# Probabilistic Robotics

6 EC | Semester 1, period 1 | 5204PRRO6Y

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|---|---|
| Owner | Master Artificial Intelligence |
| Coordinator | dr. A. Visser |
| Part of | Master Artificial Intelligence, year 2 |

## Course manual 2017/2018

### Course content

Probabilistic robotics is a subfield of robotics concerned with the perception and control part. It relies on statistical techniques for representing information and making decisions. By doing so, it accommodates the uncertainty that arises in most contemporary robotics applications.

This course is based on the book 'Probabilistic Robotics', from Sebastian Thrun, Wolfram Burgard and Dieter Fox. The book concentrates on the algorithms, and only offers a limited number of exercises. Their suggestion is to accompany the book with a number of practical, hands-on assignments for each chapter. The assignments of this course are designed to understand the basic problems concerning mobile robotics.

### Study materials

**Literature**

- Sebastian Thrun, Wolfram Burgard and Dieter Fox, Probabilistic Robotics, The MIT Press, 2005. ISBN: 9780262201629, 3rd edition.

**Software**

- Matlab, Python

### Objectives

At the end of the course, the student is able to:

- develop robust software for robots operating in real-world environments,
- understand the mathematical underpinnings of their software.

### Teaching methods

- Lecture
- Computer lab session/practical training

The lectures are to understand the mathematical foundations of the algorithms, the computer lab session are intended to translate the algorithms to software to control robots in the real-world.

### Learning activities

| Activity | Number of hours |
|---|---|
| Lectures | 24 |
| Lab sessions | 24 |
| Self study | 120 |

## Attendance

The programme does not have requirements concerning attendance (OER-B).

## Assessment

**Item and weight** **Details**

Final grade

- 0% -
- 1 (50%) Practical assignments
  - 0.25 (11%) Exercise 2.8.4
  - 0.25 (11%) Exercise 4.6.1 & 4.6.4
  - 0.25 (11%) Exercise 5.8.4 & 5.8.5 and Odometry model
  - 0.5 (22%) Kalman localization and SLAM
  - 1 (44%) Particle SLAM on a Nao field
- 1 (50%) Exam

## Inspection of assessed work

Feedback on the assignments will be directly given on the reports uploaded to Blackboard.

The final exam can be inspected at the coordinator's office (C3.157),

## Assignments

**Exercise 2.8.4**

individual assignment

**Exercise 4.6.1 & 4.6.4**

individual assignment

**Exercise 5.8.4 & 5.8.5 and Odometry mode**

individual assignment

**Kalman localization and SLAM**

pair assignment

**Particle SLAM on a Nao field**

groups assignment

## Fraud and plagiarism

The 'Regulations governing fraud and plagiarism for UvA students' applies to this course. This will be monitored carefully. Upon suspicion of fraud or plagiarism the Examinations Board of the programme will be informed. For the 'Regulations governing fraud and plagiarism for UvA students' see: www.uva.nl/plagiarism

## Course structure

| Week | Chapters | Assignment | Deadline |
|---|---|---|---|
| 1 | 1 & 2 | Exercise 2.8.4 | 07/09/2017 13:00 |
| 2 | 3 & 4 | Exercise 4.6.1 & 4.6.4 | 19/09/2017 13:00 |
| 3 | 5 - 8 | Exercise 5.8.4 & 5.8.5 and Odometry model | 26/09/2017 13:00 |
| 4 | 9 & 10 | Kalman localization and SLAM | |
| 5 | 11 & 12 | | 10/10/2017 13:00 |
| 6 | 13 & 14 | Particle SLAM on a Nao field | |
| 7 | 17 | | 22/10/2017 23:59 |

## Timetable

The schedule for this course is published on DataNose.

## Contact information

**Coordinator**

- dr. A. Visser

**Staff**

- Emiel Hoogeboom MSc