**Preliminary schedule of the course “Wood science and technology” (15 pts.)**

**20th January – 21th March 2025 (SV0046)**

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|  | **Lectures** |
|  | **Individual studies** |
|  | **Demonstrations** |
|  | **Seminars** |
|  | **Industrial excursions (preliminary)** |
|  | **Examination** |

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| --- | --- | --- | --- | --- | --- |
| **Week** | **Date** | **Time** | **Topic** | **Hrs\*** | **Lect.** |
| **4** | 20/01 | 9:00-9:45 | **Introduction- structure and organization of the course**  **Key concepts and limitations of the course**: Sustainable development, biomaterials, bio-refinery, green technologies. Dividing into groups and study tasks. | 1 | NT |
| **Wood science** | | | | |
| 20/01 | 10:00-13:45 | Chemistry of wood and extractives | 3 | RP |
| 21/01 | 9:00-11:45 | Wood anatomy | 3 | GD |
| 13:00-16:00 | Individual studies |  |  |
| 22/01 | 09:00-11:45 | Anatomy of softwoods | 3 | GD |
| 13:00-16:00 | Individual studies |  |  |
| 23/01 | 09:00-11:45 | Anatomy of hardwoods | 3 | GD |
| 13:00-16:00 | Individual studies |  |  |
| 24/01 | 09:00-11:45 | Physical properties of wood. Density, wood-water relationships, shrinkage & swelling. | 3 | NT |
|  | | | | | |
| **5** | 27/01 | 09:00-11:45 | Durability of wood to fungi, insects and marine borers. | 3 | GD |
| 28/01 | 09:00-13:45 | Durability of wood to fungi, insects and marine borers. | 4 | GD |
| 29/01 | 09:00-10:45 | Mechanical properties of wood | 2 | JVB |
| 11:00-11:45 | Thermal properties of wood | 1 | MN |
| 13:00-13:45 | Colour, odour and acoustic properties of wood | 1 | MN |
| 14:00-16:00 | Individual studies |  |  |
| 30/01 | 09:00-11:45  13:00-15:45 | **Demonstration:** Microscopy techniques, microscopy of soft- and hardwoods, detection of decay. (2 groups, 2 h each) | 4 | GD, NT |
| 31/01 | 09:00-10:45  13:00-14:45 | **Demonstration:** Testing of the mechanical properties of wood. (2 groups, 2 h each) | 4 | JVB |
| **Sawmilling of solid wood** | | | | | |
| **6** | 3/02 | 09:00-9:45 | Soft- and hardwood timber classes | 1 | NT |
| 10:00-10:45 | Sawmilling – storage of timber | 1 | NT |
| 11:00-11:45  13:00-13:45 | Sawmilling – measuring of timber; classes | 2 | NT |
| 4/02 | 09:00-10:45 | Sawing of timber – methods and sawn products | 2 | NT |
| 11:00-13:45 | Manual and machine timber grading for construction aims | 2 | NT |
| 13:00-16:00 | Individual studies |  |  |
| 5/02 | 09:00-16:00 | Individual studies |  |  |
| 6/02 | 9:00- | ***Ind. excursion:* Visit** **to Nyby sawmill (Sätra)** | 3 | NT, GD |
| 7/02 | 9:00-11:45 | **Seminar I: Wood science & sawmilling.**  **Group presentations & discussion** | 3 | GD, NT, MN |
| **Industrial wood protection, pulp and paper** | | | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **7** | 10/02 | 09:00-10:45 | Aims of wood protection. Biocides used for chemical wood protection. | 2 | NT | | 11:00-13:45 | Impregnated timber-processing and treated items | 2 | NT | | 11/02 | 09:00-11:45 | Wood modification – aims, mode of action and methods. Acetylation, furfurylation, DMDHEU and other modification methods. Novel approaches for wood modification. | 3 | NT | | 13:00-14:45 | Thermal modification of wood | 2 | NT | | 12/02 | 09:00-10:45  13:00-14:45 | **Demonstration:** Wood protection laboratory (2 groups, 2 h each) |  | NT | | 13/02 | 09:00-13:45 | Pulp and paper – mechanical processing | 4 | GD | | 14/02 | 09:00-16:00 | Pulp and paper –chemical processing | 4 | GD | | | | | | |
| **8** | 17/02 | 09:00-16:00 | Individual studies |  |  |
| 18/02 | 09:00-16:00 | Individual studies |  |  |
| 19/02 | 09:00-16:00 | Individual studies |  |  |
| 20/02 | 09:00-16:00 | Individual studies |  |  |
|  | 21/02 | 09:00-16:00 | ***Ind. excursion:*** **Visit to Skutskär pulp/paper mill**  **(Stora Enso)** |  | NT, GD |
|  | | | | | |
| **9** | 24/02 | 09:00-11:45 | **Seminar II: Wood science, pulp and paper.**  **Group presentations & discussion** | 3 | GD, NT |
| **Wood-engineering products** | | | | |
| 25/02 | 09:00-10:45 | ***Bio-composites***: adhesives, bio-based binders and non-conventional bonding | 2 | SA |
| 11:00-11:45  13:00-15:45 | Wood-based composites: veneer, plywood, structural composite lumber | 4 | SA |
| 26/02 | 09:00-11:45  13:00-13:45 | Wood-based composites: fiber- and particle boards, oriented strand board (OSB). Wood fiber insulation | 4 | SA |
| 27/02 | 09:00-11:45 | Wood thermoplastic composites | 3 | SA |
| 28/02 | 09:00-16:00 | Individual studies |  |  |
|  | | | | | |
| **10** | 3/03 | 09:00-11:45 | Nano-based biomaterials & bio-refineries - Modern approaches for utilizing cellulose, hemicelluloses & lignin in new products and processes | 3 | GD |
| 4/03 | 09:00-11:45 | Nano-based biomaterials & bio-refineries- cont. | 3 | GD |
| 5/03 | 08:30- | ***Ind. excursion:* Visit to Kraton, Söderhamn** | 8 | GD, NT |
| 6/03 | 09:00-10:45  13:00-14:45 | **Demonstration:** Demonstration and identification of biomaterials. Laboratory for composite materials (2 gr., 2 h each) | 4 | SA,NT,  GD |
|  | 7/03 | 09:00-11:45 | **Seminar III: Wood-engineering products, nano-based materials and biorefineries. Group presentations & discussion** |  | SA, GD, NT |
| **Bioenergy, biofuels, timber in buildings** | | | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **11** | 10/03 | 09:00-10:45 | Use of bio-renewable resources for energy – wood | 2 | EA | | 11:00-11:45  13:00-13:45 | Conversion of biomass into heat and power by direct combustion, thermal gasification and anaerobic digestion | 2 | EA | | 11/03 | 09:00-10:45 | Processing of biomass into pellets: technology and applications | 2 | MF | | 13:00-15:45 | ***Construction timber in buildings*** - modern developments for using solid wood & glulam in high buildings & bridges. | 3 | LP | | 12/03 | 09:00-16:00 | Individual studies |  |  | | 13/03 | 09:00-11:45  13:00-13:45 | ***Other biomaterials*** – Non-wood fibers (bamboo, hemp, rattan, flax) available and biological/physical/mechanical characteristics, properties and limitations. Current commercial uses of non-wood fiber materials in composites and their potential and competition to wood fibers. | 4 | PA, NT | | 14/03 | 09:00-11.45 | **Seminar IV: Industrial wood protection and non-wood materials. Group presentations & discussion** | 3 | GD, NT, SA | |  | | | | | | | | | | | |
| **12** | 17/03 |  | Pre-examination individual studies |  |  |
| 18/03 |  | Pre-examination individual studies |  |  |
| 19/03 |  | Consultation before the examination | 6 | All involved |
| 20/03 |  | **Examination** | 6 | GD, NT, SA |
| 21/03 |  | **Examination** | 6 | GD, NT, SA |
|  |  |  | ***Preliminary total: 83 h lectures, 16 h demonstrations, 12 h seminars, 3 excursions (18 h)*** |  |  |

\**Academic hour equal to 45 min*

***Lecturers:***

RP Rafail Papadakis

LP Lidia Proykina

MN Meysam Nazari

SA Stergios Adamopoulos

GD Geoffrey Daniel

EA Erik Anerud

NT Nasko Terziev

MF Michael Finell

JVB Joran Van Blokland

PA Percy Alao

***Location:*** See the attached map

***Communication:*** SLU, Dept. of Forest Biomaterials and Technology, Vallvägen 9D, 756 51, Uppsala

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***Language:*** English

***Compulsory:*** Lectures, seminars and excursions

***Lunchtime*:** always at 11:45-13:00

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**Vallvägen 9D**