

## KZ8022 Chemistry of Renewable Materials (7.5 ECTS)

### Course outline and schedule – HT24

| day               | Monday   | Tuesday  | Wednesday                            | Thursday   | Friday   |
|-------------------|--|--|--------------------------------------|--|--|
| Week              |  |  |                                      |  |  |
| 44<br>04/11–08/11 | <b>L1-Intro (MS)</b>   | <b>L2-Lignochem (MS)</b><br><b>Poster topics</b>             | <b>L3-polyphenols (JS)</b>           | <b>Lab 1</b><br>LNPs   | <b>Lab 2</b><br>DLS                            |
| 45<br>11/11–15/11 | <b>L4-polysacch (MX)</b>   | <b>L5-charact (MS)</b>                                       | Prep for posters and lab reports     | <b>L6-Lipids (MS)</b>  | <b>Lab 3</b><br>Nanocomp                       |
| 46<br>18/11–22/11 | <b>L7- Proteins (MS) Lab 4</b><br>Antiox.                                | <b>Lab 4</b><br>Antiox. <b>L8-thermochem transform. (MS)</b> | <b>Lab 5</b><br>AFM                  | <b>L9- biochem transf (MS)</b><br><b>Lab 6</b><br>Enz. hydrol. | <b>Lab 7</b><br>Sugar anal.                    |
| 47<br>25/11–29/11 | <b>Assign 9</b><br><b>L10-circularity (MS)</b><br><b>poster DL 14:00</b> | Prep for lab reports & exam                                  | Prep for lab reports & exam          | <b>Lab reports due</b>   | <b>L11-summary (MS)</b><br><b>Poster pres.</b> |
| 48<br>02/12–06/12 | Prep for exam  | Prep for exam  | <b>Written exam</b><br>04/11 at 9-13 |  |  |

**L = lectures, Lab = laboratory exercises, Assign = pre-class assignments**

#### Teachers:

|       |                             |  |
|-------|-----------------------------|--|
| (MS)  | Mika Sipponen               | <a href="mailto:mika.sipponen@mmk.su.se">mika.sipponen@mmk.su.se</a>                           |
| (JS)  | Joseph Samec                | <a href="mailto:joseph.samec@su.se">joseph.samec@su.se</a>                                     |
| (MX)  | Maria Ximena Ruiz Caldas    | <a href="mailto:mariaximena.ruizcaldas@mmk.su.se">mariaximena.ruizcaldas@mmk.su.se</a>         |
| (JL)  | Jing Li                     | <a href="mailto:jing.li@mmk.su.se">jing.li@mmk.su.se</a>                                       |
| (CC)  | Carla Caponio               | <a href="mailto:carla.caponio@mmk.su.se">carla.caponio@mmk.su.se</a>                           |
| (JIN) | Unnimaya Thalakkale Veettil | <a href="mailto:unnimaya.thalakkaleveettil@mmk.su.se">unnimaya.thalakkaleveettil@mmk.su.se</a> |

L: MS, JS, MXRC, AM

La: MM, JIN, JL

PP: MS, MM, JIN

#### Literature:

Course book: Introduction to Renewable Biomaterials: First Principles and Concepts Ali S. Ayoub (Editor), Lucian A. Lucia (Editor); ISBN: 978-1-119-96229-8; November 2017, 288 Pages, available from Stockholm University library as e-book (PDF)

#### Additional course material

Lecture slides

Reading material and other resources for pre-class assignments

| Date |        | Room    | AM (9:00-12:00)   | Room                    | PM (13:00-16:00)  |
|------|--------|---------|---|-------------------------|---|
| Mon  | Nov-4  | C516    | L1: Introduction to Chemistry of Renewable Materials (MS)                               | Library                 | Assignment 1  |
| Tue  | Nov-5  | Library | Assignment 2  | C516                    | L2: Lignocellulose structure and chemistry (MS)   |
| Wed  | Nov-6  | C516    | L3: Chemistry of polyphenols (JS)   | Library                 | Assignment 3  |
| Thu  | Nov-7  | C459    | Lab 1: Preparation of colloidal lignin particles (group A)                              | C459                    | Lab 1: Preparation of colloidal lignin particles (group B)                              |
| Fri  | Nov-8  | C419b   | Lab 2: Characterization of colloidal lignin particles: DLS and zeta potential (group A) | C419b                   | Lab 2: Characterization of colloidal lignin particles: DLS and zeta potential (group B) |
| Mon  | Nov-11 | C516    | L4: Chemistry and applications of polysaccharides (MX)                                  | Library                 | Assignment 4  |
| Tue  | Nov-12 | Library | Assignment 5  | C516                    | L5: Characterization techniques for renewable materials (MS)                            |
| Wed  | Nov-13 | Library | Lab reports   | Library                 | Posters   |
| Thu  | Nov-14 | C516    | L6: Lipids (MS)   | Library                 | Assignment 6  |
| Fri  | Nov-15 | C459    | Lab 3: Preparation of nanocomposite films (group A)                                     | C459                    | Lab 3: Preparation of nanocomposite films (group B)                                     |
| Mon  | Nov-18 | C516    | L7: Proteins (MS)   | Library                 | Lab 4: Characterization of the nanocomposite films: Antioxidant activity (group A)      |
| Tue  | Nov-19 | C459    | Lab 4: Characterization of the nanocomposite films: Antioxidant activity (group B)      | C516                    | L8: Thermochemical biomass transformations (MS)   |
| Wed  | Nov-20 | C268    | Lab 5: Characterization of the nanocomposite films by AFM (JL)                          | C268                    | Lab 5: Characterization of the nanocomposite films by AFM (JL)                          |
| Thu  | Nov-21 | C516    | L9: Biochemical transformations (MS)  | C455                    | Lab 6: Enzymatic hydrolysis (groups A&B)  |
| Fri  | Nov-22 | C459    | Lab 7: Sugar analysis from enzymatic hydrolysis of nanocomposite films (group A)        | C459                    | Lab 7a: Sugar analysis from enzymatic hydrolysis of nanocomposite films (group B)       |
| Mon  | Nov-25 | C516    | L10: Recycling, degradation and biodegradation (MS)                                     | Library                 | Last day to hand in posters (PDF) at 14:00  |
| Tue  | Nov-26 |         | Lab reports and exam prep.  |                         | Lab reports and exam prep.  |
| Wed  | Nov-27 |         | Lab reports and exam prep.  |                         | Lab reports and exam prep.  |
| Thu  | Nov-28 |         | Lab reports due   |                         | Exam preparation  |
| Fri  | Nov-29 | C516    | L11: Summary  | Outside of Magneli Hall | Poster presentations  |
| Mon  | Dec-02 |         | Exam preparation  |                         | Exam preparation  |
| Tue  | Dec-03 |         | Exam preparation  |                         | Exam preparation  |
| Wed  | Dec-04 | C516    | Written exam (9:00-13:00)   |                         |   |

\* See Athena course site for details

**Lectures**

- L1: Introduction (MS)
- L2: Lignocellulose chemistry (MS)
- L3: Polyphenols (JS)
- L4: Polysaccharides (MX)
- L5: Characterization techniques (MS)
- L6: Lipids (MS)
- L7: Proteins (MS)
- L8: Thermochemical biomass transformations (MS)
- L9: Biochemical biomass transformations (MS)
- L10: Recycling, degradation and biodegradation (MS)
- L11: Summary (MS)

**Labs**

- Lab 1: Preparation of colloidal lignin particles
- Lab 2: Characterization of colloidal lignin particles: DLS and zeta potential
- Lab 3: Preparation of nanocomposite films
- Lab 4: Characterization of the nanocomposite films: Antioxidant activity
- Lab 5: AFM for characterization of the nanocomposite films
- Lab 6: Enzymatic hydrolysis of the nanocomposite films
- Lab 7: Sugar analysis from enzymatic hydrolysis of nanocomposite films

**Assignments**

Reading, videos and questions to be completed prior to the lectures