ENGINEERING PROGRAMME

2024-2025
Year 2 / Year 3

Specialisation option

Low-Tech Engineering – Sustainable housing techniques

OD TYLOTEC

PROGRAMME SUPERVISOR
Jean-Marc BEN GUIGUI

Autumn Semester

Course unit	ECTS Credits	Track	Course code	Title
UE 73	12	Core course	INGLOW LOWTEC1 MALORE	Low-tech Engineering Low-tech Project Low-tech, ethical and responsible management
UE 74	13	Core course	COFALO HABILO LOWTEC2	Low-tech design and manufacturing Ecological and low-tech housing Low-tech Project 2

Spring Semester

Course unit	ECTS Credits	Track	Course code	Title
UE 83	14	Core course	HABITE LORIZON LOWTEC3	Sustainable housing and responsible territory Low-tech deepening Low-tech Project 3

ENGINEERING - OD TYLOTEC

Year 2 / Year 3 - Autumn Semester - Course Unit 73 / 93

Low-tech Engineering [INGLOW]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Objectives

This module aims to provide an in-depth understanding of low-tech issues, key concepts such as low-tech systems and eco-design, as well as concrete practices such as design for low-tech and the circular economy. Students will explore the application areas of low-tech, meet industry players and acquire essential skills to address environmental, social and economic challenges in an innovative and sustainable way.

Course contents

- Introduction to low-tech issues
- Definition of Low-Tech systems and the approach
- Travel and meetings with Low-Tech players
- Definition of needs and uses
- Design at the service of Low-Tech
- Innovation approach and tools
- Eco-Design methods and environmental assessment
- Circular economy

Course material

Bihouix, P. (2014). L'âge des low tech: vers une civilisation techniquement soutenable. Éditions du Seuil.
Raworth, K. (2017). La Théorie du Donut.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	8 hrs	24 hrs	0 hrs	0 hrs	0 hrs

Low-tech Project [LOWTEC1]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Objectives

The realization of the sustainable housing project by the students with our partners Kerloc and Apala is broken down into modules of three times 136 hours over periods 1, 2 and 3. This represents approximately 400 hours of work spread over the 7 months of presence students.

Course contents

The principle of this option is based on project-based learning. The completion of the sustainable housing project should allow students to complete their training in the field. They will also have to train themselves on points that will not be covered in the lessons.

Course material

Assessment

Collective assessment: EVC 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	6	0 hrs	0 hrs	0 hrs	136 hrs	0 hrs

Low-tech, ethical and responsible management [MALORE]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Basic notions of management and project management

Objectives

This module offers a holistic approach to low-tech management, integrating skills in project management, agile methods, scientific research, collective intelligence, change management, ethics, and effective communication, with particular emphasis on visual and project indicators.

Course contents

- Introduction to low-tech management
- Project Management Basics
- Lean, Agile and Holacracy methods
- Introduction to scientific research
- Intelligence Collective
- That which accompanies change
- Responsible and ethical management
- Writing deliverables, visual management and project indicators

Course material

Aubry, C., Appert, E. (2019). L'art de devenir une équipe agile. (n.p.): Dunod.
Ballé, M., Beauvallet, G. (2020). Le management lean: Édition actualisée. France: Pearson.
Boussuat, B., Abgrall, L., Jaouën Kadi, V. (2022). Le Lean management en couleurs: Embarquez vos équipes vers une performance durable - méthode DISC-4Colors. (n.p.): Dunod.
Deslandes, G. (2012). Le management éthique. France: Dunod.
Laloux, F. (2024). Reinventing Organizations - Vers des communautés de travail inspirés. Canada: Tredaniel.
Lenhardt, V., Bernard, P. (2021). L'intelligence collective en action: Repères pour une co-construction du sens de l'entreprise. France: Pearson.
Sousa Cardoso, C. d., & Messina, J.-C. (2019). 121 outils pour développer le collaboratif: animer l'intelligence collective dans vos réunions, ateliers, séminaires. Eyrolles.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Year 2 / Year 3 - Autumn Semester - Course Unit 74 / 94

Low-tech design and manufacturing [COFALO]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI / Jérôme FRIANT

Requirements

Basic notions of design and manufacturing processes

Objectives

Discover a low-tech approach to design and manufacturing. Objectives include introducing 3D design with FreeCAD, exploring prototyping in Fablab, applying the Ashby method to choosing low-tech materials, redesigning common products, and implementing adapted welding, boilermaking and wood processes. Students will work on a concrete project, receive personalized support and present their achievements in a group, while understanding the economic and environmental advantages of the low-tech approach.

Course contents

- Introduction to low-tech design and prototyping
- Materials and choice according to the Ashby method
- Study and redesign of a commonly used product
- Implementation of welding / boilermaking / wood processes
- The wood material and its derivatives
- Advanced 3D design techniques with FreeCAD
- Advanced prototyping in a Fablab
- Practical low-tech design and manufacturing project

Course material

Allwood, J. M., Cullen, J. M., (2012). Sustainable materials: with both eyes open. UIT Cambridge Limited.
Ashby, M. F. (2011). Matériaux et environnement: choix éco-responsable en conception. Dunod.
Ashby, M. F. (2012). Materials and the environment: eco-informed material choice. Butterworth-Heinemann Inc
Grosse, François (2010). Le découplage croissance / matières premières. De l'économie circulaire à l'économie de la fonctionnalité: vertus et limites du recyclage. Futuribles.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Year 2 / Year 3 - Autumn Semester - Course Unit 74 / 94

Ecological and low-tech housing [HABILO]

LEAD PROFESSOR(S): Emmanuel ROZIÈRE / Jean-Marc BEN GUIGUI

Requirements

Basic course in energy and materials

Objectives

This module aims to provide students with the knowledge and skills necessary to design, build, and renovate homes in a sustainable and ecological manner. Focusing on bioclimatic design, the use of local and eco-friendly materials, as well as the adoption of simple and self-sustaining technologies, this module trains students capable of creating resilient, resource-efficient and environmentally friendly homes, while promoting energy and water autonomy.

Course contents

- Bioclimatic design and sustainable architecture
- Local eco-materials for sustainable construction
- Eco-construction of resilient housing
- Renewable energy and energy efficiency for independent housing
- Building thermal
- Sustainable water management
- Ecological hygiene and sanitation
- Simple and appropriate building technologies and autonomous systems

Course material

Bodin, A. (2023). L'habitat permacole: guide pratique de la maison écologique et autonome inspirée par la permaculture. France: Editions Eyrolles.
Boudellal, M. (2011). Ecologique et autonome: Concevoir autrement son habitat. (n.p.): Dunod.
La Grange, C. (2013). La maison écologique: Penser et construire son habitat à moindre frais. France: Ed. de Terran.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Year 2 / Year 3 - Autumn Semester - Course Unit 74 / 94

Low-tech Project 2 [LOWTEC2]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Objectives

The realization of the sustainable housing project by the students with our partners Kerloc and Apala is broken down into modules of three times 136 hours over periods 1, 2 and 3. This represents approximately 400 hours of work spread over the 7 months of presence students.

Course contents

The principle of this option is based on project-based learning. The completion of the sustainable housing project should allow students to complete their training in the field. They will also have to train themselves on points that will not be covered in the lessons.

Course material

Assessment

Collective assessment: EVC 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	7	0 hrs	0 hrs	0 hrs	136 hrs	0 hrs

Year 2 / Year 3 - Spring Semester - Course Unit 103 / 83

Sustainable housing and responsible territory [HABITE]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Objectives

This module aims to train students in the essential principles and practices of sustainability in housing and land use planning. Key points include intelligent waste management, adaptation to climate change, compliance with environmental certifications, promotion of sustainable mobility, integration of permaculture and biodiversity, low-tech planning of cities and territories , as well as understanding sustainable practices in forestry and agroforestry.

Course contents

- Waste management and circular economy
- Adaptation and resilience to climate change in a habitat
- Certification and environmental standards
- Sustainable and alternative mobility
- Permaculture, sustainable landscaping and biodiversity
- Low-tech city and territory
- Sustainable forestry and agroforestry
- Travel and meetings with stakeholders in eco-construction and sustainable housing

Course material

ADEME (2021). Villes low-tech: pour un urbanisme de discernement.
Deboudt, P. (2010). Inégalités écologiques, territoires littoraux & développement durable. France: Presses Universitaires du Septentrion.
Hervé-Gruyer, P., Hervé-Gruyer, C. (2021). Permaculture: guérir la terre, nourrir les hommes. France: Actes Sud.
Pattaroni, L., Kaufmann, V., Rabinovich, A. (2009). Habitat en devenir: enjeux territoriaux, politiques et sociaux du logement en Suisse. Suisse: Presses polytechniques et universitaires romandes.
Villes low-tech: pour un urbanisme de discernement. (2024). France: l'Institut Paris région.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

ENGINEERING - OD TYLOTEC

Year 2 / Year 3 - Spring Semester - Course Unit 103 / 83

Low-tech deepening [LORIZON]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

INGLOW - Low-Tech Engineering: Fundamentals and Practices

Objectives

This module aims to deepen students' understanding of essential aspects of low-tech engineering. It focuses on feedback, responsible communication, low-tech philosophy, history of techniques, low-tech business and entrepreneurial models, responsible digital, industry and low-tech perspective. -electronics tech. Students will be better equipped to integrate these elements into their engineering approach, thus promoting a holistic and sustainable vision.

Course contents

- Feedback, Capitalization and Knowledge Sharing
- Responsible communication
- Low-tech philosophy and engineering ethics
- The history of techniques and low-tech
- Low-tech Business Model and Low-tech Entrepreneurship
- Low-tech and responsible digital
- Industry and low-tech
- Low-tech electronics

Course material

Atelier Paysan. (2021). Reprendre la terre aux machines: manifeste pour une autonomie paysanne et alimentaire. France: Éditions du Seuil.
Crawford, M. B. (2016). Éloge du carburateur: Essai sur le sens et la valeur du travail. France: La Découverte.
Crawford, M. B. (2019). Contact: pourquoi nous avons perdu le monde, et comment le retrouver. France: La Découverte.
Ellul, J. (1988) Le bluff technologique.
Franklin, U. (1989). The Real World of Technology.
Fustec, A. (2024). La stratégie du Y.
Illich, I., Giard, L., & Bardet, V. (1973). La convivialité. Editions du Seuil.
Jarrige, F. (2016). Technocritiques: Du refus des machines à la contestation des technosciences. Canada: La Découverte.
Jevons, W. (1865). The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal Mines.
Mateus, Q., Roussilhe, G. (2023). Perspectives low-tech: comment vivre, faire et s'organiser autrement ?. France: Éditions Divergences.
Mumford, L. (1966). Le Mythe de la machine, technique et développement humain.
Schumacher, E. (1973). Small is Beautiful: A Study of Economics As If People Mattered.
Gaillard Clément. (2023). Une anthologie pour comprendre les Low-Tech.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	3	8 hrs	24 hrs	0 hrs	0 hrs	0 hrs

Year 2 / Year 3 - Spring Semester - Course Unit 103 / 83

Low-tech Project 3 [LOWTEC3]

LEAD PROFESSOR(S): Jean-Marc BEN GUIGUI

Requirements

Objectives

The realization of the sustainable housing project by the students with our partners Kerloc and Apala is broken down into modules of three times 136 hours over periods 1, 2 and 3. This represents approximately 400 hours of work spread over the 7 months of presence students.

Course contents

The principle of this option is based on project-based learning. The completion of the sustainable housing project should allow students to complete their training in the field. They will also have to train themselves on points that will not be covered in the lessons.

Course material

Assessment

Collective assessment: EVC 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	8	0 hrs	0 hrs	0 hrs	136 hrs	0 hrs