged-in home page), users **continue to see** the same **full** course list. In this page, if no study plan has been created yet, the user may create an empty one, by specifying the full-time or part-time option; this empty list can be edited according to the following instructions. If a study plan has already been created and persistently saved, it is immediately displayed (in the same page) and can be edited as below.

The editing of the displayed study plan allow the following operations:

- Always display the number of credits corresponding to the courses in the study plan, and the minimum-maximum allowed values.
- Add a course from the full list to the study plan. Only courses that satisfy all constraints can be added.
- Remove a course from the study plan, if it does not violate any “preparatory” constraint (otherwise, the application should display the reason).

- If a course cannot be added, it will be marked differently in the full list, and the application should display the reason.

During the editing session, the user may “Save” the study plan in a persistent way (this will replace any possible previous version). The user may “Cancel” the current modifications, and in this case the persistent copy (if any) must not be modified.

When saving, the study plan must be validated according to the min-max number of credits.

Additionally, the user may “Delete” the entire study plan, including the persistent copy.

After each of these actions, the application will **be in** the logged-in home page.

### Project requirements

- The application architecture and source code must be developed by adopting the best practices in software development, in particular those relevant to single-page applications (SPA) using React and HTTP APIs.
- The project must be implemented as a React application that interacts with an HTTP API implemented in Node+Express. The database must be stored in a SQLite file.
- The communication between client and server must follow the “two servers” pattern, by properly configuring CORS, and React must run in “development” mode.
- The root directory of the project must contain a README.md file, and have two subdirectories (client and server). The project must be started by running the two commands: “cd server; nodemon index.js” and “cd client; npm start”. A template for the project directories is already available in the exam repository. You may assume that nodemon is globally installed.
- The whole project must be submitted on GitHub, on the same repository created by GitHub Classroom.
- The project **must not include** the node\_modules directories. They will be re-created by running the “npm install” command, right after “git clone”.
- The project may use popular and commonly adopted libraries (for example day.js, react-bootstrap, etc.), if applicable and useful. Such libraries must be correctly declared in the package.json file, so that the npm install command might install them.
- User authentication (login) and API access must be implemented with passport.js and session cookies. No further protection mechanism is required. The user registration procedure is not requested.

### Database requirements

- The project database must be implemented by the student, and must be pre-loaded with *at least five* students, at least one **with a part-time study plan**, at least one **with a full-time study plan**. At least two courses should have reached the maximum number of enrolled students.
- The database must include, at least, the following courses:

| Code    | Name  | Credits | Max students | Incompatible with  | Preparatory course |
|---------|---|---------|--------------|--------------------|--------------------|
| 02GOLOV | Architetture dei sistemi di elaborazione      | 12      |              | 02LSEOV            |                    |
| 02LSEOV | Computer architectures                        | 12      |              | 02GOLOV            |                    |
| 01SQJOV | Data Science and Database Technology          | 8       |              | 01SQMOV<br>01SQLOV |                    |
| 01SQMOV | Data Science e Tecnologie per le Basi di Dati | 8       |              | 01SQJOV<br>01SQLOV |                    |
| 01SQLOV | Database systems                              | 8       |              | 01SQJOV<br>01SQMOV |                    |
| 01OTWOV | Computer network technologies and services    | 6       | 3            | 02KPNOV            |                    |
| 02KPNOV | Tecnologie e servizi di rete                  | 6       | 3            | 01OTWOV            |                    |
| 01TYMOV | Information systems security services         | 12      |              | 01UDUOV            |                    |
| 01UDUOV | Sicurezza dei sistemi informativi             | 12      |              | 01TYMOV            |                    |
| 05BIDOV | Ingegneria del software                       | 6       |              | 04GSPOV            | 02GOLOV            |
| 04GSPOV | Software engineering                          | 6       |              | 05BIDOV            | 02LSEOV            |
| 01UDFOV | Applicazioni Web I                            | 6       |              | 01TXYOV            |                    |
| 01TXYOV | Web Applications I                            | 6       | 3            | 01UDFOV            |                    |
| 01TXSOV | Web Applications II                           | 6       |              |                    | 01TXYOV            |
| 02GRSOV | Programmazione di sistema                     | 6       |              | 01NYHOV            |                    |
| 01NYHOV | System and device programming                 | 6       | 3            | 02GRSOV            |                    |
| 01SQOOV | Reti Locali e Data Center                     | 6       |              |                    |                    |
| 01TYDOV | Software networking                           | 7       |              |                    |                    |
| 03UEWOV | Challenge                                     | 5       |              |                    |                    |
| 01URROV | Computational intelligence                    | 6       |              |                    |                    |
| 01OUZPD | Model based software design                   | 4       |              |                    |                    |
| 01URSPD | Internet Video Streaming                      | 6       | 2            |                    |                    |

## Contents of the README.md file

The README.md file must contain the following information (a template is available in the project repository). Generally, each information should take no more than 1-2 lines.

1. Server-side:
  - a. A list of the HTTP APIs offered by the server, with a short description of the parameters and o the exchanged objects
  - b. A list of the database tables, with their purpose
2. Client-side:
  - a. A list of 'routes' for the React application, with a short description of the purpose of each route
  - b. A list of the main React components
3. Overall:
  - a. A screenshot of the **logged-in home page during an editing session**. This screenshot must be embedded in the README by linking an image committed in the repository.
  - b. Username and password of the defined users.

## Submission procedure

To correctly submit the project, you must:

- **Be enrolled** in the exam call.
- **Accept the invitation** on GitHub Classroom, and correctly **associate** your GitHub username with your student ID.
- **Push the project** in the **main branch** of the repository created for you by GitHub Classroom. The last commit (the one you wish to be evaluated) must be **tagged** with the tag **final**.

Note: to tag a commit, you may use (from the terminal) the following commands:

```
# ensure the latest version is committed
git commit -m "...comment..."
git push

# add the 'final' tag and push it
git tag final
git push origin --tags
```

Alternatively, you may insert the tag from GitHub's web interface (follow the link 'Create a new release').

To test your submission, these are the exact commands that the teachers will use to download the project. You may wish to test them on a clean directory:

```
git clone ...yourCloneURL...
cd ...yourProjectDir...
git pull origin main # just in case the default branch is not main
git checkout -b evaluation final # check out the version tagged with
'final' and create a new branch 'evaluation'
(cd client ; npm install)
(cd server ; npm install)
```

Ensure that all the needed packages are downloaded by the npm install commands. Be careful: if some packages are installed globally, on your computer, they might not be listed as dependencies. Always check it in a clean installation.

The project will be tested under Linux: be aware that Linux is case-sensitive for file names, while Windows and macOS are not. Double-check the case of import and require() statements.