



Programme: Computation in Architecture
Title: Tactical Experimentations: Research Informed Design Inquiry
Module responsible: Paul Nicholas
Period: February 1 st – June 25 th , 2027 (2 nd semester) Exam period: Week 24-25 2027 ECTS-points: 30 ECTS
Contents: This semester focuses on introducing research methods for supporting design-led architectural inquiry [methodology]. Students are required to personally direct a competent, inventive and ambitious architectural investigation of appropriate complexity. The semester begins with the writing of a programme of study that critically reflects upon the work to date in order to identify a personal territory of architectural interest and appropriate methods of investigation [concept & programme]. Focus is placed on the use of research methods, research-by-design primarily, as a critical support for design-led inquiry and the development of innovative practice [practice]. Skill building in computational, simulation and digital fabrication methods is structured to support and enable design investigation. Over the semester, courses and lectures are run in parallel with the design project. These courses introduce and build skills in the use of computer programming as an architectural design tool and developing awareness of digital design practice. Parallel understandings of these same themes are developed through lectures from practitioners and researchers. The semester will include the following courses: -Fundamentals of Computation introduces students to the use of scripting/programming techniques including machine learning as an architectural design tool. The course contextualizes programming topics relative to questions of design methodology, information flows, geometry, building practice and aesthetics. -Parametric Life-Cycle Assessment introduces students to the use of parametric LCA methodologies. The course introduces digital LCA tools and relies on a project-based case study for students to develop a complete assessment and a critical analysis of the results. -CITA sessions. The course introduces students to a broader community of digital practitioners. It includes scheduled visits to architectural practices with particular expertise in simulation, sustainability and materiality as well as presentations given by invited academics, practitioners and researchers from related fields. - Thinking Architecture 2 – The machines to make machines introduces students to environmental accounting for digital fabrication practices through six case studies of workflows and their associated LCA indicators. The class is based in lectures, discussion and LCA data visualization assignments.
Teaching forms: Workshops, Courses, Individual tuition
Learning Outcomes (Knowledge, skills and competences): • Knowledge of design-led research methods and a critical understanding of their merits, limits and contexts of use. • Ability to use relevant architectural theory to define, inform and position design-led research informed investigation. • Can define a personally directed research informed architectural investigation of appropriate complexity.

- Competent use of simulation techniques with developed understandings of their assumptions, abstractions, limits and opportunities within design contexts.
- Competence in deploying appropriate digital design strategies for addressing architectural, structural, fabrication, programmatic and site-based issues.
- Competence with specific material forming techniques and their potential for informing complex architectural proposition.
- Propositional project work that develops personally-directed competencies and knowledge via research methods.

Syllabus: (Number of pages approx.)

- Andrew Adamatzky, Phil Ayres, Gianluca Belotti, *et al.* Fungal architecture. *arXiv preprint arXiv:1912.13262*, 2019.
- Mette Ramsgaard Thomsen, Paul Nicholas, Martin Tamke, Tom Svilans, "A new material vision." *Data, matter, design: Strategies in computational design*, 2020.
- Material Cultures, *Material Reform*. Mack Books, 2022.
- Jeremy Caradonna, "The Industrial Revolution and Its Discontents." *Sustainability*. Oxford University Press, 2022.
- Johan Rockström, Will Steffen, Kevin Noone, *et al.* "A safe operating space for humanity." *nature*, 2009, vol. 461, no 7263, p. 472-475.
- Philippe Descola, *Beyond Nature and Culture*, University of Chicago Press, 2013.
- Vinciane Despret, *Living as a Bird*, Polity Press, 2021.
- Bruno Latour, *We have never been modern*, Harvard University Press, 1993.
- Mette Ramsgaard Thomsen, Nicole Miller, Stine Nielsen. *Fragility*. Ardeth, 2024.
- Frédérique Aït-Touati, Alexandra Arènes and Axelle Grégoire, *Terra Forma. A Book of Speculative Maps*. The MIT Press, 2022
- David Benjamin, *Embodied Energy and Design: Making Architecture Between Metrics and Narratives*. Lars Muller, 2018
- Stuart Brandt, *The clock of the long now: Time and responsibility*. Basic Books, 2008.
- Roman Krznaric, *The Good Ancestor: How to Think Long Term in a Short-Term World*. Random House, 2020.

Method of assessment: Oral exam of 30 minutes

Grading: Grading according to the 7-point grading scale

Censor: Internal grading

Reexam/illness exams: As ordinary but with the precondition that the student submit their project in Digital Exam before the oral examination.

Submission requirements:

Comprehensive design portfolio that records and reflects upon the semester's work (including representations, photographs, drawings, models, 1:1 prototypes, time-based media, etc) Verbal presentation of study.