

Contexte informationnel : de la perception à l'action
Mention (cochez la mention et le parcours concerné)

APAS	IEAP BTI	IEAP IEMH	IEAP FH	MS	EOPS
			x		

Semestre d'étude (cochez le semestre relatif à l'enseignement)

Master APAS				Master MS				Master EOPS				Master IEAP	Master IEAP	Master IEAP	Master IEAP		Master IEAP			
S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2 IEMH/BTI	S2 FH	S3 BTI	S4 BTI	S3 IEMH	S4 IEMH	S3 FH	S4 FH
														x						

Nature et volume du cours (renseignez le nombre d'heures ou de semaines de stage relatifs à l'enseignement)

Cours magistral (CM)	Travaux dirigés (TD)	Pédagogie Active	Travail Personnel Etudiant	Stage
18 h	9 h	h	h	semaines

Objectifs de l'enseignement (précisez en quelques lignes les notions abordées, les connaissances et/ou compétences visées par l'enseignement)

This course aims to provide students with a coherent understanding of how perception and action are closely coupled within the nervous system. The objectives cover knowledge, skills, and scientific reasoning.

After reviewing the important and common concepts in motor control, we will present a theoretical approach to movement production and adaptation based on cybernetic theory. The general concepts of cybernetics will be presented and then developed specifically in a cybernetical approach of motor control. We will refer to the predictive brain and the essential concepts of efference copy and corollary discharge. Following the theoretical presentation of this cybernetic approach to movement, we will look at several experimental findings that validate the key concepts and explain in greater depth the mechanisms of learning and adaptation of motor skills and sensorimotor integration.

Mots-clés

Neurosciences, Internal model, sensory afferences, efference copy, prediction, adaptation, cybernetics
Sensory conflict, degraded sensory inputs, personality traits

Compétences à acquérir

The student must be able to understand how the brain transforms sensory information into actions, measure and analyze motor behaviors, and apply this understanding to ergonomics.

Modalités d'évaluations envisagées (CC + SAE) : CCCC

The SAE will be based on reading and critically analyzing scientific articles, as well as on the oral defense of solutions to a given problem. This assessment must demonstrate an understanding of the experimental scientific evidence validating the key concepts of the course.

Plan de cours :

Cybernetical (or computational) approach of motor control

1. Introduction
2. Cybernetical approach of motor control
 - a. Some generalities about cybernetics
 - b. Model for motor control
 - c. Efference copy and corollary discharge

d. Internal models: inverse and forward

3. Experimental evidence

4. Conclusion

Integration of sensory and motor function

1. Sensory conflict & performance

1.1. High performance adaptation

1.2. Cybersickness evoked by Simulators, virtual reality, or computer games)

2. Sensory conflict & motionsickness (Autonomous vehicle)

3. Degraded sensory inputs and performance

4. Individual cognitive traits change sensory integration

Bibliographie indicative :