

## Transnational course in Biomaterial and Chemistry

Welcome to the Transnational course in Biomaterial and Chemistry. This course is an interdisciplinary course that uses a combination of the ICT, virtual mobility and intensive study programme at LTU, Sweden, DHBW, Germany and Oulu University, Finland. This is done so that basic chemistry and biomaterials can be studied in a flexible, interactive way at the time and place that you as a student prefer but still within the teaching terms. This is done whilst under the guidance and with the expertise of university teachers and researchers working actively within the fields of chemistry and biomaterials. Group work and networking opportunities will allow you to interact with your European colleagues following the same course, allowing you to practice your language skills and establish your own network within Germany and Sweden. It also allows you to work alongside people from different disciplines giving you a broader perspective on careers and possibilities beyond University.

Applications that can use sustainable, lightweight materials are of high interest to companies looking to reduce their dependency on materials derived from fossil fuels; meet the increasing demand for a lower environmental impact of their products and decrease costs.

By attending this course you will gain a good understanding of biomaterials and the chemistry that gives them their properties. This will not only broaden your knowledge in material science but give you a sound basis in chemistry that is useful both in your further studies and in your professional career.

**Timing:** autumn 2018 and spring 2019

### **Intended learning outcomes (ILO):**

- Understand and explain chemical reactions and bonding, display formulas.
- Remember and identify material categories, classify their effects.
- Explain some organic chemistry fundamentals, concepts and terminology and use them for the description of organic chemistry phenomena.
- Name some organic structures, explain their properties, deduce basic reaction types and explain their mechanisms, especially alcohols and carbohydrates.
- Explain some chemical applications in process and environmental technology. In particular, the student will be able to demonstrate novel applications in which chemistry is used.
- Describe and classify different biobased polymers and natural fibres and suitable manufacturing methods for these biobased materials using current scientific literature.
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- Transfer knowledge to/from other disciplines and select and use appropriate methods and tools in these different disciplines as well as gain further digital skills.
- Use new information sources, independently deepen knowledge and reflect over skills level and knowledge in order to increase this were necessary.
- Coordinate work within groups of national and international, interdisciplinary students and take opportunities to establish their own international network and so doing communicate in a foreign language with greater competence and raise intercultural skills.

**Mode of delivery:** Online teaching and face-to-face teaching in the laboratory.

**Learning activities and teaching methods:** 90 hours of online working/independent self-study and 50 hours of laboratory and group work during the intensive study period at LTU, Sweden, DHBW, Germany or Oulu University, Finland.

**Recommended or required reading:**

- Materials- Engineering, Science, Processing and Design; Michael Ashby, Hugh Shercliff and David Cebon. Elsevier, ISBN: 978-0-08-097773-7.
- Oksman, K., Mathew, A. P., Bismarck, A., Rojas, O., & Sain, M. (Eds.). (2014). Handbook of Green Materials: Processing Technologies, Properties and Applications (in 4 volumes) (Vol. 5). World Scientific.
- Hart, H., Craine, L., Hart, D., Hadad, C. (2007). Organic Chemistry: A Short Course, 12. edition, Houghton Mifflin, Boston.
- Scientific articles.

**Assessment methods and criteria:**

*Online assessment: Pass/Fail:*

**Canvas online course Week 1-3:**

There are rated quizzes every Friday you need to finish.

Additionally, there are Discussions you have to participate in.

**Canvas online course Week 4-6:**

There are rated quizzes every Friday and a group project which you must finish.

**Canvas online course Week 7-9:**

There are rated quizzes, online discussion sessions and a group exercises which you must finish.

*Intensive Study Period (ISP) assessment: Pass/Fail:*

- At the end of the intensive study period, the host university course leader will approve your visit based on attendance and performance on the tasks set at the university. The tasks at LTU will be focused on biomaterials, Oulu University will be focused on organic chemistry and biomaterials and at DHBW the tasks will be based on general skills including those that use 3D visual software.

**Other information:** Course uses the web-based learning management system Canvas where a course room is updated regularly with course information. Student should have access to their own computer on which they can install programs. Also an internet connection, headset, microphone and web camera will be necessary. Use Canvas to follow the online course, hand-in written assignment. Make note of any deadline so that you can upload your work in time. You are also welcome to use this forum to ask questions about the activities, tasks and content of the course or for more individual queries you can call or email the relevant person. Keeping up to date in the course room and reading the e-mails sent is important for the course to run smoothly. This course has 3 self-study modules with e-tutorials and assessment and online study group.

Mandatory intensive study period of 10 days (5 working days) at a campus either in Lulea, Sweden, Oulu, Finland or in Karlsruhe, Germany is held 11-20.1.2019.

**Schedule for the course:**

- Introduction to online course **4.10.2018**
- Online Basic chemistry module week 41-43, **8-26.10.2018**.
- Online Organic chemistry module week 44-46, **29.10-16.11.2018**.
- Online Biomaterials module week 47-49, **19.11-7.12.2018**.
- Intensive study period week 2-3, **11-20.1.2019**.