PENS-326

Cognitive Landscapes

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Cursus	Sem.	Type
Projeter ensemble ENAC	BA6	Opt.

Language of teaching	English
Credits	4
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	
Hours	**48 weekly**
Courses	4 weekly
Exercises	22 weekly
Project	22 weekly
Number of positions	

Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.

Summary

This course explores how brainwave dynamics can inform urban design through cross-frequency coupling as a model for adaptability, variability, and integration in urban systems.

Content

This interdisciplinary teaching course explores how brainwave dynamics can inform new approaches to spatial planning. Contemporary urban landscapes often lack the cohesion and resonance of historically evolved settlements, largely due to the legacy of 20th-century, object-centered planning paradigms that neglected the formative role of topography and natural systems.
In contrast, the southwestern parts of Tokyo offer an alternative model, where intricate topographical conditions have shaped nature-driven urban environments distinguished by their distinctive atmospheric qualities. Acting as an external force on urban development, the local fluvial terrain enables small-scale functional diversity while maintaining large-scale spatial continuity. The resulting scenery constitutes a cognitively resonant urban landscape that sparks and rewards curiosity, supports programmatic fluidity, and potentially encourages cultural connectivity.
Program:

1. Introduction to an empirically grounded design methodology
2. Mechanisms of neural integration as generative models for urban form
3. Analysis of urban structures along a naturalness spectrum
4. Hands-on contact with EEG (electroencephalography)
5. Identification of cross-frequency-coupling modes (e.g. phase-phase coupling)
6. Digital fabrication of urban landscapes that embody cognitive patterns
7. Production of speculative urban plans based on EEG-derived data
8. Critical evaluation of spatial coherence and emotional resonance

Keywords

neurourbanism, landscape urbanism, cognitive spatial dynamics, complex systems, cross-frequency coupling, digital fabrication

Learning Prerequisites

Important concepts to start the course

- Basic graphic and spatial representation skills
- Introductory knowledge of urban morphology
- Curiosity for cross-disciplinary research methods
- Basic computational literacy, technical affinity
- Collaborative and experimental mindset

Learning Outcomes

By the end of the course, the student must be able to:

- Integrate insights across disciplinary boundaries
- Design and test experimental urban morphologies
- Interpret and classify EEG-derived datasets
- Translate temporal structures into physical models
- Analyze natural and urban formations using spectral techniques
- Discuss and compare theoretical frameworks
- Represent spatial data and conceptual findings effectively
- Identify and articulate patterns of spatial coherence

Transversal skills

- Communicate effectively with professionals from other disciplines.
- Demonstrate a capacity for creativity.
- Use a work methodology appropriate to the task.

Teaching methods

The course combines input lectures by experts from affiliated disciplines, a design assignment conducted in teams of two, and EEG measurement sessions at the Brain Mind Institute.

Expected student activities

Active participation in lectures, engagement in collaborative design work, and involvement in experimental sessions.

Assessment methods

Assessment is based on weekly project results, a midterm presentation, and a final presentation. The overall evaluation takes into account the student's progression over the semester; demonstrable improvement may positively influence the final grade.

- Weekly project results: ~ 68 %
- Midterm presentation (weighted double): ~ 12 %
- Final presentation (weighted triple): ~ 20 %

Resources

Moodle Link

- https://go.epfl.ch/PENS-326