ROS Teaching GUIDE

ROS online teaching step-by-step guide to boost robotics teaching

The Construct

Content

REQUIREMENTS

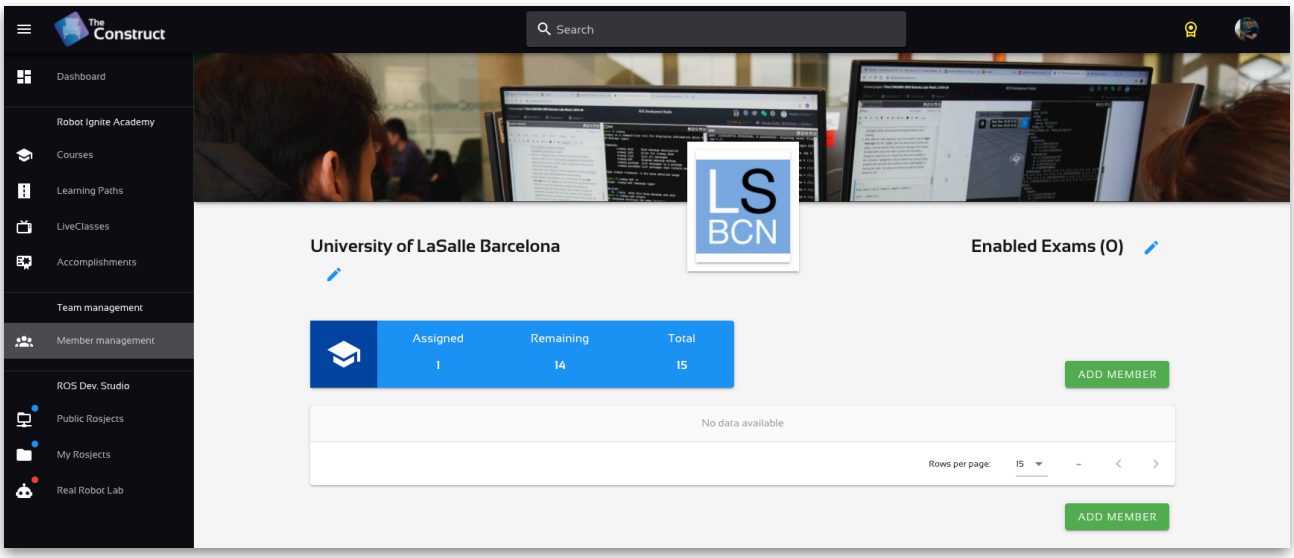
1. Use any type of computer
2. Students only need a web browser. Supported browsers are Chrome and Firefox. Other browsers may work, but not guaranteed.
3. No previous knowledge of Linux or programming is required.

Prepare Your Students

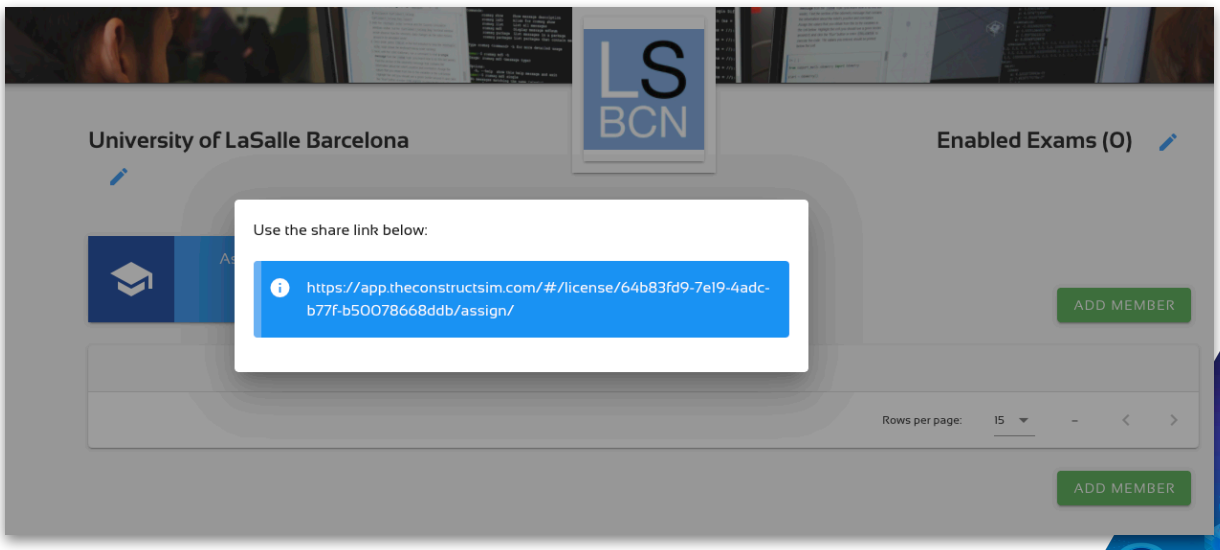
Before starting to teach, you need to get your students ready to work.

1. Assign a license to each student

In order to provide a license to each student you have to log in in The Construct and go to the **Team Management** option on the side-bar menu.

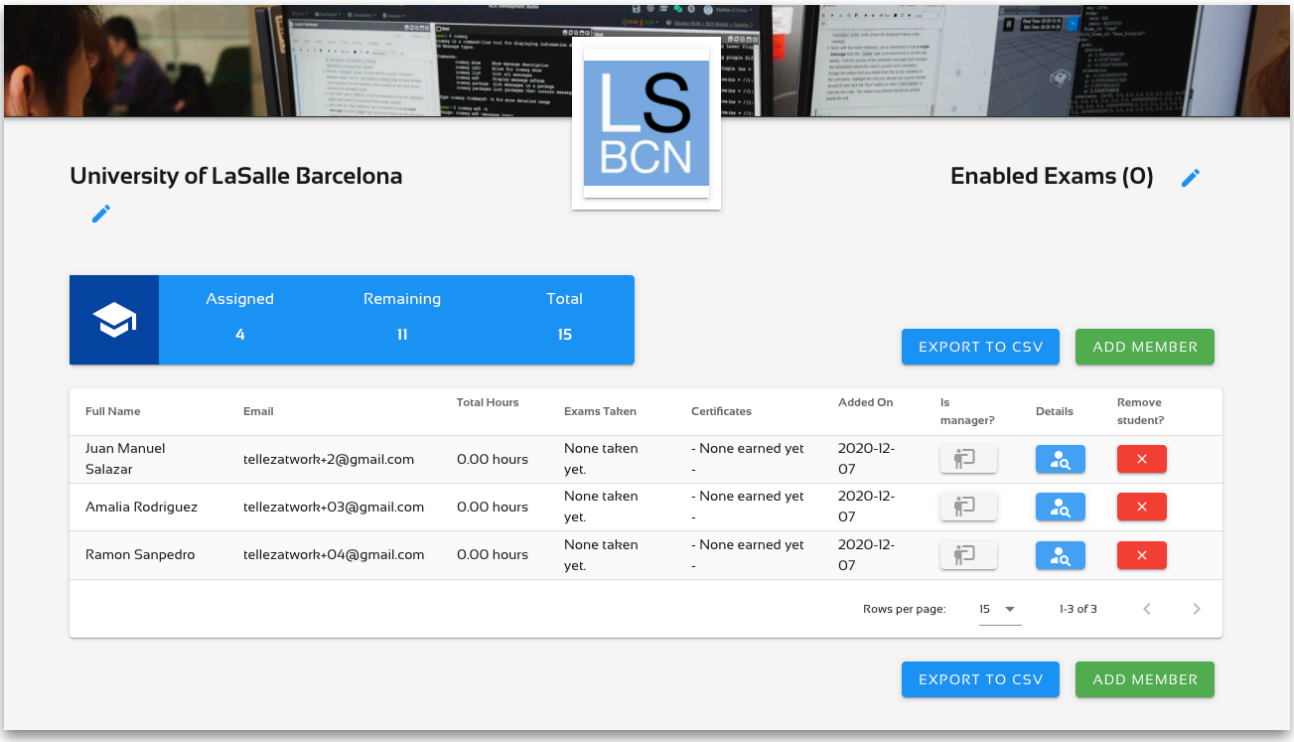


Then click on the **Add Member** green button. A link will appear on the screen. Copy this link and send it to your students by using email, live chat or any other medium. Every person that clicks on that link will get a license assigned to him.



Any student that clicks on the link will get full access to the academy, based on the plan you have purchased. When they click on the link they will be redirected to The Construct and asked to log in or create a free account. Then the license will be assigned to him.

The students that accept the license will appear on your list of members inside the **Team Management page**.



The link has a 1 day time live, which means that, if the student clicks on it after a day has passed since creation, he will not get assigned a license.

2. Get them ready for ROS

Very likely your students will not know anything about Linux or Python or C++. If that is your case, then you need to get your students up to date on those subjects.

Make your students take the Code Foundation learning path. This path includes a Linux for Robotics course and a Python for robotics course. Finally, there is an online exam they have to take. The exam will be automatically corrected, and the score sent to you directly on his report.

Make sure they do this path before anything else. Otherwise they will not be able to follow the ROS courses.

Teach Theory and Practice

The teaching procedure consists on delivering the material while practicing, then ask students to do exercises in front of you. Finally, they will have to work on their project.

1. Select the courses and units you will deliver

Prior to the class, have a review of the courses the academy has. Each course is composed by a series of units. Select the courses and units within each course that you would like to deliver. You don't have to deliver full courses if you don't think that the units are worth it.

2. Delivering the material

All the courses provide all the material required for you to teach the subject. We suggest you you use the notebooks provided on each course as your slides to follow the material with the students.

On the day of the class, open the Unit you want to teach and project it to the students (if online, share your screen). Then follow the notebook as your guiding slides.

Bear in mind that the notebook is full of things that need to be done, that means, you will have to explain and at the same time do the included actions as you explain. Force your students to also do those actions with you and be checking if they are following and getting the same results as you.

At some point in the notebook, you will find a section indicated as Exercise. This means that the students must do this exercise right now on the class, in front of you. This is the most important moment of your class. If they have been following your class and done the practice with you, they must be able to solve the exercise. They may though have doubts and questions. This is were you as the teacher can shine, since you will be in charge of understanding their problems and then provide them with an answer.

Take into account that you as a teacher can see the solution to the exercise (link included in the notebook just after the exercise), but that the student can't (it is hidden to avoid copy/paste). Use that to your advantage.

3. Make students practice even more

Every course is composed by a series of units. Last unit is always *the Project*. The project is the unit that makes the student practice in a full project all the

subjects covered in all the units of the course. You should make the students do the project along the whole time that you are going to deliver the course.

Let's say that you are delivering the ROS Basics in 5 Days course to your students and that you have 40 hours of class to deliver that course. Then we propose you that you take 25 hours to deliver the subject with the method explained in point 2, and then dedicate 15 hours to work on the project.

We suggest that the project is done by the students during those 15 hours of class, in front of you. This is necessary so they can ask you questions and you can observe where they are struggling.

Very common, they will not have time enough to finish the project on the class time, so they will have to keep working at home. That is no problem because the academy allows the students to access from any place.

4. Create your own ROS projects (optional)

Some teachers prefer to create their own ROS projects for the students. If that is your case, you are covered by the academy.

To create your own ROS project, you need to create a s (ROS-project). ROSjects are ROS projects that are executed inside the web environment of the academy, so they do not need any installation in the student computer.

ROSjects are complete ROS projects that you can create as if they were in your own computer and can include anything you would have in your computer.

The main advantage of ROSjects is that they can be shared with your students and then they can have a copy of the ROSjects you create and then reproduce your results, without needing to install anything.

Create your ROSject

To create a ROSject:

1. go to the side-bar menu and click on ***My ROSjects***
2. Then click on the ***Create ROSject*** red button
3. Fill in the required information
4. Then the an empty ROSject will appear in *My ROSjects* section
5. Open the ROSjects to start filling it with the information of your project. For that, click on the ***Run*** label of the ROSject

6. After a few seconds, the ROSject will be there ready for you to fill the documentation, simulations and ROS code that you may want to include for your students.

Share your ROSject with students

Once your ROSject is finished and you want to share with your students so they can work with it and complete it, you need to share it with them. For that, go to *My ROSjects* and click on the *Details* icon of the ROSject.
Then click on the *Share* button to get the sharing link. Provide this link to your students. Every person that clicks on that link will get a copy of your ROSject.

At that point, your students will be able to open your ROSject and do the work you asked them.

Bear in mind that each person that clicks on your ROSject link will get a full independent copy of your ROSject. You and they, both can work on your own copy of it without interfering in the other's ROSject.

7. Practice with real robots (optional)

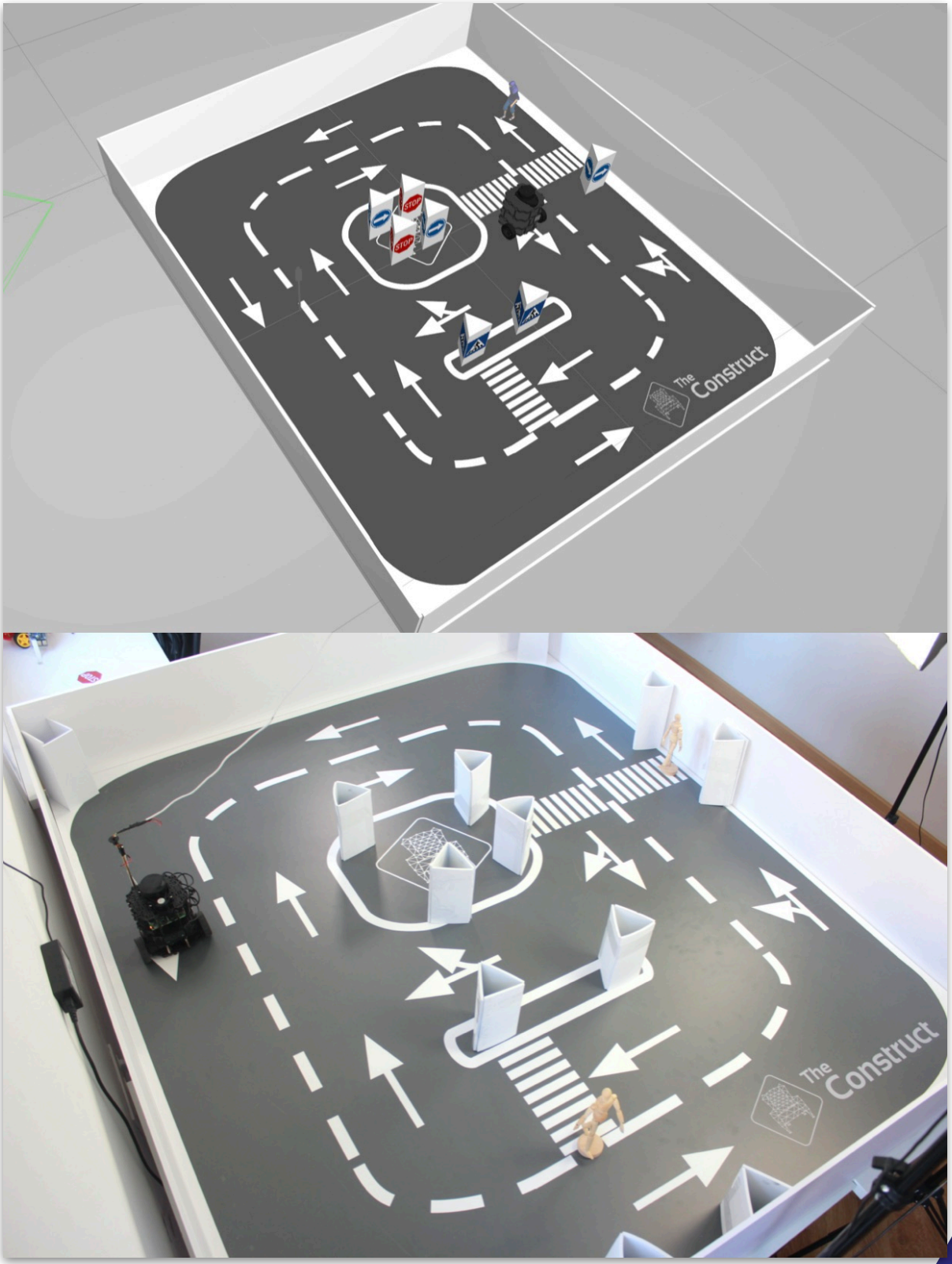
You can make your students practice with the real robot lab included in the academy. Each student and teacher has included in the license a 25 minutes real robot session per week.

We recommend you to create specific objectives for the students to be done in each session. At present those objectives are not provided by the academy.

How to access the real robot lab

1. First, each student has to book a time in the lab. For that go to the side-bar menu option entitled ***Real Robot Lab***
2. Then click on the blue button ***Book a Session***
3. Select the robot to use (at present only TurtleBot 3 available)
4. Then select the best day and time
5. Finally **Confirm**. Now you have a robot booked
6. A robot icon would have appear at the top right of the screen.
7. Click on that robot icon and you will see a link to further video instructions and a red button to get the ROSject, as well as the time remaining to your booked session.

8. Click on the red button to get the ROSject to be used with the lab. This ROSject has the simulation of the real environment as well as instructions about how to work with the real environment



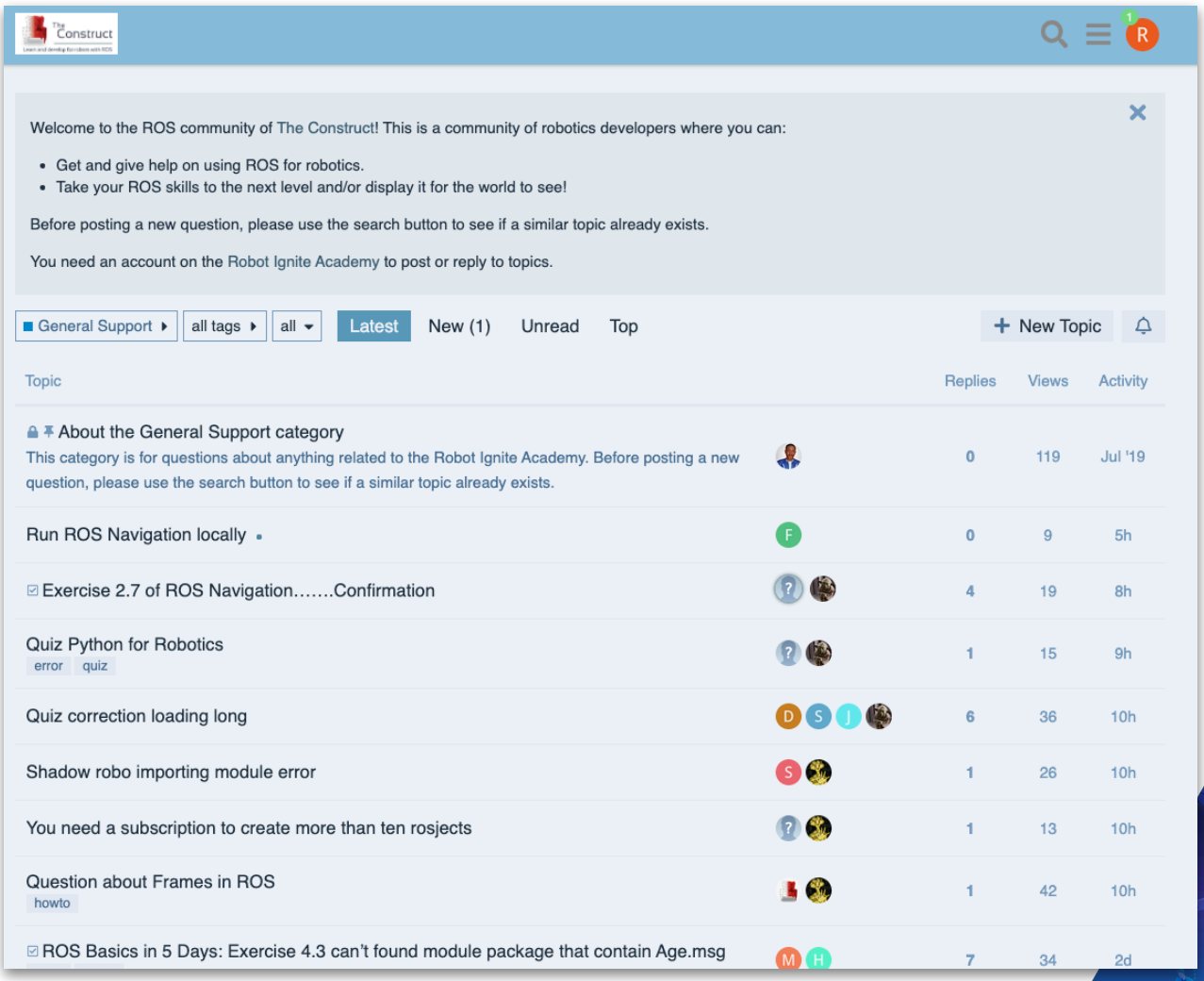
Provide Off-Hours Support

The academy provide off-hours support to your students by means of a Forum.

Your students can ask questions about the subjects to our team of experts by making use of the Forum. The *Forum* is available from the *Question* mark icon that is located in the lower right corner of every page.

Questions are answered usually within 24 hours (if asked during week-days).
Questions are automatically sorted in the *Forum* section that belongs to the course the student is doing.

Specify to your students that they should make use of this service when they are working on their own.



Evaluate Students

The academy has a system that allows you to test your students and provide you with an automatic score

Some courses have an associated exam that you can activate to test your students.

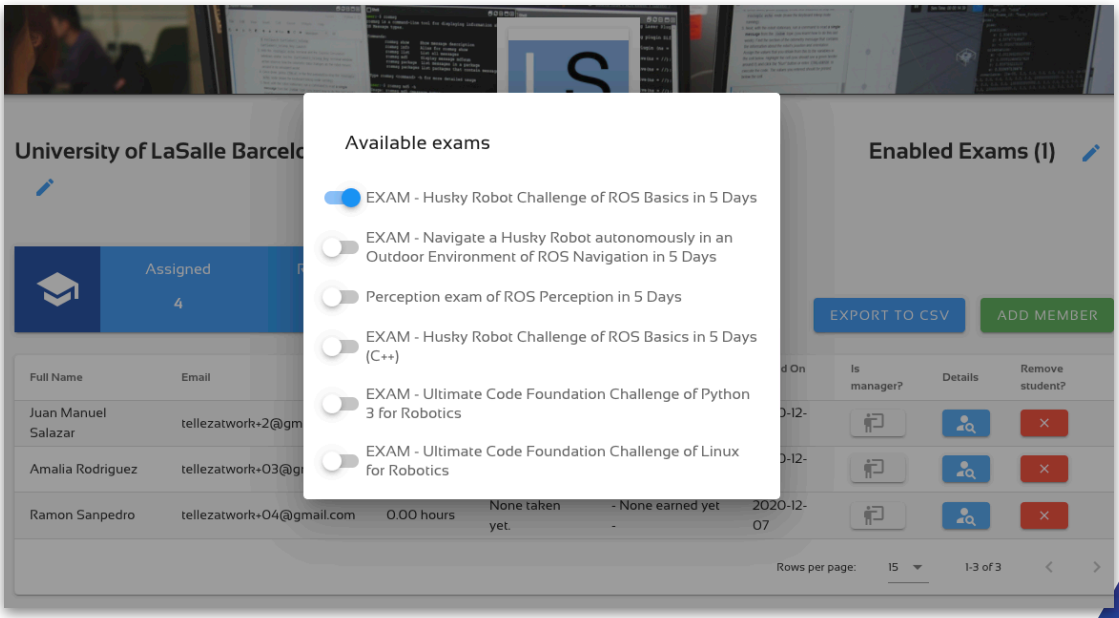
Exams are automatically corrected. This means that you don't have to correct and score the exams. They will be automatically done by the academy.

How to check the available exams

As a teacher, you can check anytime the exams content. To check them, go and open the course you want to check. hen click on the list of units available for that course (lower bottom left). You will see that there is a *Unit* called Exam. Select that one and the exam will open for you

Bear in mind that the exam is only available to the teacher (until the teacher activates it to all the students). This means that your students don't have access to that exam until you activate it.

How to activate the exams for the students



1. Select the day and time at which you will do the exam, and communicate this to your students.
2. On the selected day and time, access to the **Team Management** section
3. Click on the **Enable Exams** section. A pop up menu will appear with all the exams available.
4. Select the exam that you want the students to do
5. From that moment, the exam will be available to all your students.
6. Indicate to your students the place to access the exam, that is, the exam unit included in the course.
7. Remember to deactivate the exam once the time is up.
8. Then ask your students to click on the button to correct the exam. After a few minutes, the score will be obtained and it will be directly sent to you and appear on the Team Management page.
9. Finally, when the time is up, go to the *Team Management* area and disconnect the exam.

At present, we only have exams for the following courses:

* ROS Basics in 5 days (both Python and C++ versions)
* ROS Navigation
* ROS Perception

At present, there is a single exam for those courses. We are working on introducing several exams for every course, and assign them randomly to students when activated. This will increase the factor against copying between students.

Control Students Progress

The Academy provides a place where to check whether your students are progressing or not

You can check anytime how much progress is each student having by going to the *Team Management* area. There you will get a list of all your students with a complete listing of their activity in the academy, including exams taken, certificates earned, time spend in the different lessons, and so.

To get that, just go to the ***Team Management*** area and click on the ***Details*** icon of the student you want to check his activity.