2019 Syllabus - Cosi 119a

2019 Syllabus
Syllabus for Cosi119a

<table>
<thead>
<tr>
<th>Instructors</th>
<th>Pito Salas</th>
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<tbody>
<tr>
<td>Schedule</td>
<td>TBD</td>
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<tr>
<td>Location</td>
<td>TBD</td>
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<tr>
<td>On-demand office Hours</td>
<td><a href="http://www.calendly.com/pitosalas/ftf">http://www.calendly.com/pitosalas/ftf</a></td>
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<tr>
<td>Prerequisites</td>
<td>Cosi12b, 21a and one other elective</td>
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<td>Expectations</td>
<td>Success in this 4 credit hour course is based on the expectation that students will spend a total of 10-15 hours every week on it</td>
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<td>Email contact:</td>
<td><a href="mailto:pitosalas@brandeis.edu">pitosalas@brandeis.edu</a></td>
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<td>Office</td>
<td>Volen 134</td>
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Syllabus

Learning Objectives

This course is a pragmatic introduction to autonomous robotics. Our goal is to introduce students to the "big question" that need to be answered in order to build autonomous robots. Questions such as "How do I know where I am?" and "How do I decide what to do?" We will take a software engineering approach, always focusing on how to turn the concepts into actual robot behaviors in the real world.

Students will

- **Robotics**: Learn the key mobile autonomous robotics concepts, such as localization, state management, coordinate frames and coordinates, mapping and path finding and the basic information structures and data used in robotics such as sensor data, command data, sensor fusion such as odometry.
• **Architecture**: Learn how to think architecturally within the context of a fully distributed operating system. How to create small concurrent modules that communicate with each other. How to organize desired functionality and behavior for maximum flexibility and scalability within such an environment.

• **ROS**: Learn to program the all-important “Robot Operating System”, ROS, which is the leading real-time distributed operating system for research and industrial robotics. They will demonstrate understanding of the key concepts of ROS, nodes, topics, commands and services, concurrency, distributed operating systems, and more.

**Grading**

Grading will be based on the following:

• ~33%: Participation: Engagement with the course, presence in classroom discussions, following up on commitments and obligations, contributing in the further design of the course with ideas and content. This will be assessed by the instructor’s personal observations.

• ~33%: Individual work contributing to programming projects and team projects, documentation of this work in the lab notebooks, demonstrating seriousness and independence. This will be assessed by reviewing the lab notebooks, personal observation and peer and self assessments.

• ~33%: Final Deliverables: There will be a well defined, team based, final deliverable in the form of code and documentation. This will be assessed via a rubric.

**Prerequisites**

Students have to have completed Cosi21a plus one additional Cosi Elective. Instructor has final say on admission based on individual student factors.

**Required Course Text Book**

• *Programming Robots with ROS*. This is an excellent book that introduces ROS from the bottom up. You should get a copy. Beware, ROS is pretty complicated. It's real-time, distributed operating system which is installed both on the robot and on the controlling laptop (if there is one). It can be quite difficult to configure and fiddly. But it is very very powerful!

**General Policies**

**Change Policy**

The instructor reserves the right to make changes to this syllabus and the associated curriculum web site if he deems it necessary. Any changes will
either be announced in class or through e-mail. All students are responsible for finding out about such changes. Each student must be aware that not all assignments are listed in the syllabus. Students must use their common sense and not look for loopholes in the syllabus because, ultimately, the instructor has the final say in all matters. If you are confused on any assignment, ask the instructor for clarification.

By deciding to stay in this course, you are agreeing to all parts of this syllabus. In fairness to everyone, the syllabus must apply equally to all students without exception.

**Experiential Learning**

This is an experiential learning course! You will be working in teams and discovering what that’s like, and how to be effective in that kind of setting. It’s something that will definitely come up in your future work, no matter what direction you take: business, academia, non profits, government, or entrepreneurship. You can count on learning from the challenges, obstacles and successes you encounter.

You will also be asked to be very self-reliant, figuring out things on your own, having to use the web to research tools and techniques to use, sorting through the noise and finding the best solutions. Everything will not be served up on a silver platter. You can count on developing your self confidence and perseverance and hopefully come to see the value of this in your future.

Overall you will be asked to think about what you are learning from these experiences, what you could apply in the future, and how this course may influence the way you think about what you want to do next.

- Intro