

Student Handbook

Master in Engineering, Data Science and Human Movement

M1 & M2 · 2026–2027



The complete programme, unit and component content, assessment, placements, contacts and student services.

English edition · 6 September 2026

Master and Year 2 lead: Michel-Ange Amorim · Year 1 lead: David Rudrauf

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How to use this handbook

This handbook is for students enrolled in Year 1 or Year 2 of the IDSMH master's programme. It explains the degree structure, gives the content of every unit and component, and identifies where to check a date, room, assessment or administrative procedure.

Source	Use
Copernic specifications PR536 and PR463	Official titles, codes, credits, hours, thresholds, content and assessment regulations.
Eidos	Timetable, rooms, groups, published material, libraries, Journal Clubs, notebooks and activities delivered through Eidos.
eCampus	Course spaces and material for teaching that is not yet published in Eidos.
Student administration and programme leads	Agreements, enrolment, adjustments, individual cases and any decision that requires human approval.

Always check dates, rooms and groups in the timetable issued for your cohort. Official titles, credits and progression rules remain those of the current programme specifications.

Contacts, locations and induction

Scope	Contact	Contact details
Programme and Year 2 lead	Michel-Ange Amorim	michel-ange.amorim@universite-paris-saclay.fr
Year 1 lead	David Rudrauf	david.rudrauf@universite-paris-saclay.fr
IDSMH student administration	Marianne Baumard	master.ismh@universite-paris-saclay.fr · +33 1 69 15 62 36

Teaching locations

Location	Use	Address or reference
Building 425	Student administration and teaching rooms	Rue du Doyen Georges-Poitou 91400 Orsay
Building 335	Teaching rooms and CIAMS facilities depending on the session	Rue Pierre-de-Coubertin 91440 Bures-sur-Yvette
Other sites	Henri Moissan LUMEN laboratories and partner organisations	Full address in the timetable

Graduate School induction workshop

The Sport Movement Human Factors Graduate School induction workshop takes place on Wednesday 9 September 2026 from 9.00 to 18.00. Registration opens at 8.30 in the Olivier Kahn auditorium in the Henri Moissan 2 building.

Programme structure and progression rules

Year 1 and Year 2 each carry 60 ECTS credits. Each year comprises two 30-ECTS competency blocks. Each block must be passed and one block cannot compensate for the other.

Year	Structure	Progression	Thresholds
Year 1	Two 30-ECTS blocks	Block threshold 10	Compensation within the block subject to unit threshold 7; placement threshold 10
Year 2	Two 30-ECTS blocks	Block threshold 10	Compensation within the block subject to unit threshold 7; placement threshold 10

When the programme specification does not state an assessment formula, the teaching team publishes the applicable arrangement in the course space. Practical assessment dates and instructions are published in the relevant course and timetable.

Teaching hour abbreviations

Code	Meaning
CM	Lectures
TD	Tutorials
TP	Practical classes
PT	Tutored project
AA	Autonomous activity or online learning
Project	Project or placement

Year 1 programme

Year 1 establishes common foundations in cognitive and movement science, mathematics, data, ergonomics, robotics, research and professional development.

Some activities are shared with other programmes, including EOPS; the timetable identifies the relevant groups.

Semester 1 · 30 ECTS

Code	Course unit	Hours	ECTS	Page
EN00016939	From Cognitive Science to AI for Human Movement I	28 h CM + 16 h TD	5	7
EN00016942	Physical Ergonomics	14 h CM + 2 h TD + 6 h TP	3	10
EN00016944	Mathematics for Human Movement	20 h CM + 30 h TD	6	11
EN00016945	Human Biomechanics and Motor Control	24 h CM + 15 h TD	4	12
EN00016946	Data Science I	12 h CM + 24 h TD + 10 h TP	5	13
EN00016955	Understanding Scientific Research I	12 h CM + 12 h TD	3	14
EN00016956	Professional Development I	28 h CM + 8 h TD	4	16

Semester 2 · 30 ECTS

Code	Course unit	Hours	ECTS	Page
EN00016958	Human Movement Analysis	17 h TD + 30 h project	3	18
EN00016959	Data Science II	12 h CM + 18 h TD	3	20
EN00016994	Physical Engineering	26 h CM + 30 h TD + 6 h TP	7	21
EN00016995	Entrepreneurship, Accounting and Business Simulation	42 h TD	3	22
EN00016997	Understanding Scientific Research II	24 h TD	2.5	23
EN00017000	Cross-disciplinary Project	8 h TD + 15 h project	1.5	25
EN00017001	Professional Development II	6 h TD + 210 h project	10	26

The Year 1 placement comprises at least 210 hours and may extend to 301 hours once the agreement and dates have been approved.

Year 1 catalogue · Semester 1

Each course unit is presented with its components, content, organisation and assessment arrangements. Practical guidance is published in the course space.

M1 · SEMESTER 1 · UE

From Cognitive Science to AI for Human Movement I

EN00016939 · Official title: From cognitive science to AI for human movement I

ECTS 5	UNIT HOURS 28 h CM + 16 h TD	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

3 COURSE COMPONENTS

UC 1/3 Introduction to Cognitive Science

EC00000247 · Official title: Introduction to cognitive science

HOURS 12 h CM + 4 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport · Shared delivery PR1062

PREREQUISITES

Bachelor's-level study in sport and human movement science, cognitive science, engineering or a related field; foundations in descriptive and inferential statistics, experimental reasoning and scientific reading. Python or MATLAB is helpful but not required.

LEARNING OUTCOMES

- Place the major concepts of cognitive science—perception, attention, memory, learning, emotion, social cognition, imagery, language and consciousness—within the main historical frameworks, from behaviourism and cognitivism to connectionist, Bayesian and normative approaches.
- Match research questions to psychophysics, experimental design, neuroimaging, EEG/MEG, psychophysiology, behavioural observation and modelling.
- Connect perception, action planning and motor control; diagram a simple model, critique a seminal paper and transfer the analysis to ergonomics, human–machine interaction and movement analysis.

CONTENT AND PROGRESSION

- Lectures 1–2 — Historical and epistemological foundations, Marr's levels, normative, algorithmic and implementation-level models; experimental methods, psychophysics, EEG/MEG, fMRI, eye tracking and psychophysiology.
- Lectures 3–4 — Perception, attention, memory, learning, motivation, emotion, social cognition, imagery, consciousness and language.
- Lectures 5–6 — Action, forward and inverse models, the speed–accuracy trade-off, adaptation and IDSMH applications.
- Tutorials — Structured reading of a paper and experimental ideation using paradigms such as Stroop, mental rotation, Fitts and attentional blink.

TEACHING FORMAT

Twelve lecture hours in six two-hour sessions and four tutorial hours in two two-hour sessions, including guided reading and model mapping. Taught in English.

ASSESSMENT · INTRODUCTION TO COGNITIVE SCIENCE*Continuous assessment with a separate second session*

SESSION 1 CCE × 50 % + EEF × 50 %	SESSION 2 EEF × 100 %
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UC 2/3 Perception, Decision and Psychophysics

EC00000248 · Official title: Perception, decision and psychophysics

HOURS 4 h CM + 12 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead Michel-Ange Amorim · michel-ange.amorim@universite-paris-saclay.fr

Faculty Faculté des Sciences du Sport

Shared delivery PR479

LEARNING OUTCOMES

Understand how relationships between physical stimuli, sensations and behaviour can be measured and modelled using psychophysical tools (sensory thresholds, psychometric functions and measurement methods) together with cognitive and computational frameworks.

CONTENT AND PROGRESSION

This course presents the fundamental principles of perception, decision-making and psychophysics. It introduces the historical, philosophical and theoretical foundations of the discipline, from Fechner to contemporary information-processing models. Conceptual material and mathematical models are combined with practical work involving the implementation of a psychophysical experiment and appropriate analysis tools, giving students a rigorous understanding of perceptual and decision-making processes and their applications.

ASSESSMENT · PERCEPTION, DECISION AND PSYCHOPHYSICS*Continuous assessment with a separate second session*

SESSION 1 CCE × 100 %	SESSION 2 CCE × 100 %
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UC 3/3 Neuroscience of Human Movement

EC00000249 · Official title: Neuroscience of human movement

HOURS 12 h CM	LANGUAGE English	THRESHOLD No component threshold
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Lead Michel-Ange Amorim · michel-ange.amorim@universite-paris-saclay.fr

Faculty Faculté des Sciences du Sport

Shared delivery PR479

LEARNING OUTCOMES

- Understand how the brain perceives, plans and adapts human movement; how these mechanisms are measured, interpreted and optimised; and how they explain brain–behaviour relationships and interindividual variability.
- Explain the principles of brain plasticity and motor learning.
- Evaluate the contributions and limitations of neuroergonomic technologies—stimulation, imaging and brain–machine interfaces—for performance, health and rehabilitation.

CONTENT AND PROGRESSION

A critical, applied study of movement neuroscience in sport, performance and human-factors engineering: brain and behavioural variability, interindividual differences in motor efficiency, adaptation and recovery.

Contemporary methods—neuroimaging, stimulation and electrophysiology—and their causal or reproducibility limits; levels from molecular mechanisms to behaviour; plasticity, motor learning and psychophysiological inference for performance and rehabilitation.

An evolutionary perspective situates movement and adaptation within human history. Technology-driven neuroplasticity—brain–machine interfaces, robotic therapy, stimulation, mental imagery and observation–imitation—is assessed for its scientific and ethical implications for performance, health and recovery.

ASSESSMENT · NEUROSCIENCE OF HUMAN MOVEMENT*Continuous assessment with a separate second session*

SESSION 1 EEF × 100 %	SESSION 2 EEF × 100 %
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M1 · SEMESTER 1 · UE

Physical Ergonomics

EN00016942 · Official title: Ergonomie Physique

ECTS 3	UNIT HOURS 14 h CM + 2 h TD + 6 h TP	SEMESTER Semester 1	LANGUAGE French	UNIT THRESHOLD 7
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3 COURSE COMPONENTS

UC 1/3 Introduction to Ergonomics

EC00000464 · Official title: Introduction à l'ergonomie

HOURS 8 h CM	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences

ASSESSMENT · INTRODUCTION TO ERGONOMICS

Continuous assessment with a separate second session

SESSION 1 EE (pass/fail) × 100 %	SESSION 2 EE (pass/fail) × 100 %
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UC 2/3 Risk Factors and Anthropometry

EC00000465 · Official title: Facteurs de risque et anthropométrie

HOURS 6 h CM	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences

ASSESSMENT · RISK FACTORS AND ANTHROPOMETRY

Continuous assessment with a separate second session

SESSION 1 EE (pass/fail) × 100 %	SESSION 2 EE (pass/fail) × 100 %
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UC 3/3 Physical Ergonomics Assessment Methods

EC00000466 · Official title: Méthodes d'évaluation en ergonomie physique

HOURS 2 h TD + 6 h TP	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

ASSESSMENT · PHYSICAL ERGONOMICS ASSESSMENT METHODS

Continuous assessment with a separate second session

SESSION 1 EE × 100 %	SESSION 2 EE × 100 %
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M1 · SEMESTER 1 · UE

Mathematics for Human Movement

EN00016944 · Official title: Mathématiques pour le mouvement humain

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
6	20 h CM + 30 h TD	Semester 1	French	7

Faculty Faculté des Sciences du Sport · Discipline Mathématiques

PREREQUISITES

Foundations in physics (Newtonian mechanics) and mathematics (trigonometry, vectors, differentiation and integration).

CONTENT AND PROGRESSION

Fundamental tools from matrix calculus and differential calculus for studying and modelling human movement (linear algebra and functional analysis). The theoretical concepts are generally illustrated with concrete applications from human movement science.

ASSESSMENT · MATHEMATICS FOR HUMAN MOVEMENT

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EE × 50 % + EEF × 50 %	EE × 50 % + EEF × 50 %

M1 · SEMESTER 1 · UE

Human Biomechanics and Motor Control

EN00016945 · Official title: Human biomechanics and motor control

ECTS 4	UNIT HOURS 24 h CM + 15 h TD	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

2 COURSE COMPONENTS

UC 1/2 Motor Control

EC00000250 · Official title: Motor control

HOURS 12 h CM	LANGUAGE French	THRESHOLD No component threshold
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Lead Isabelle Siegler · isabelle.siegler@universite-paris-saclay.fr

CONTENT AND PROGRESSION

This 12-hour motor-control course introduces the major scientific questions in human motor control and the main features of computational and biophysical theories. Experimental studies are discussed throughout the course.

ASSESSMENT · MOTOR CONTROL

Continuous assessment with a separate second session

SESSION 1 EE × 100 %	SESSION 2 EE × 100 %
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UC 2/2 3D Biomechanics of Human Movement

EC00000251 · Official title: 3D biomechanics of human movement

HOURS 12 h CM + 15 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead Samuel Hybois · samuel.hybois@universite-paris-saclay.fr

ASSESSMENT · 3D BIOMECHANICS OF HUMAN MOVEMENT

Continuous assessment with a separate second session

SESSION 1 CCE × 30 % + EEF × 70 %	SESSION 2 EEF × 100 %
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M1 · SEMESTER 1 · UE

Data Science I

EN00016946

ECTS 5	UNIT HOURS 12 h CM + 24 h TD + 10 h TP	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

2 COURSE COMPONENTS

UC 1/2 Measurement Tools for Sport Performance

EC00000252 · Official title: Measurement tools for sport performance

HOURS 8 h CM + 4 h TD + 10 h TP	LANGUAGE English French	THRESHOLD No component threshold
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CONTENT AND PROGRESSION

Recent technologies for measuring sport performance and human movement are examined from both technical and applied perspectives: electrogoniometers, EMG sensors, inertial measurement units, optoelectronic systems, photoelectric cells and related instruments. Students produce a technical report on a selected technology.

ASSESSMENT · MEASUREMENT TOOLS FOR SPORT PERFORMANCE

Continuous assessment with a separate second session

SESSION 1 EE × 60 % [Written assignment] + CCTP × 40 % [Practical report]	SESSION 2 EE × 100 % [Written assignment]
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UC 2/2 Signal Processing and Programming

EC00000253 · Official title: Signal processing and programming

HOURS 4 h CM + 20 h TD	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

Students acquire basic proficiency in MATLAB programming. Core operations used in human movement analysis—filtering, normalisation, segmentation and classification—are introduced and applied in practical exercises.

ASSESSMENT · SIGNAL PROCESSING AND PROGRAMMING

Continuous assessment with a separate second session

SESSION 1 EE × 100 % [Computer-based examination]	SESSION 2 EE × 100 %
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M1 · SEMESTER 1 · UE

Understanding Scientific Research I

EN00016955 · Official title: Understanding scientific research I

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
3	12 h CM + 12 h TD	Semester 1	English French	7

Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This unit comprises two components.

Research Methods — A critical examination of current scientific paradigms and the methodologies used to conduct research in human movement science.

Standards, Safety and Legislation — Ethics in human research and its evolving legal framework (Huriet and Jardé Acts, European and international frameworks, GDPR and data archiving); the establishment, operation and opinions of ethics committees and support structures; professional ethics, the French national charter for research professions and scientific misconduct; integrity in scientific publishing, including predatory journals; open and citizen science; the role of Poléthis, the Université Paris-Saclay Council for Research Ethics and Scientific Integrity; medical devices, standards and CE marking.

BIBLIOGRAPHY AND RESOURCES

- Cobey, K. D., et al. (2018). What is a predatory journal? A scoping review, version 2. *F1000Research*, 7, 1001 — DOI 10.12688/f1000research.15256.2
- Poléthis (2019). *Journal Poléthis*, no. 1
- CNRS/COMETS (2017). *Pratiquer une recherche intègre et responsable* [French]

2 COURSE COMPONENTS

UC 1/2 Research Methods

EC00000254 · Official title: Research methods

HOURS	LANGUAGE	THRESHOLD
6 h CM + 12 h TD	English French	No component threshold

Faculty Faculté des Sciences du Sport

ASSESSMENT · RESEARCH METHODS

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EO × 100 %	EO × 100 %

UC 2/2 Standards, Safety and Legislation

EC00000255 · Official title: Normes, sécurité, législation

HOURS 6 h CM	LANGUAGE French	THRESHOLD No component threshold
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ASSESSMENT · STANDARDS, SAFETY AND LEGISLATION*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
EE × 100 %	EE × 100 %

M1 · SEMESTER 1 · UE

Professional Development I

EN00016956 · Official title: Connaissance du Milieu Professionnel I

ECTS 4	UNIT HOURS 28 h CM + 8 h TD	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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CONTENT AND PROGRESSION

In this unit, students attend selected activities from the first-year ST2 Medical Robotics thematic sequence at CentraleSupélec, held from late November to late January. Its introductory lectures present the economic, social, medical, scientific and technological context of medical robotic systems.

Students also attend the two-day international workshop organised in January by the Sport, Movement and Human Factors Graduate School. Each year, academics from leading international universities address a new theme.

Université Paris-Saclay's careers and employer-relations service introduces tools for entering the workforce, including practical work on CVs and cover letters.

Training workshops, awareness-raising sessions and lectures on sustainable development in relation to sport and human movement science complete the unit.

4 COURSE COMPONENTS

UC 1/4 Medical Robotics Lectures

EC00000460 · Official title: Conférences "Robotique médicale"

HOURS 8 h CM	LANGUAGE English French	THRESHOLD No component threshold
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ASSESSMENT · MEDICAL ROBOTICS LECTURES

Continuous assessment with a separate second session

SESSION 1 CCTP × 100 % [Synthesis paper]	SESSION 2 CCTP × 100 %
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UC 2/4 Multidisciplinary Lectures

EC00000461 · Official title: Conférences pluri-disciplinaires

HOURS 10 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

ASSESSMENT · MULTIDISCIPLINARY LECTURES

Continuous assessment with a separate second session

SESSION 1 CCTP × 100 % [Conference report]	SESSION 2 CCTP × 100 %
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UC 3/4 Career Development Tools

EC00000462 · Official title: Outils pour l'insertion professionnelle

HOURS 8 h TD	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

ASSESSMENT · CAREER DEVELOPMENT TOOLS*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
EE × 50 % [CV and cover letter] + EO × 50 % [Interview]	EE × 50 % [CV and cover letter] + EO × 50 % [Interview]

UC 4/4 Sustainable Development

EC00000463 · Official title: Développement soutenable

HOURS 10 h TD	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

TEACHING FORMAT

This component includes an ungraded pass/fail activity. Its learning outcomes and associated competency elements must be achieved. If the component is not passed, the entire competency block is not passed, in accordance with the programme regulations.

ASSESSMENT · SUSTAINABLE DEVELOPMENT*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
EO (pass/fail) × 100 % [Workshops]	EE (pass/fail) × 100 % [Workshops]

Year 1 catalogue · Semester 2

Each course unit is presented with its components, content, organisation and assessment arrangements. Practical guidance is published in the course space.

M1 · SEMESTER 2 · UE

Human Movement Analysis

EN00016958 · Official title: Human movement analysis

ECTS 3	UNIT HOURS 17 h TD + 30 h project	SEMESTER Semester 2	LANGUAGE French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

2 COURSE COMPONENTS

UC 1/2 From the Action–Perception Loop to AI-driven Robotics

EC00000256 · Official title: From the action-perception loop to AI-driven robotics

HOURS 13 h TD + 20 h project	LANGUAGE English French	THRESHOLD No component threshold
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Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

PREREQUISITES

Foundations in Python and NumPy, Linux commands, file editing and SSH, plus an intuitive understanding of reference frames, 3D transformations and kinematics. Git and ROS/ROS 2 are recommended but not required.

LEARNING OUTCOMES

- Connect the perception–action loop—state estimation, planning, control, feedback, latency and adaptation—to human movement.
- Deploy and instrument an embedded ROS 2 architecture using nodes, topics, services, actions, TF, QoS, rosbag and RViz.
- Combine RGB-D perception, detection or segmentation, pose and uncertainty with navigation or SLAM, six-degree-of-freedom manipulation, voice/text interaction and state-machine or agent orchestration, including LLM agents, safety and recovery.
- Evaluate success, time, proximity or collisions, accuracy and stability from logs and a reproducible notebook.

CONTENT AND PROGRESSION

The module implements a sensor → state-estimation → decision and planning → action → sensory-feedback chain on a ROS 2 platform. The project integrates 3D perception, navigation, manipulation and voice interaction as a measurable system in which robustness, instrumentation, errors, metrics, safety and reproducibility matter as much as performance.

TEACHING FORMAT

Thirteen hours of progressive tutorials and twenty project hours, normally five four-hour sessions, in teams of three or four: milestones, short challenges, code and architecture reviews, then a final demonstration.

SPECIFIC ARRANGEMENTS

- Diagnosis covers latency, TF frames, QoS, logs and embedded computing; reproducibility uses Git, ROS 2 conventions, launch scripts and an evaluation protocol.
- Safety includes pre-motion checks, test zones, stop procedures and speed or effort limits. When equipment is constrained, RViz/Gazebo and rosbag replay precede robot validation.

COMPETENCIES DEVELOPED

ROS 2 and Jetson; RGB-D and point clouds; SLAM, manipulation and grasping; voice/text agents; protocols, logs and diagnosis. The project develops teamwork, Git, risk management and technical communication. Deliverables: repository, README, node diagrams, video and concise report.

ASSESSMENT · FROM THE ACTION–PERCEPTION LOOP TO AI-DRIVEN ROBOTICS

Continuous assessment with a separate second session

SESSION 1 CCE × 50 % [Written assignment] + CCO × 50 % [Presentation and demonstration]	SESSION 2 EE × 50 % [Written assignment] + EO × 50 % [Presentation and demonstration]
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UC 2/2 Human Movement Case Study

EC00000257 · Official title: Case study of human movement

HOURS	LANGUAGE	THRESHOLD
4 h TD + 10 h project	French	No component threshold

Faculty Faculté des Sciences du Sport

ASSESSMENT · HUMAN MOVEMENT CASE STUDY

Continuous assessment with a separate second session

SESSION 1 CCTP × 100 %	SESSION 2 CCTP × 100 %
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M1 · SEMESTER 2 · UE

Data Science II

EN00016959

ECTS 3	UNIT HOURS 12 h CM + 18 h TD	SEMESTER Semester 2	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

2 COURSE COMPONENTS

UC 1/2 Statistics

EC00000258

HOURS 6 h CM + 12 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This course explains why statistical analysis is essential for interpreting experimental results in biology and physiology. Topics include probability, variables, populations, samples, univariate analysis, parametric and non-parametric tests, correlation and effect size.

ASSESSMENT · STATISTICS

Continuous assessment with a separate second session

SESSION 1 EE × 33 % + EE × 67 %	SESSION 2 EE × 100 %
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UC 2/2 Introduction to Machine Learning

EC00000259 · Official title: Introduction to machine learning

HOURS 6 h CM + 6 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead Ioannis Bargiotas · ioannis.bargiotas@inria.fr · Faculty Faculté des Sciences du Sport

ASSESSMENT · INTRODUCTION TO MACHINE LEARNING

Continuous assessment with a separate second session

SESSION 1 EE × 100 %	SESSION 2 EE × 100 %
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M1 · SEMESTER 2 · UE

Physical Engineering

EN00016994 · Official title: Ingénierie Physique

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
7	26 h CM + 30 h TD + 6 h TP	Semester 2	French	7

Faculty Faculté des Sciences

2 COURSE COMPONENTS

UC 1/2 Introduction to Robotics

EC00000262 · Official title: Introduction à la robotique

HOURS	LANGUAGE	THRESHOLD
12 h CM + 18 h TD + 6 h TP	French	No component threshold

Faculty Faculté des Sciences

CONTENT AND PROGRESSION

This course introduces the concepts and methods required to address robotic-manipulation problems. It covers manipulator robots, geometric and kinematic modelling tools, and the analysis of robot properties when designing manipulation tasks against precise specifications. Practical case studies and MATLAB/Simulink simulations illustrate the fundamental principles. The historical and economic context of robotic manipulation is also introduced.

ASSESSMENT · INTRODUCTION TO ROBOTICS

Continuous assessment with a separate second session

SESSION 1	SESSION 2
CCE × 30 % + EEF × 70 %	EEF × 100 %

UC 2/2 Dynamical Systems Approach

EC00000263 · Official title: Approche systèmes dynamiques

HOURS	LANGUAGE	THRESHOLD
14 h CM + 18 h TD	French	No component threshold

Faculty Faculté des Sciences

CONTENT AND PROGRESSION

Students learn to use systems concepts and tools to model the dynamic behaviour of physiological systems. They study the movement physiology of a simple human limb as an input–output system represented by a differential equation, then derive quantitative information about its dynamics, including transient response, response time, stability or instability and steady state.

ASSESSMENT · DYNAMICAL SYSTEMS APPROACH

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EE × 100 %	EE × 100 %

M1 · SEMESTER 2 · UE

Entrepreneurship, Accounting and Business Simulation

EN00016995 · Official title: Entrepreneuriat, comptabilité, jeu d'entreprise

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
3	42 h TD	Semester 2	French	7

Faculty Polytech Paris-Saclay

LEARNING OUTCOMES

Understand how a company operates by examining its main functions and the objectives—often competing—associated with each function.

CONTENT AND PROGRESSION

The unit comprises two distinct courses:

Business Economics: types of companies; the production, commercial, financial and human-resources functions; and modes and strategies of business growth.

Management Simulation (business game): develop a practical understanding of a company's economic and financial challenges through a simulator that models market conditions and competition. Over three days, students manage a company's day-to-day operations, with particular attention to profitability calculations and marketing strategy.

ASSESSMENT · ENTREPRENEURSHIP, ACCOUNTING AND BUSINESS SIMULATION

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EO × 50 % [Business simulation] + EEF × 50 % [Accounting]	EEF × 100 % [Accounting]

M1 · SEMESTER 2 · UE

Understanding Scientific Research II

EN00016997 · Official title: Understanding scientific research II

ECTS 2.5	UNIT HOURS 24 h TD	SEMESTER Semester 2	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

3 COURSE COMPONENTS

UC 1/3 Scientific Communication — Journal Club

EC00000264 · Official title: Scientific communication - Journal Club

HOURS 9 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

PREREQUISITES

Preferably: completion of the M1 Introduction to Cognitive Science unit; foundations in statistics and research methods; ability to read scientific articles in English.

LEARNING OUTCOMES

- Critically read seminal articles in cognitive science.
- Deliver a 20–30-minute oral presentation covering objectives, methods, results and models, and respond to questions.
- Produce scientific-communication materials, including slides, captioned figures and model diagrams.
- Construct an argument, discuss limitations and replicability, and relate findings to human movement and IDSMH themes.

TEACHING FORMAT

- One one-hour introductory and article-assignment session, followed by four two-hour sessions with approximately four presentations per session.

Rotating roles for each article: presenter, discussant and rapporteur.

- A proposed reading list combining seminal and recent must-read articles.
- Peer feedback using criteria covering clarity, rigour, visualisation and the relationship between models, theory and data.
- The course is taught in English.

ASSESSMENT · SCIENTIFIC COMMUNICATION — JOURNAL CLUB

Continuous assessment with a separate second session

SESSION 1 CCO × 100 %	SESSION 2 EEF × 100 %
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UC 2/3 Research from the Lab

EC00000265 · Official title: Research from the lab

HOURS 6 h TD	LANGUAGE English	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

ASSESSMENT · RESEARCH FROM THE LAB*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
CCTP × 100 %	CCTP × 100 %

UC 3/3 Hackathon

EC00000266

HOURS 9 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

PREREQUISITES

Foundations in experimental work and/or programming (Python, MATLAB or R) are recommended, together with a collaborative mindset. Students need their own laptop.

LEARNING OUTCOMES

- Plan and organise teamwork to solve a scientific and technical problem.
- Formulate a clear research question connecting cognition and movement.
- Design a prototype—an experiment, analysis or small model—and iterate rapidly.
- Document and communicate a reproducible result through code, figures and a short pitch.

TEACHING FORMAT**Three three-hour sessions:****Kick-off and ideation:** problems, data and success criteria.**Prototyping sprint:** data collection, simulation and analysis.**Demonstrations and posters:** a 15-minute team pitch followed by questions.

- Teams of three or four should ideally combine sport/human-movement and engineering backgrounds.

SPECIFIC ARRANGEMENTS

- Open tools such as Jupyter, NumPy, SciPy and scikit-learn, or equivalent software.
- Preference for open or simulated data.
- An open-source licence, such as MIT, is recommended for deliverables.

ASSESSMENT · HACKATHON*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
CCO × 100 %	EEF × 100 %

M1 · SEMESTER 2 · UE

Cross-disciplinary Project

EN00017000 · Official title: Projet transversal

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
1.5	8 h TD + 15 h project	Semester 2	French	7

Faculty Faculté des Sciences du Sport

ASSESSMENT · CROSS-DISCIPLINARY PROJECT

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EE × 50 % [Written assignment] + EO × 50 % [Oral defence]	EE × 100 % [Written assignment]

M1 · SEMESTER 2 · UE

Professional Development II

EN00017001 · Official title: Connaissance du Milieu Professionnel II

ECTS 10	UNIT HOURS 6 h TD + 210 h project	SEMESTER Semester 2	LANGUAGE French	UNIT THRESHOLD 10
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Faculty Faculté des Sciences du Sport

LEARNING OUTCOMES

First-year Master's research placement.

CONTENT AND PROGRESSION

This unit develops research methods through a placement in a laboratory or a company, including a start-up or R&D department. It comprises at least 210 hours and may extend to 301 hours once its dates, workload and agreement have been approved by student administration and the Year 1 lead.

The topic must link life sciences—biomechanics, physiology or behavioural neuroscience—with engineering—design, systems modelling or signal processing—and use appropriate measurement systems to analyse how a product or method affects human movement. Laboratory topics align with the units supporting the programme, including the FéDeV network; CIAMS publishes possible placements at the start of the year. Company hosts may work in ergonomics, disability, exoskeletons, sport technology or movement measurement.

ASSESSMENT · PROFESSIONAL DEVELOPMENT II

Continuous assessment with a separate second session

SESSION 1 EE × 33 % [Research dissertation] + EO × 67 % [Placement oral defence]	SESSION 2 EE × 33 % [Research dissertation] + EO × 67 % [Placement oral defence]
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Year 2 programme

Year 2 advances modelling, movement and data analysis, human–machine interaction, research and professional development.

Semester 1 · 30 ECTS

Code	Course unit	Hours	ECTS	Page
EN00001833	Understanding Scientific Research III	30 h TD + 6 h TP	4	29
EN00001834	Innovation, Project Management and Business Environment	32 h TD	3	31
EN00001835	Robotics Engineering	24 h CM + 21 h TD + 9 h TP	5	33
EN00001836	Human–Machine Interaction	19 h CM + 12 h TD	3	35
EN00001837	Ergonomics, Biomechanics and Modelling	18 h CM + 21 h TD + 5 h TP	4	36
EN00001838	Physiological Systems Modelling	16 h CM + 12 h TD	3	38
EN00016576	Data Science III	4 h CM + 45 h TD + 20 h project	5	39
EN00016577	Assistive and Adaptive Control	12 h CM + 9 h TD + 9 h TP	3	41
EN00016579	From Cognitive Science to AI for Human Movement II	22 h CM + 26 h TD	5	42

Semester 2 · 30 ECTS

Code	Course unit	Hours	ECTS	Page
EN00001839	Professional Development III	20 h CM + 10 h TD + 3 h AA	28	45
EN00014515	Semester 2 Catalogue Elective		2	49
EN00016564	Internationalisation Unit	20 h AA	2	50

In Semester 1, each student chooses one 5-ECTS specialisation unit. In Semester 2, one 2-ECTS unit is chosen between the catalogue elective and Internationalisation.

Year 2 specialisation choice

Code	Elective specialisation unit	Hours	ECTS
EN00001835	Robotics Engineering	24 h CM + 21 h TD + 9 h TP	5
EN00016579	From Cognitive Science to AI for Human Movement II	22 h CM + 26 h TD	5

Every Year 2 student must choose one of these two 5-ECTS units. Submit the choice after the induction meeting and no later than Wednesday 9 September 2026 so that enrolment numbers for Ingénierie robotique can be sent to UVSQ.

This is a Semester 1 specialisation unit choice.

Year 2 catalogue · Semester 1

Each course unit is presented with its components, content, organisation and assessment arrangements. Practical guidance is published in the course space.

M2 · SEMESTER 1 · UE

Understanding Scientific Research III

EN00001833 · Official title: Understanding scientific research III

ECTS 4	UNIT HOURS 30 h TD + 6 h TP	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This unit comprises two components:

Case Study Project

Students carry out a small scientific study that includes motion capture and analysis, in connection with the Physiological Systems Modelling unit and/or the Ergonomics, Biomechanics and Modelling unit.

Scientific Project Management

Students identify, classify and analyse existing knowledge through advanced literature-search methods, Zotero-based reference organisation and a structured scientific-paper reading grid. They prepare a research project by selecting a measurement chain and analysis methods, designing a protocol, choosing participants and variables, and organising the experimental environment. Project planning covers Gantt charts, shared schedules and time constraints. The component culminates in a small-scale project.

2 COURSE COMPONENTS

UC 1/2 Case Study Project

EC00000295 · Official title: Case study project

HOURS 15 h TD + 6 h TP + 10 h project	LANGUAGE English French	THRESHOLD No component threshold
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Lead Isabelle Siegler · isabelle.siegler@universite-paris-saclay.fr

CONTENT AND PROGRESSION

Students carry out a small scientific study that includes motion capture and analysis, in connection with the Physiological Systems Modelling unit and/or the Ergonomics, Biomechanics and Modelling unit.

ASSESSMENT · CASE STUDY PROJECT

Continuous assessment with a separate second session

SESSION 1 SUPERVISED PROJECT × 100 %	SESSION 2 SUPERVISED PROJECT × 100 %
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UC 2/2 Scientific Project Management

EC00000300

HOURS 15 h TD	LANGUAGE English French	THRESHOLD No component threshold
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Lead Alain Hamaoui · alain.hamaoui@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

Identify, classify and analyse existing knowledge through advanced literature-search methods, Zotero-based reference organisation and a structured scientific-paper reading grid.

Prepare a research project by selecting a measurement chain and analysis methods, designing a protocol, choosing participants and variables, and organising the experimental environment.

Plan the project with a Gantt chart, a shared schedule and explicit management of time constraints.

Complete a small-scale project.

SPECIFIC ARRANGEMENTS

Assessment: an oral examination embedded in the course.

ASSESSMENT · SCIENTIFIC PROJECT MANAGEMENT

Continuous assessment with a separate second session

SESSION 1 EO × 100 %	SESSION 2 EO × 100 %
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M2 · SEMESTER 1 · UE

Innovation, Project Management and Business Environment

EN00001834 · Official title: Innovation, Gestion de projet et Connaissance de l'entreprise

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
3	32 h TD	Semester 1	French	7

Faculty Polytech Paris-Saclay

CONTENT AND PROGRESSION

This unit brings together two complementary components.

Team Management — Value creation through human resources; management of individuals and project teams; collective decision-making and influence; motivation and engagement at work; leadership styles; theoretical foundations and practical scenarios.

Project Management — The full project life cycle: inception—nature, three dimensions, preliminary study, funding, sponsor, risk and the go/no-go decision; definition through specifications, estimation, costing and planning; launch; monitoring through committees, knowledge management, analytical tracking and management tools; completion—acceptance, training, documentation, pilot deployment, technical implementation and roll-out; audit and quality in business.

2 COURSE COMPONENTS

UC 1/2 Team Management

EC00000153 · Official title: Management d'équipes

HOURS	LANGUAGE	THRESHOLD
12 h TD	French	No component threshold

Lead Valérie Guimard · valerie.guimard@si-4you.com · Faculty Polytech Paris-Saclay

CONTENT AND PROGRESSION

The course examines how the human-resources function creates value through the management of individuals and project teams, group decision-making and influence, motivation and engagement at work, and leadership styles. Theoretical foundations are combined with practical scenarios.

ASSESSMENT · TEAM MANAGEMENT

Continuous assessment with a separate second session

SESSION 1	SESSION 2
EO × 50 % + EE × 50 %	EO × 50 % + EE × 50 %

UC 2/2 Project Management

EC00000154 · Official title: Gestion de projet

HOURS 20 h TD	LANGUAGE French	THRESHOLD No component threshold
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Lead Valérie Guimard · valerie.guimard@si-4you.com

CONTENT AND PROGRESSION

Project culture and the project life cycle.

Inception — Project nature, three dimensions, preliminary study, funding, sponsor, risk assessment and the go/no-go decision.

Definition — Specifications, estimation, costing and planning.

Launch — Conditions for a successful start.

Monitoring — Steering and follow-up committees, knowledge management, analytical tracking and management tools.

Completion — Acceptance procedures, training, documentation, pilot deployment, technical implementation and roll-out.

Audit and quality — Preparing and conducting an audit; quality in business.

ASSESSMENT · PROJECT MANAGEMENT*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
EE × 50 % + EO × 50 %	EE × 50 % + EO × 50 %

M2 · SEMESTER 1 · UE

Robotics Engineering

EN00001835 · Official title: Ingénierie robotique

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
5	24 h CM + 21 h TD + 9 h TP	Semester 1	French	7

Faculty UFR des sciences

CONTENT AND PROGRESSION

This unit comprises two components:

Robot Modelling

Develop the ability to model the kinematics and dynamics of a robotic system interacting with its environment. Topics include geometric and inverse-kinematic modelling, manipulability, dynamic modelling, external torques and forces, and the components of a robotic system.

Biorobotics

Students choose one of two courses.

Biorobotics 1 develops the ability to analyse and design a biorobotic system from specifications for the robotic system and biomechanical characteristics. Topics include admittance control and impedance control using muscle models.

Biorobotics 2 uses dynamic models from the other modules for humanoid control while integrating human-specific criteria and constraints. Topics include dynamic control, humanoids and exoskeletons.

ASSESSMENT · ROBOTICS ENGINEERING

Continuous assessment with a separate second session

Arrangements are specified by the teaching team.

2 COURSE COMPONENTS

UC 1/2 Robot Modelling

EC00000237 · Official title: Modélisation des robots

HOURS	LANGUAGE	THRESHOLD
12 h CM + 12 h TD + 3 h TP	French	No component threshold

Lead Abderraouf Benali · abderraouf.benali@uvsq.fr · Faculty UFR des sciences

LEARNING OUTCOMES

Develop the ability to model the kinematics and dynamics of a robotic system interacting with its environment.

CONTENT AND PROGRESSION

Geometric and inverse-kinematic modelling; manipulability; dynamic modelling; external torques and forces; components of a robotic system.

ASSESSMENT · ROBOT MODELLING

Continuous assessment with a separate second session

SESSION 1	SESSION 2
CCTP × 40 % + EE × 60 %	EE × 70 % + CCTP × 30 %

UC 2/2 Biorobotics

EC00000238 · Official title: Biorobotique

HOURS	LANGUAGE	THRESHOLD
12 h CM + 9 h TD + 6 h TP	French	No component threshold

Lead Barthelemy Cagneau · barthelemy.cagneau@uvsq.fr · Faculty UFR des sciences

LEARNING OUTCOMES

Students choose one of two courses.

Biorobotics 1 develops the ability to analyse and design a biorobotic system from specifications for the robotic system and biomechanical characteristics.

Biorobotics 2 uses dynamic models introduced in the other modules for humanoid control and examines how human-specific criteria and constraints can be integrated.

CONTENT AND PROGRESSION

Biorobotics 1: admittance and impedance control using muscle models.

Biorobotics 2: dynamic control, humanoids and exoskeletons.

TEACHING FORMAT

Students choose one course. Biorobotics 1 comprises 6 hours of lectures, 3 hours of tutorials and 6 hours of practicals. Biorobotics 2 comprises 6 hours of lectures and 6 hours of tutorials.

ASSESSMENT · BIOROBOTICS

Continuous assessment with a separate second session

SESSION 1	SESSION 2
CCTP × 40 % + EE × 60 %	CCTP × 30 % + EE × 70 %

M2 · SEMESTER 1 · UE

Human–Machine Interaction

EN00001836 · Official title: Human-machine interaction

ECTS 3	UNIT HOURS 19 h CM + 12 h TD	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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PREREQUISITES

Completion of the M1 IDSMH Neuroscience of Human Movement and Motor Control courses.

CONTENT AND PROGRESSION

The From Perception to Motor Control course presents behavioural and neurocognitive evidence, together with theoretical approaches to perception–action coupling, motor control and proprioception, in the context of human–machine interaction.

The Neuroscience of Human Movement, Ergonomics and Assistive Technology course addresses the human characteristics and design issues that must be considered when developing technology with a human in the loop, including cobots and virtual-reality systems.

ASSESSMENT · HUMAN–MACHINE INTERACTION

Continuous assessment with a separate second session

SESSION 1 EE × 50 % + EO × 50 %	SESSION 2 EE × 100 %
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M2 · SEMESTER 1 · UE

Ergonomics, Biomechanics and Modelling

EN00001837 · Official title: Ergonomie, Biomécanique, Modélisation

ECTS 4	UNIT HOURS 18 h CM + 21 h TD + 5 h TP	SEMESTER Semester 1	LANGUAGE French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

PREREQUISITES

Bachelor's-level knowledge of musculoskeletal anatomy, physiology and biomechanics.

CONTENT AND PROGRESSION

This unit comprises three components:

Physical Ergonomics

Fundamental concepts in joint biomechanics and physical ergonomics, enabling students to understand the mechanisms underlying musculoskeletal disorders and their prevention. Particular attention is paid to seated-posture ergonomics and its role in preventing spinal pain.

Musculoskeletal Modelling: Inverse Approach

The main stages involved in modelling and simulating muscle activity from human motion-capture data. Students use a tool such as OpenSim to model and simulate the movement under study.

Musculoskeletal Modelling: Forward Approach

An introduction to predictive movement simulation with musculoskeletal models and optimal-control methods. Numerical trajectory-optimisation methods and the formulation of optimal-control problems are applied to examples of human movement simulation using OpenSim Moco and the Bioprim library.

3 COURSE COMPONENTS

UC 1/3 Physical Ergonomics

EC00000292 · Official title: Ergonomie physique

HOURS 15 h CM + 5 h TP	LANGUAGE French	THRESHOLD No component threshold
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Lead Alain Hamaoui · alain.hamaoui@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This course introduces fundamental concepts in joint biomechanics and physical ergonomics so that students can understand the mechanisms underlying musculoskeletal disorders and their prevention. Particular attention is paid to seated-posture ergonomics and its role in preventing spinal pain.

ASSESSMENT · PHYSICAL ERGONOMICS

Final assessment

SESSION 1 EEF × 100 %	SESSION 2 EEF × 100 %
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UC 2/3 Musculoskeletal Modelling: Inverse Approach

EC00000293 · Official title: Modélisation musculo-squelettique : approche inverse

HOURS	LANGUAGE	THRESHOLD
3 h CM + 12 h TD	French	No component threshold

Lead Isabelle Siegler · isabelle.siegler@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This course presents the main stages involved in modelling and simulating muscle activity from human motion-capture data. Students use a tool such as OpenSim to model and simulate the movement under study.

ASSESSMENT · MUSCULOSKELETAL MODELLING: INVERSE APPROACH*Final assessment*

SESSION 1	SESSION 2
EO × 100 %	EO × 100 %

UC 3/3 Musculoskeletal Modelling: Forward Approach

EC00000294 · Official title: Modélisation musculo-squelettique : approche directe

HOURS	LANGUAGE	THRESHOLD
9 h TD	French	No component threshold

Lead Samuel Hybois · samuel.hybois@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This course introduces predictive movement simulation with musculoskeletal models and optimal-control methods. Numerical trajectory-optimisation methods and the formulation of optimal-control problems are applied to human movement simulations using OpenSim Moco and the Bioptrim library.

ASSESSMENT · MUSCULOSKELETAL MODELLING: FORWARD APPROACH*Continuous assessment with a separate second session*

SESSION 1	SESSION 2
CCTP × 100 %	EEF × 100 %

M2 · SEMESTER 1 · UE

Physiological Systems Modelling

EN00001838 · Official title: Modélisation de systèmes physiologiques

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
3	16 h CM + 12 h TD	Semester 1	French	7

Faculty Faculté des Sciences

PREREQUISITES

Linear algebra: matrix calculations and reduction of a matrix to Jordan or diagonal form.

Analysis: linear ordinary differential equations with constant coefficients, Laplace and z transforms, signal spectra and data filtering.

LEARNING OUTCOMES

Introduce the tools required to estimate the parameters of a joint model from numerical measurements, in order to represent musculo-tendinous behaviour during movement. Key topics include muscle–tendon linkage models, state-space models, input–output models, and stiffness and viscosity estimation.

CONTENT AND PROGRESSION

Construction of physiological models from experimental data. Students use tools from input–output dynamical-systems theory to build mathematical models from experimental data, with applications to movement physiology. The course explicitly connects experimentation with the modelling of an input–output system.

ASSESSMENT · PHYSIOLOGICAL SYSTEMS MODELLING

Continuous assessment with a separate second session

SESSION 1	SESSION 2
CCTP × 50 % + EE × 50 %	CCTP × 50 % + EE × 50 %

M2 · SEMESTER 1 · UE

Data Science III

EN00016576

ECTS 5	UNIT HOURS 4 h CM + 45 h TD + 20 h project	SEMESTER Semester 1	LANGUAGE English French	UNIT THRESHOLD 7
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Faculty Faculté des Sciences du Sport

LEARNING OUTCOMES

This unit develops advanced skills in scientific programming, statistical analysis and data visualisation applied to human movement. It combines two complementary courses: one focused on programming for experimental-data processing and one on applied statistical analysis and visual analytics.

CONTENT AND PROGRESSION

Programming for Human Motion Analysis

This course extends the scientific-programming techniques in MATLAB or Python introduced during M1 IDSMH. Students learn to import, process and analyse experimental data from human movement science; design and simulate numerical models of human behaviour; and independently develop computational tools for biomechanical, physiological or behavioural questions. A project based on human movement data integrates these skills.

Applied Statistics and Visual Analytics

This course combines applied statistics and data visualisation. Lectures introduce exploratory statistical methods, principles of information visualisation and good practices for representing complex data. Tutorials cover interactive-dashboard design and automated visualisation of time series, behavioural data and related datasets with open-source tools. An open-data project integrates statistical analysis, interpretation, and the production of relevant, communicative visualisations.

2 COURSE COMPONENTS

UC 1/2 Programming for Human Motion Analysis

EC00000230 · Official title: Programming for human motion analysis

HOURS 30 h TD + 10 h project	LANGUAGE English French	THRESHOLD No component threshold
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Lead Jules Bernard-Espina · jules.bernard-espina@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This course extends the scientific-programming techniques in MATLAB or Python introduced previously, enabling students to process and analyse experimental data and to design and simulate numerical models in human movement science.

ASSESSMENT · PROGRAMMING FOR HUMAN MOTION ANALYSIS

Continuous assessment with a separate second session

SESSION 1 ETP × 60 % + CCTP × 40 % [Project]	SESSION 2 ETP × 60 % + CCTP × 40 % [Project]
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UC 2/2 Applied Statistics and Visual Analytics

EC00000231 · Official title: Applied statistics and Visual analytics

HOURS	LANGUAGE	THRESHOLD
4 h CM + 15 h TD + 10 h project	English French	No component threshold

Lead Michel-Ange Amorim · michel-ange.amorim@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

LEARNING OUTCOMES

Enable students to transform complex analyses into clear, effective and communicative graphical representations that support exploration, interpretation and dissemination, including for non-specialist audiences.

CONTENT AND PROGRESSION

This course integrates applied statistics and visual analytics in the context of data science for human movement. Students learn to analyse and visually represent behavioural data from a range of sources.

Lectures introduce statistical principles for data exploration and the theoretical foundations of information visualisation. Tutorials focus on interactive-dashboard design and automated generation of visualisations for time series and other datasets using open-source technologies.

Students complete a project based on open data.

ASSESSMENT · APPLIED STATISTICS AND VISUAL ANALYTICS

Continuous assessment with a separate second session

SESSION 1	SESSION 2
ETP × 50 % + CCTP × 50 % [Project]	ETP × 50 % + CCTP × 50 % [Project]

M2 · SEMESTER 1 · UE

Assistive and Adaptive Control

EN00016577 · Official title: Assistance et contrôle adapté

ECTS 3	UNIT HOURS 12 h CM + 9 h TD + 9 h TP	SEMESTER Semester 1	LANGUAGE French	UNIT THRESHOLD 7
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Faculty UFR des sciences

LEARNING OUTCOMES

Develop the control system of a robotic assistive device.

CONTENT AND PROGRESSION

Haptics; control and stability of coupled systems; performance of assistive devices.

ASSESSMENT · ASSISTIVE AND ADAPTIVE CONTROL

Continuous assessment with a separate second session

SESSION 1 EE × 60 % + CCTP × 40 % [Project and report]	SESSION 2 EE × 70 % + CCTP × 30 %
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M2 · SEMESTER 1 · UE

From Cognitive Science to AI for Human Movement II

EN00016579 · Official title: Des sciences cognitives à l'IA pour le mouvement humain II

ECTS	UNIT HOURS	SEMESTER	LANGUAGE	UNIT THRESHOLD
5	22 h CM + 26 h TD	Semester 1	English French	7

Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This specialisation unit comprises three components.

Advanced Models in Cognitive Science and Artificial Intelligence — Marr's levels, Bayesian and dynamical models, Kalman/LQG, neural networks, transformers, reinforcement learning and applications to robots, movement and psychophysiological signals in reproducible notebooks.

Journal Club — critical reading and paired presentation of seminal or recent papers, with a model diagram, figure or demonstration, discussion and synthesis.

Machine Learning for Human Movement — dataset construction and a complete pipeline for preprocessing, modelling, validation, interpretation and discussion of experimental results.

3 COURSE COMPONENTS

UC 1/3 Advanced Models in Cognitive Science and Artificial Intelligence

EC00000232 · Official title: Modèles avancés en sciences cognitives et intelligence artificielle

HOURS	LANGUAGE	THRESHOLD
12 h CM + 8 h TD	English French	No component threshold

Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr

PREREQUISITES

Foundations in statistics and Python: running a notebook, manipulating arrays and writing a simple function. Refreshers are included. Students should be interested in cognition–action, AI, robotics, movement and psychophysiology.

LEARNING OUTCOMES

- Connect Marr's normative, algorithmic and implementation levels, connectionism, Bayesian approaches, deep networks, LLMs and reinforcement learning to action planning and human movement.
- Implement canonical neural, hidden-state, Kalman/LQG, bandit and actor–critic models.
- Analyse movement and physiological time series with 1D CNNs, RNNs or lightweight transformers, cross-validation and interpretation.
- Understand agents, LLM/VLM, zero-shot and sim-to-real robotics, then build a reproducible pipeline for MoCap, IMU, EMG, ECG, SCR or respiration while assessing validity and generalisation.

CONTENT AND PROGRESSION

- Lecture 1 — History and frameworks of perception–action modelling.
- Lecture 2 — Dynamical systems, state spaces, Kalman filters and LQG.
- Lecture 3 — Perceptrons, back-propagation, CNNs, RNNs and transformers.
- Lecture 4 — Bandits, the two-step task, exploration–exploitation and motor learning.

Lecture 5 — AI for autonomous robotics: agents, LLM/VLM, zero-shot, sim-to-real, navigation and intervention.

- Lecture 6 — Multimodal pipelines for movement and psychophysiology.
- Tutorials — Kalman/LQG tracking, bandits, classification of gestures, gait, EMG and ECG, and a mini-project delivered as a notebook and annotated figure.

TEACHING FORMAT

Twelve lecture hours in six two-hour sessions and eight Jupyter tutorial hours in four two-hour small-group sessions. Taught in English, with targeted refreshers in Python, regression, matrix operations and filtering, fixed seeds and an experiment log.

SPECIFIC ARRANGEMENTS

Progressive support uses commented notebooks with NumPy/SciPy, scikit-learn and PyTorch.

ASSESSMENT · ADVANCED MODELS IN COGNITIVE SCIENCE AND ARTIFICIAL INTELLIGENCE

Continuous assessment with a separate second session

SESSION 1 CCE × 50 % + EEF × 50 %	SESSION 2 EEF × 100 %
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UC 2/3 Journal Club

EC00000233

HOURS 8 h TD	LANGUAGE English	THRESHOLD No component threshold
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Lead David Rudrauf · david.rudrauf@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

PREREQUISITES

Preferably: completion of the M1 IDSMH Introduction to Cognitive Science unit and the M1 IDSMH Journal Club.

LEARNING OUTCOMES

- Conduct an in-depth paired analysis covering methods, models, analyses, code and resources.
- Discuss replicability and transfer to IDSMH questions in neuroimaging, motor control and human–machine interaction.
- Deliver an advanced presentation with a model diagram and a short demonstration using a notebook or reproduced figure.
- Lead discussion through the rotating roles of discussant and rapporteur.

TEACHING FORMAT

- Four two-hour sessions, with two articles per session: approximately 30–35 minutes of presentation and 20–25 minutes of discussion per article.

Roles: presenter; discussant focusing on methods and modelling; and rapporteur producing a one-page synthesis and pipeline diagram.

- The proposed corpus combines seminal and recent articles on cognitive modelling, AI applied to behaviour and movement, GLM, DCM, optimal control, LLMs and language.

ASSESSMENT · JOURNAL CLUB

Continuous assessment with a separate second session

SESSION 1 CCO × 100 %	SESSION 2 EEF × 100 %
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UC 3/3 Machine Learning for Human Movement

EC00000234 · Official title: Machine Learning pour le mouvement humain

HOURS	LANGUAGE	THRESHOLD
10 h CM + 10 h TD	English French	No component threshold

Lead Ioannis Bargiotas · ioannis.bargiotas@inria.fr · Faculty Faculté des Sciences du Sport

PREREQUISITES

Basic familiarity with Jupyter Notebook or Google Colab; preferably, introductory Python programming with control structures, functions and array manipulation; elementary descriptive statistics and probability.

LEARNING OUTCOMES

- Introduce core machine-learning concepts and their applications to human movement data.
- Identify the features needed to build a usable dataset.
- Construct and evaluate a complete data-processing pipeline comprising pre-processing, modelling and validation.
- Apply standard regression, classification and clustering algorithms to movement data.
- Interpret results and discuss their limitations in the context of human movement analysis.

CONTENT AND PROGRESSION

Introduction to machine learning for human movement; data types including coordinates, signals and trajectories; problem formulation and the machine-learning project lifecycle; data pre-processing and exploration; cleaning, normalisation and visualisation; feature selection and extraction.

Supervised learning: classification with k-nearest neighbours, decision trees and support-vector machines; linear regression, regularisation and logistic regression.

Unsupervised learning: k-means and hierarchical clustering; dimensionality reduction with principal component analysis.

TEACHING FORMAT

The course comprises 10 hours of lectures and 10 hours of tutorials.

Lectures present the theoretical foundations of machine learning, including problem definition, bias and variance, cross-validation and performance evaluation. Tutorials use Python with simple human movement datasets such as trajectories, sensor signals, smartwatch data and posture measurements. Students progressively complete a practical mini-project implementing a full analysis pipeline.

SPECIFIC ARRANGEMENTS

Jupyter Notebook or Google Colab is used systematically in practical sessions. Regular quizzes and self-assessments reinforce key concepts. Guided small-group practical work supports active learning, using teaching datasets on gait, posture, simple gestures, inertial signals and tabular data. Support progressively develops autonomy in model design and interpretation.

Assessment combines graded quizzes and tutorial exercises, active participation and progress through the notebooks, plus a supervised project that builds a complete machine-learning pipeline for a small human movement dataset. The project is assessed on methodological quality, relevance of choices, interpretation and clarity of presentation, delivered orally or through a commented notebook.

ASSESSMENT · MACHINE LEARNING FOR HUMAN MOVEMENT

Continuous assessment with a separate second session

SESSION 1	SESSION 2
CCTP × 60 % + SUPERVISED PROJECT × 40 %	CCTP × 60 % + SUPERVISED PROJECT × 40 %

Year 2 catalogue · Semester 2

Each course unit is presented with its components, content, organisation and assessment arrangements. Practical guidance is published in the course space.

M2 · SEMESTER 2 · UE

Professional Development III

EN00001839 · Official title: Connaissance du milieu professionnel III

ECTS 28	UNIT HOURS 20 h CM + 10 h TD + 3 h AA	SEMESTER Semester 2	LANGUAGE French	UNIT THRESHOLD 10
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Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

This unit comprises four components:

A four- to six-month placement

The placement addresses a fundamental or applied research question in engineering and/or data science connected with human movement science.

A seminar and lecture series on universal design and sustainable development

This course introduces sustainable-design principles for devices related to human movement. It addresses environmental, social and ethical issues and teaches students to integrate life-cycle assessment when designing or evaluating responsible, appropriate solutions.

Multidisciplinary lectures

Students attend lectures, seminars, workshops and thematic events such as Sport, Movement and Human Factors Graduate School activities, FéDeV events, internal or guest seminars and professional presentations. They may visit laboratories, technology platforms or partner companies, discuss topics with speakers and produce individual or group syntheses such as reflective notes, reports or presentations.

An e-learning module on preventing gender-based and sexual violence

Open-access videos and illustrations present different contexts of gender-based and sexual violence. The module has no forum or facilitated activities. It includes ungraded self-assessment quizzes and a graded final quiz requiring a score of 100% to earn the completion badge.

SPECIFIC ARRANGEMENTS

Assessment arrangements

Placement: a fundamental or applied research dissertation and an oral presentation.

Seminar and lecture series on universal design and sustainable development: possible activities include an individual or group synthesis paper, a critical analysis of a seminar, reflection on a defined issue, an oral presentation or structured debate, and active participation in discussion.

Multidisciplinary lectures: a synthesis portfolio describing the activities attended and their contribution to the student's career plan; a critical report or oral presentation on a lecture or visit; and assessment of active participation.

E-learning module on preventing gender-based and sexual violence: ungraded self-assessment quizzes and a graded final quiz requiring 100% correct answers to earn the completion badge. This component is an ungraded pass/fail requirement whose learning outcomes and competency elements must be achieved. If it is not passed, the entire competency block is not passed, in accordance with the programme regulations.

ASSESSMENT · PROFESSIONAL DEVELOPMENT III*Continuous assessment with a separate second session*

SESSION 1 PLACEMENT × 100 %	SESSION 2 PLACEMENT × 100 %
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4 COURSE COMPONENTS**UC 1/4 Placement**

EC00000221 · Official title: Stage

HOURS 10 h TD + 560 h project	LANGUAGE French	THRESHOLD 10
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Lead Michel-Ange Amorim · michel-ange.amorim@universite-paris-saclay.fr · Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

The placement lasts between four and six months and addresses a fundamental or applied research question in engineering and/or data science connected with human movement science.

Ten hours of tutorials help students understand the professional environment and the competencies associated with the national Master's degree framework in relation to their placement.

ASSESSMENT · PLACEMENT*Final assessment*

SESSION 1 PLACEMENT × 33 % [Research dissertation] + PLACEMENT × 67 % [Oral defence]	SESSION 2 PLACEMENT × 33 % [Research dissertation] + PLACEMENT × 67 % [Oral defence]
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UC 2/4 Sustainable Design and Human Movement

EC00000222 · Official title: Conception durable et mouvement humain

HOURS 10 h CM	LANGUAGE French	THRESHOLD No component threshold
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LEARNING OUTCOMES

This course introduces sustainable-design principles for devices related to human movement. It addresses environmental, social and ethical issues and teaches students to integrate life-cycle assessment when designing or evaluating responsible, appropriate solutions.

CONTENT AND PROGRESSION

Seminar and lecture series.

TEACHING FORMAT

This component includes an ungraded pass/fail activity. Its learning outcomes and associated competency elements must be achieved. If the component is not passed, the entire competency block is not passed, in accordance with the programme regulations.

SPECIFIC ARRANGEMENTS**Possible assessment formats:**

- an individual or group synthesis paper, including critical analysis of a seminar or reflection on a defined issue;
- an oral presentation or structured debate on a selected theme;
- participation and engagement in discussions.

ASSESSMENT · SUSTAINABLE DESIGN AND HUMAN MOVEMENT*Continuous assessment with a separate second session*

Arrangements are specified by the teaching team.

UC 3/4 Multidisciplinary Lectures

EC00000223 · Official title: Conférences multidisciplinaires

HOURS 10 h CM	LANGUAGE French	THRESHOLD No component threshold
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Faculty Faculté des Sciences du Sport

LEARNING OUTCOMES

Develop an in-depth understanding of professional and scientific environments related to engineering, data science and human movement through lectures, seminars, workshops and thematic events. Place fundamental and applied research and socio-economic issues in an interdisciplinary perspective.

CONTENT AND PROGRESSION

Participation in lectures, seminars and workshops, including Sport, Movement and Human Factors Graduate School activities, FéDeV events, internal or guest seminars, and professional presentations.

Visits to laboratories, technology platforms or partner companies.

Discussion and exchange with speakers.

Individual or group synthesis work, including reflective notes, reports and presentations.

TEACHING FORMAT

Multidisciplinary seminar and lecture series. This component includes an ungraded pass/fail activity. Its learning outcomes and associated competency elements must be achieved. If the component is not passed, the entire competency block is not passed, in accordance with the programme regulations.

SPECIFIC ARRANGEMENTS**Possible assessment formats:**

- a synthesis portfolio describing the activities attended and their contribution to the student's career plan;
- a critical report or oral presentation on a lecture or visit;
- active participation in sessions and discussions.

ASSESSMENT · MULTIDISCIPLINARY LECTURES

Continuous assessment with a separate second session

Arrangements are specified by the teaching team.

UC 4/4 Preventing Gender-based and Sexual Violence (GBSV)

EC00000224 · Official title: Agir contre les violences sexistes et sexuelles (VSS)

HOURS	LANGUAGE	THRESHOLD
1.5 h AA	French	No component threshold

Faculty Faculté des Sciences du Sport · Format Online learning · Shared delivery PR898

LEARNING OUTCOMES

Recognise statements, behaviour and acts that constitute gender-based or sexual violence, prevent misconduct, and know how to respond when witnessing or experiencing such behaviour within the university.

TEACHING FORMAT

Open-access videos and illustrations present different contexts of gender-based and sexual violence; there is no forum or facilitated activity. Ungraded self-assessment quizzes lead to a graded final quiz requiring 100% correct answers for the achievement badge.

This ungraded component is assessed on a pass/fail basis. Its learning outcomes and competency elements—and therefore the corresponding competency block—must be achieved in accordance with the programme regulations.

COMPETENCIES DEVELOPED

By the end of the course, students can:

- identify statements or behaviour constituting gender-based or sexual violence;
- respond appropriately as a witness or victim;
- avoid statements or behaviour that may constitute gender-based or sexual violence.

ASSESSMENT · PREVENTING GENDER-BASED AND SEXUAL VIOLENCE (GBSV)

Full continuous assessment (single session)

SECOND CHANCE

Not applicable because this component has a single assessment session

M2 · SEMESTER 2 · UE

Semester 2 Catalogue Elective

EN00014515 · Official title: UE libre catalogue S2

ECTS 2	SEMESTER Semester 2	LANGUAGE French
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Shared delivery University-wide catalogue · 53 other programmes · full list in appendix

ASSESSMENT · SEMESTER 2 CATALOGUE ELECTIVE

Final assessment

Arrangements are specified by the teaching team.

M2 · SEMESTER 2 · UE

Internationalisation Unit

EN00016564 · Official title: UE Internationalisation

ECTS 2	UNIT HOURS 20 h AA	SEMESTER Semester 2	LANGUAGE English
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Faculty Faculté des Sciences du Sport

CONTENT AND PROGRESSION

Courses taught in English are available through the EUGLOH alliance led by Université Paris-Saclay and, more broadly, through the Sport, Movement and Human Factors Graduate School.

TEACHING FORMAT

This unit includes an ungraded pass/fail activity. Its learning outcomes and associated competency elements must be achieved. If the unit is not passed, the corresponding competency block is not passed, in accordance with the programme regulations.

ASSESSMENT · INTERNATIONALISATION UNIT

Continuous assessment with a separate second session

Arrangements are specified by the teaching team.

Placements and professional development

Placement	Credits	Hours	Assessment
Year 1	10 ECTS	At least 210 hours · up to 301 hours after approval	Dissertation: 33% · oral defence: 67%
Year 2	Within the 28-ECTS unit	10 TD hours + 560 project hours · stated duration: 4 to 6 months	Dissertation: 33% · oral defence: 67%

Year 1 placement

The placement project includes at least 210 hours. It may be extended to 301 hours after the dates, workload and agreement have been approved by student administration and the Year 1 lead.

Under the general French rules, a placement must receive a stipend when its actual duration exceeds two consecutive months or the equivalent of 44 seven-hour days, or from the 309th hour when the placement is discontinuous. The signed agreement and actual duration determine how this rule applies.

- [Minimum internship stipend](#) [French public service information](#)

Year 2 placement

The Year 2 placement is recorded as component EC00000221 and comprises 560 project hours plus 10 TD hours. It takes place in a laboratory, company or partner organisation after the topic and agreement have been approved.

Preparing for employment

The Université Paris-Saclay Career Center provides job and placement listings, events and careers resources. Sign in with your institutional identity.

- [Université Paris-Saclay Career Center](#)

Research environment

Structure	Connection to the programme
CIAMS	Complexité, Innovation, Activités Motrices et Sportives laboratory — research-led teaching and placement topics.
FéDeV	Demeny-Vaucanson Federation — a network of laboratories connecting human movement and engineering science.
H-CODE	Human in the Loop for Control and Decision interdisciplinary initiative — control, decision, modelling and human-centred systems.
SMHF GS	Sport, Movement and Human Factors Graduate School — scientific projects and learning community.

- [CIAMS](#)
- [H-CODE](#)
- [Sport Movement Human Factors Graduate School projects](#)

International opportunities and student life

An international placement or mobility period requires academic, administrative, contractual and destination-specific safety approval. Complete the procedure before making any booking.

The EUGLOH alliance offers activities, mobility opportunities and placements. Check the current offer for applicable conditions and dates.

- [EUGLOH opportunities for students](#)
- [International mobility at Université Paris-Saclay](#)

Preventing gender-based and sexual violence

The FUN MOOC Agir contre les violences sexistes et sexuelles has course reference 71013. It takes approximately two hours, is self-paced in French and remains accessible until 29 January 2027. Successful completion earns a badge.

- [MOOC on preventing gender-based and sexual violence](#)

Student engagement

The University may recognise eligible involvement in student associations, civic or elected roles, paid or entrepreneurial activity, and civic service under the current procedure and evidence requirements. Check the elective offer and contact student administration before registration.

Working with Eidos and eCampus

Eidos brings together the programme's shared services and the courses published there. Other teaching spaces remain available through eCampus according to each instructor's guidance.

Area	Student use
Timetable	Sessions, groups, rooms, status, updates and exports.
Libraries	Textbooks and articles linked to courses and activities.
Journal Clubs	Reading corpus, registration, allocation, guidance and deadlines.
Learning material	Quarto slides and resources published in the course context.
JupyterHub	Notebooks for analysis, simulation, artificial intelligence and robotics.
Quizzes	Practice or assessment activities opened by the instructor.
Paul	Contextual assistance on the programme, courses, services and procedures.

Digital security

- Use your institutional identity through Adonis SSO when it is offered.
- Never share a password, access token, copy of student data or privileged administration link.
- Sign out on shared computers and report immediately any access that does not match your role.
- Every administrative decision or timetable change remains subject to human approval.

Sources and abbreviations

This handbook presents the official 2026–2027 Year 1 and Year 2 curricula, together with institutional and induction information relevant to students.

- Official 2026–2027 Year 1 IDSMH curriculum (PR536), version dated 6 September 2026.
- Official 2026–2027 Year 2 IDSMH curriculum (PR463), version dated 6 September 2026.
- Université Paris-Saclay institutional pages for the master's programme, Year 1 and Year 2.
- French national qualification record RNCP 38699.
- Induction information issued by the programme leads for the specialisation choice, placements and September 2026 events.
- [Institutional programme page](#)
- [Institutional Year 1 page](#)
- [Institutional Year 2 page](#)
- [RNCP 38699 qualification record](#)

Assessment abbreviations

Code	Meaning
CCE	Written continuous assessment
CCO	Oral continuous assessment
CCTP	Continuous practical assessment
EE	Written assessment
EEF	Final written assessment
EO	Oral assessment
ETP	Practical assessment
STAGE	Placement assessment

Appendix · Catalogue elective sharing

Catalogue elective EN00014515 is shared across the programmes listed below. This administrative list does not replace the catalogue of options actually available.

Programme	Programme	Programme	Programme
CPES1	CPES3	PR1017	PR1041
PR1110	PR1123	PR1128	PR1129
PR1130	PR1162	PR1169	PR1199
PR1360	PR1375	PR282	PR324
PR377	PR378	PR379	PR391
PR392	PR393	PR406	PR41U
PR441	PR463	PR481	PR526
PR529	PR551	PR594	PR613
PR626	PR628	PR629	PR632
PR645	PR65U	PR662	PR678
PR723	PR731	PR788	PR789
PR87	PR922U	PR927	PR961
PR962U	PR98	PS10007	PS27916
PS28849	PS28891		