MICRO-502 **Aerial robots**

Floreano Dario

Cursus	Sem.	Type
Microtechnique	MA2, MA4	Opt.

Langue d'enseignement	français
Crédits	4
Session	Eté
Semestre	Printemps
Examen	Ecrit
Charge	120h
Semaines	14
Heures	**4 hebdo**
Cours	2 hebdo
Exercices	2 hebdo
Nombre de places	**40**

Résumé

The course provides an introduction to the design, control, and applications of aerial robots. Students will be able to translate theoretical concepts into practice by means of hands-on exercises with simulated drones.

Contenu

Applications, products and market
; Regulation, privacy, safety issues
; Refresher of aerodynamic principles relevant for drone design and analysis; Multicopters; Fixed Wings; Flapping Wings; Hardware Components and Integration (motor, battery, frame, materials, autopilots, modeling); Communication; State estimation; Control methods (rate and attitude control, velocity control); Perception and navigation (way-point navigation, take-off and landing); Advanced topics drawn from the recent literature: novel drone concepts (VTOL, caged drones, multi-modal drones, modular drones, morphing drones, insect-like drones, etc.), Collision avoidance, SLAM methods, Swarming, etc.

Mots-clés

Aerial robots; flying robots; drones

Compétences requises

Cours prérequis obligatoires

Mobile Robots

Concepts importants à maîtriser

Programming language for hands-on exercises: C/C++

Méthode d'enseignement

Weekly lectures
Discussion of advanced topics described in the technical literature
Lab exercises

Travail attendu

Course attendance
Reading of background literature suggested in the class
Critical reading of technical articles and presentation in class

Solving problems with software during hands-on exercises

Méthode d'évaluation

Written exam (multiple choice questions)
Assessment of problem-solving capability in hands-on exercises

Encadrement

Office hours	Non
Assistants	Oui
Forum électronique	Oui

Ressources

Bibliographie

Floreano, D. et al. (2009) *Flying Insects and Robots*, Springer Verlag (selected chapters)
Tennekes, H. (2009) *The Simple Science of Flight*, MIT Press (selected chapters)
10 articles selected from the recent literature and presented / analysed in the class

Ressources en bibliothèque

- Flying Insects and Robots / Floreano
- The Simple Science of Flight / Tennekes