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Process Chemistry Centre



Advanced Courses at  
Laboratory of Natural Materials Technology  
Åbo Akademi University

# Modern Analytical Tools for Pulp, Paper, and Biorefinery

November 20-24, 2023  
Turku / Åbo

**Lecture room: BC Wikgren, Biocity  
Tykistökatu 6, 20520 Turku  
Åbo Akademi University**

# Modern Analytical Tools for Pulp, Paper, and Biorefinery

## DS00CJ20

This course will present recent analytical techniques for pulp and paper. It is a combined course for PhD students and researchers from industry and research institutes.

- For students, who want to earn 5 credits (ECTS) for the course, there will be lectures and essays. We strongly recommend that students should have at least a basic knowledge of wood/biomass chemistry and analytical methods before registering.
- For industry representatives, you may attend all the lectures. Group work and course essay are not required.

### Course leaders:

Prof. Chunlin Xu, Docent Anna Sundberg,  
Laboratory of Natural Materials Technology

### Contact information:

Professor Chunlin Xu  
Åbo Akademi/Laboratory of Natural Materials Technology  
Henrikinkatu 2, FIN-20500 Turku  
Chunlin.Xu@abo.fi

### Course venue:

Åbo Akademi University, BC Wikgren, Biocity, Tykistökatu 6, 20520 Turku, Finland

### Course fee:

-PhD students from other Finnish Universities	Free
-PhD students from other countries	300€
-Representatives from industry and research institutes	800€
-Others, please contact Prof. Chunlin Xu	

The course fee includes lectures, course material, coffee & tea during the breaks, and course get-together (on Tuesday evening).

## Registration:

- Representatives from industry and research institutes, register by *November 14<sup>th</sup>* by e-mail to [Chunlin.Xu@abo.fi](mailto:Chunlin.Xu@abo.fi)
- Students at Åbo Akademi register through Peppi and by sending an e-mail to [Chunlin.Xu@abo.fi](mailto:Chunlin.Xu@abo.fi)
- PhD students from Finnish universities: Register to the course by *November 14<sup>th</sup>* by e-mail to [Chunlin.Xu@abo.fi](mailto:Chunlin.Xu@abo.fi). For transferring credits, Please, find more information on this webpage <https://www.abo.fi/en/study/already-in/flexible-studies/students-from-other-universities/> , and be in contact with your home university..
- Note! there are a limited number of participants

## Accommodation:

Moderate-price hotels at walking distance are found from [www.booking.com](http://www.booking.com).

## Links:

- Homepage of the university:  
<http://www.abo.fi/>
- Information about Turku/Åbo can be found at <http://www.turku.fi/> and <http://www.visitturku.fi/>

Questions? Do not hesitate to contact Prof. **Chunlin Xu**! See you in November!



## Preliminary Course Contents

- Sampling, pre-treatment and extraction of different samples (wood, pulp, paper, waters, deposits), Chunlin Xu, ÅA
- Analysis methods for industry from a chemical company's point of view", Milla Leppä, Kemira
- Lipophilic and hydrophilic extractives – a mess without appropriate analyses, Anna Sundberg, ÅA
- Analysis of cellulose, hemicelluloses and pectins: cleaving and chromatography, Anna Sundberg, ÅA
- SPME – A versatile technique for methanol, volatile terpenes, odorous compounds, cognac aroma etc, Andrey Pranovich, ÅA
- Sensor technology for on-line analysis, Johan Bobacka, ÅA
- Polymerized extractives, Anna Sundberg, ÅA
- Analysis of DisCo in papermaking, Anna Sundberg, ÅA
- Molar mass determinations, Chunlin Xu, ÅA
- Fiber properties -standard and advanced analysis of fibers, pulp and paper, Jan Gustafsson, ÅA
- Flow cytometry, Lari Vähäsalo, CH Bioforce
- Lignin analysis and some microanalytical techniques, Andrey Pranovich, ÅA
- Pyrolysis and thermal chemolysis combined with GC and GC-MS, Andrey Pranovich, ÅA
- NMR spectroscopy, Robert Lassfolk, ÅA
- NMR for Polymer/Nanocellulose analysis, Alistair King, VTT
- Barrier's quality control in industry, Aleksi Pekkanen, UPM
- Barrier properties, Vinay Kumar, VTT

	<b>Monday 20.11</b>
9:45	Registration and coffee
10:00-10:45	Welcome and introduction, Chunlin Xu (NMT, ÅA) Presentation of attendees
10:45-11:45	01 Sampling, pre-treatment and extraction of different samples (wood, pulp, paper, waters, deposits), Chunlin Xu (NMT, ÅA)
11:45	Lunch break
12:45 - 14:15	02 NMR spectroscopy - Introduction, Robert Lassfolk (Organic chemistry, ÅA)
14:15-14:30	Short break for stretching and coffee
14:30-16:00	03a NMR for Polymer/Nanocellulose analysis, Alistair King (Organic Chemistry, VTT)
16:00	Initialization of essays
	<b>Tuesday 21.11</b>
9:00- Coffee at 10:15	04 Pyrolysis and thermal chemolysis combined with GC and GC-MS, Andrey Pranovich (NMT, ÅA)
-11:30	05 Lignin analyses and some microanalytical techniques, Andrey Pranovich (NMT, ÅA)
11::30	Lunch break
13:00-14:00 14:15-15:00	06 Lipophilic and hydrophilic extractives - a mess without appropriate analyses, Anna Sundberg (NMT, ÅA)
15:00-16:00	07 Analysis methods for industry from a chemical company's point of view, Milla Leppä (Kemira)
About 16:30	Lab tour at Aurum (Henrikinkatu 2) and Pizzas in Aurum
	<b>Wednesday 22.11</b>
9:00-10:00 + 10:15-10:50	08 Analyses of cellulose, hemicelluloses and pectins: cleaving and chromatography, Anna Sundberg (NMT, ÅA)
11:00-12:00	09 SPME - A versatile technique for methanol, volatile terpenes, odorous compounds, cognac aroma etc., Andrey Pranovich (NMT, ÅA)
12:00	Lunch break
13:15-14:00	10 Sensor technology for on-line analyses, Johan Bobacka (analytical chemistry, ÅA)
14:15-15:00	11a Polymerized extractives and process waters, Anna Sundberg (NMT, ÅA)
15:10-16:00	11b Analyses of process water, Anna Sundberg (NMT, ÅA)
	<b>Free evening</b>
	<b>Thursday 23.11</b>
9:00-10:00	12 Flow cytometry, Lari Vähäsalo (CH Bioforce)
10:00-10:15	Short break for stretching and coffee
10:15-12:00	13 Fiber properties - standard and advanced analysis of fibers, pulp and paper, Jan Gustafsson (NMT, ÅA)
12:00	Lunch break
13:30-14:30	14 Molar mass determination, Chunlin Xu (NMT, ÅA)
14:30-15:00	Coffee break
15:00- 16:00	Group work on essays
	<b>Free evening</b>
	<b>Friday 24.11</b>
8:30- 10:15	15 Barrier and packaging – classifications and analytical methods, Vinay Kumar (VTT)
10:15-10:30	Coffee break
10:30-12:00	16 Barrier and packaging – industrial perspectives, Aleksi Pekkanen, UPM
<b>12:00</b>	<b>End of the course</b>