Master's Department of Engineering Sciences

MSc in Automation Engineering and Robotics

Name of the unit: Sensorimotor modeling

Lecturer: Emmanuel Guigon (emmanuel.guigon@sorbonne-universite.fr)
Course code:
Student workload: 16 h of lectures, 12 h of labs
Credits: 3 ECTS
Specialization tracks: ☐ ROBOT ☐ SI ☒ MeDH (elective)
Semester offered: ☐ S1 ☐ S2 ☒ S3 ☐ S4
Language of instruction: ☐ French ☒ English
Targeted audience: ☒ Engineering Sciences students ☐ Other (specify):
Localization : ☒ PMC Campus ☐ Other (specify):

Course Overview

The goal of this course is to introduce students with knowledge on psychological, neural and computational processes involved in perception and action. The course starts with an introduction on the conceptual nature of perceptual and motor processes, and their interplay. Then, it is be divided into three parts: (1) a detailed description of perceptual processing (sensation/perception, attention, spatial perception, multisensory interactions, sensory substitution); (2) a detailed description of motor processing (organization of action, computational motor control, biological motor control, models and theories); (3) a practical part during which students replicate basic experimental or computational results related to human sensorimotor performance.

Keywords: sensation, perception, action, cognition, model, experiment

Prerequisites

Students should have previously acquired the following prerequisites to follow this course:

- General background either in engineering, mathematics, physics, computer science, psychology or medicine. Some programming skills (python/C/Matlab) and knowledge in statistics will be required to realize the project.

Intended Learning Outcomes

By the end of this course, students will be able to:

1. knowledge acquisition on perceptual processes
2. knowledge acquisition on motor processes

Indicative Teaching Sequence and Methods

Week	C/TD/TP*	Content	Preparation	Learn. outc.
S1	C	Introduction - sensation/perception/attention	reading articles	AAV1
S2	C	spatial perception, multisensory interactions, sensory substitution	reading articles	AAV1
S3	C	organization of action, computational motor control	reading articles	AAV2
S4	C	biological motor control, models and theories	reading articles	AAV2
S5	TP	in class project + work in autonomy		
S6	TP	in class project + work in autonomy		
S7	TP	in class project + work in autonomy		
S8	TP	oral project report (whole class)		

* C/TD/TP respectively corresponds to lectures, tutorials and lab sessions.

Indicative Assessment of Intended Learning Outcomes (1st session)

Week	Individ./group	In-person/remote	Type of exam	Evaluated outcomes	Scale %
S8	Group	In-person	Other	AAV1-2	100 %

2nde session of exam

Session	Individ./group	In-person/remote	Type of exam	Evaluated outcomes	Scale %

Bibliographic references

- Turvey MT (1977) Preliminaries to a theory of action with reference to vision. In: Perceiving, Acting and Knowing: Toward an Ecological Psychology (Shaw R, Bransford J, eds), pp 211-265. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Alais D, Newell FN, Mamassian P (2010). Multisensory processing in review: from physiology to behaviour. Seeing Perceiving. 23(1):3-38. doi: 10.1163/187847510X488603.
- Posner MI, Petersen SE. The attention system of the human brain. Annu Rev Neurosci. 1990;13:25-42. doi: 10.1146/annurev.ne.13.030190.000325.

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