Nordic Biomaterials with CHEMARTS

8 - 19 August 2022

Aalto University

Nordic Biomaterials with CHEMARTS

The use of materials today is not sustainable for the environment and our future. Take action and learn how to create new concepts for sustainable material development by combining design, technology and natural materials science in the context of circular economy.

In the coming years, our material world will change dramatically. The overuse of existing raw materials cannot continue and global consumption must decrease. However, our need for materials will not disappear: also in the future, materials will come to nurture us, cover us, comfort us, delight us, as well as keep us alive. This means that we need many new ideas, collaboration across all borders and hard work to replace our existing material systems and consumption habits with more sustainable ones. If used wisely, wood- and plant-based materials offer one possible pathway towards a more sustainable material world: they come from renewable sources, can be modified on a chemical level, and can be used for recyclable or biodegradable products.

Sustainable design and renewable materials

Nordic Biomaterials with CHEMARTS (CHEM-E0165) inspires students to combine design and material science for new cellulose-driven concepts and ideas. Combining natural materials with advanced technologies offer new possibilities for sustainable development within existing and emerging industries.

This graduate-level course teaches students with varying backgrounds (design, science, engineering, business) to combine design with material research. It introduces a broad spectrum of biomaterials, especially wood-and plant-based. During the course, students familiarise themselves with practice-based material research, experience how interdisciplinary material research happens in practice, and explore how raw materials could be turned into innovative business ideas in the context of circular economy.

What is CHEMARTS?

CHEMARTS is a long-term strategic collaboration between two Aalto University schools, the School of Chemical Engineering (CHEM) and the School of Arts, Design and Architecture (ARTS). The schools merged their forces with the aim to invent new ways to harness wood and cellulose. The idea is to research the performance and design of advanced cellulosic materials for innovative uses and inspire students and researchers to create new concepts for the future use of cellulose and other biomaterials.

Responsible Teachers

Pirjo Kääriäinen is Associate Professor of Design and Materialities at Aalto University's School of Arts, Design, and Architecture. Her background is in textile design and manufacturing. Together with professor Tapani Vuorinen she has facilitated the interdisciplinary CHEMARTS collaboration between the School of Arts, Design, and Architecture (ARTS) and the School of Chemical Engineering (CHEM) since 2011. CHEMARTS aims to inspire students and researchers to explore design-driven approaches in materials research and to create future-oriented concepts, applications, and business seeds for a more sustainable world of materials.

Tapani Vuorinen is Professor of Forest Products Chemistry at Aalto University's School of Chemical Engineering, Finland. He has co-authored over 200 peer-reviewed scientific papers on the structure and chemistry of plant biomass and its conversion into chemical and material products. His current research focuses on the chemistry, nanostructure, and reactivity of the plant cell wall. Besides his own scientific substance, Tapani has promoted collaboration between academic disciplines, external stakeholders, and the public through co-organizing interdisciplinary CHEMARTS courses, real-life boot camps, and other partnerships within industrial companies and secondary schools.

Basic information

Application period
1 Feb – 31 May 2022
summer.aalto.fi

Course	Nordic Biomaterials with CHEMARTS
Credits	6 ECTS
Format	Online
Teaching period	8-19 August 2022
Duration	2-week intensive + pre- and post-assignments
Application period	1 February 2022 – 31 May 2022
Eligibility	Bachelor's degree
Course fees	1600€ tuition fee + 300€ programme fee (incl. VAT 24%)
Website	Nordic Biomaterials with CHEMARTS

CHEMARTS aims to inspire students to explore biomaterials and create new concepts for their use.

Photo: Petri Anttila

Learning outcomes

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summer.aalto.fi

Familiarize with materials that are processed either chemically or mechanically from trees or other plants

The ability to develop innovative ideas through hands-on prototyping and experimenting with materials

Understand the principles of scaling the ideas towards innovations and even commercialisation

Awareness of the main sustainability issues related to this field

Experience of an interdisciplinary working environment in practice

Practical arrangements

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summer.aalto.fi

Course schedule

1-5 August: Pre-work (online)

- Optional kick-off meeting
- Self-paced course orientation
- Laboratory Safety course

8-19 August: Intensive weeks (on campus)

- Daily program 9-17, including lectures, discussions, guided experiments, project development, hands-on experimentation in pairs/teams/individually (detailed program to be shared later)
- One-day excursion
- Joint presentation event and feedback discussion

by 31 August: Post-work (online)

- Report including documentation of the research process, individual reflection on key takeaways and course experience.
- Optional joint feedback session

Workload

The total course workload of 160h (6 ECTS) is divided as follows:

- 25h Self-paced orientation and Laboratory Safety course
- 25h Lectures, discussions and presentation
- 40h Class preparation and reflection
- 35h Laboratory work
- 10h Excursion
- 25h Post-work assignment

The course is graded **pass/fail.**

The passing of the course requires active participation individually and in teamwork, and a report of the working process.

Combining natural materials with advanced technologies offer new possibilities for sustainable development within existing and emerging industries.

Project: Chiao-wen Hsu and Yu Chen

Photo: Eeva Suorlahti

Student Testimonials

"**The best part of this course** was that we were able to get practical knowledge about biomaterial practicalities as well as exploring a sustainable mindset and learn about sustainable entrepreneurship. Moreover, we could test our ideas in the laboratory with different biomaterials and tools. We had various guest speakers from several different industries, such as the forest industry, entrepreneurs, investors and artists. We got the opportunity to ask questions and discuss with them – some of my classmates even got to pitch their ideas."

Mariko Yoshida
Aalto University School of Arts, Design and Architecture Master Student
Nordic Biomaterials 2021 Alumna

“I loved the excursion to Verla, a UNESCO World Heritage site with a paper mill established in 1872. The mill, today a museum, produced groundwood pulp and white wood pulp board, and during the visit, we got to follow the technological process from timber cutting and pulp production to board drying, sorting and packing.”

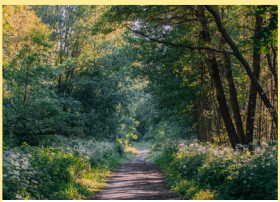
Carolina Weigl
Konstfack University (Stockholm), Industrial and Experience Design Master Student
Nordic Biomaterials 2021 Alumna

Project: Mariko Yoshida

Photo: Petri Anttila

Social Program

Getting to know fellow students from around the world is one of the best things about study abroad experiences. Aalto University Summer School offers extracurricular programme and networking opportunities to get to know both Finland and your new coursemates. See some examples of our activities below!



Excursions to the Finnish Forest

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Take a day trip to the forest or the seaside! Did you know there is a national park only 25 km away from the Otaniemi campus?

Explore the best Helsinki has to offer

—

Discover Helsinki's sights with other Summer School students and hear more about the past and present of the Finnish capital.

Portfolio Photos and Presentation Day

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The course includes portfolio photography by a professional and experienced photographer during Presentation Day. You can add the portfolio photos of your work to your own portfolio or just keep them as a memory.

Photo: Julia Kivelä, Jussi Hellsten / Helsinki Marketing, Eeva Ruorlahti / Aalto University

Application instructions

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summer.aalto.fi

Find a course on summer.aalto.fi

Fill in your application online

Confirm your participation after being accepted

Contact Us

summer@aalto.fi

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