**Schedule of the course “Wood science and technology” - 15 pts**

**17th January - 23rd March 2022 (SG0213)**

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|  | **Lectures** |
|  | **Individual studies** |
|  | **Student-lecturer(s) individual discussions** |
|  | **Seminars** |
|  | **Examination** |

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| **Date** | **Time** | **Topic** | **Hrs\*** | **Lect.** |
| 17/01 | 13:00-14:45 | **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. | 2 | GD, NT |
| **Wood science** | | | | |
| 18/01 | 09:00-11:45 | Chemistry of wood and extractives | 3 | MJ |
| 13:00-13:45 | Variations and interrelations between the wood properties. Statistical tools in wood science | 1 | NT |
| 19/01 | 09:00-11:45 | Anatomy of softwoods | 3 | GD |
| 13:00-16:00 | Individual studies |  |  |
| 20/01 | 09:00-11:45 | Anatomy of hardwoods | 3 | GD |
| 13:00-16:00 | Individual studies |  |  |
| 21/01 | 09:00-11:45 | Durability of wood to fungi, insects and marine borers. | 3 | GD |
|  | | | | |
| 24/01 | 09:00-11:45  13:00-14:45 | Durability of wood to fungi, insects and marine borers. | 4 | GD |
| 14:00-16:00 | Individual studies |  |  |
| 25/01 | 09:00-11:45 | Physical properties of wood. Density, wood-water relationships, shrinkage & swelling. | 3 | NT |
| 13:00-13:45 | Thermal properties of wood | 1 | MN |
| 26/01 | 09:00-9:45 | Colour, odour and acoustic properties of wood | 1 | NT |
| 10:00-10:45 | Mechanical properties of wood | 1 | JVB |
| 11:00-11:45 | Weathering of wood and consequences | 1 | MJ |
| 13:00-13:45 | Brief review – most used timbers of the world | 1 | NT |
| 14:00-16:00 | Individual studies |  |  |
| 27/01 | 09:00-11:45  13:00-13:45 | Student-lecturer(s) individual discussion | 4 | MJ, NT,  GD, JVB |
| 28/01 | 09:00-11:45  13:00-13:45 | Student-lecturer(s) individual discussion | 4 | MJ, NT,  GD |
| **Sawmilling of solid wood** | | | | |
| 31/01 | 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 |
| 01/02 | 09:00-10:45 | Sawing of timber – methods and sawn products | 2 | NT |
| 11:00-11:45 | Manual and machine timber grading for construction aims | 1 | JVB |
| 13:00-16:00 | Individual studies |  |  |
| 02/02 | 09:00-16:00 | Individual studies |  |  |
| 03/02 | 09:00-16:00 | Individual studies |  |  |
| 04/02 | 13:00-16:00 | **Seminar I: Wood science & sawmilling.**  **Group presentations & discussion** | 3 | GD, NT,  MJ, JVB |
| **Pulp and paper** | | | | |
| 07/02 | 09:00-11:45  13:00-13:45 | Pulp and paper – mechanical processing | 4 | DF |
| 08/02 | 09:00-11:45  13:00-13:45 | Pulp and paper –chemical processing | 4 | GD |
| 09/02 | 09:00-16:00 | Individual studies |  |  |
| 10/02 | 09:00-16:00 | Individual studies |  |  |
| 11/02 | 09:00-11:45  13:00-15:45 | Student-lecturer(s) individual discussion | 6 | GD, DF |
|  | | | | |
| 14/02 | 09:00-11:45 | **Seminar II: Wood science, Pulp and paper.**  **Group presentations & discussion** | 3 | GD, DF, MJ, NT |
| **Wood-engineering products** | | | | |
| 15/02 | 09:00-10:45 | ***Bio-composites***: adhesives, bio-based binders and non-conventional bonding | 2 | MJ |
| 11:00-11:45  13:00-15:45 | Wood-based composites: veneer, plywood, fiber- and particle boards, oriented strand board (OSB) | 4 | SA |
| 16/02 | 09:00-11:45  13:00-13:45 | Wood-based composites: Cross-laminated timber (CLT) and laminated veneer lumber (LVL). Wood fiber insulation | 4 | SA |
| 17/02 | 09:00-11:45 | Wood thermoplastic composites | 3 | MJ |
| 18/02 | 09:00-16:00 | Individual studies |  |  |
|  | | | | |
| 21/02 | 09:00-11:45 | Nano-based biomaterials & biorefineries - Modern approaches for utilizing cellulose, hemicelluloses & lignin in new products and processes | 3 | GD |
| 22/02 | 09:00-11:45 | Nano-based biomaterials & biorefineries- cont. | 3 | GD |
| 23/02 | 09:00-16:00 | Individual studies |  |  |
| 24/02 | 09:00-16:00 | Individual studies |  |  |
| 25/02 | 09:00-11:45  13:00-15:45 | Student-lecturer(s) individual discussion | 6 | SA, GD,  DF, MJ |
| **Industrial wood protection** | | | | |
| 28/02 | 09:00-9:45 | Aims of wood protection. Biocides used for chemical wood protection | 1 | MJ |
| 10:00-11:45 | Impregnated timber-processing and treated items | 2 | NT |
| 13:00-16:00 | Individual studies |  |  |
| 01/03 | 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 | MJ |
| 13:00-14:45 | Thermal modification of wood | 2 | JG |
| 02/03 | 09:00-16:00 | Individual studies |  |  |
| 03/03 | 09:00-16:00 | Student-lecturer(s) individual discussion | 6 | MJ, NT, JG |
| 04/03 | 09:00-11:45 | **Seminar III: Wood-engineering products, nano-based materials and biorefineries.**  **Group presentations & discussion** | 3 | GD, SA, DF, MJ, NT, JG |
|  |  | **Bioenergy, biofuels, timber in buildings** |  |  |
| 07/03 | 09:00-10:45 | Use of bio-renewable resources for energy – wood, herbaceous crops, algae | 2 | JJ |
| 11:00-11:45  13:00-13:45 | Conversion of biomass into heat and power by direct combustion, thermal gasification and anaerobic digestion | 2 | JJ |
| 08/03 | 09:00-10:45 | Processing of biomass into chemicals and fuels: breakdown to sugars, alcohols, biodiesel and thermochemical conversion | 2 | MS |
| 13:00-15:45 | ***Construction timber in buildings*** - modern developments for using solid wood & glulam in high buildings & bridges. | 3 | PG/JVB |
| 09/03 | 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 | DF, NT |
| 10/03 | 09:00-16:00 | Individual studies |  |  |
| 11/03 | 09:00-11.45 | **Seminar IV: Industrial wood protection and non-wood materials. Group presentations & discussion** | 3 | GD, SA, DF, MJ, NT, JG |
|  | | | | |
| 14/03 |  | Pre-examination individual studies |  |  |
| 15/03 |  | Pre-examination individual studies |  |  |
| 16/03 |  | Pre-examination individual studies |  |  |
| 17/03 |  | Pre-examination individual studies |  |  |
| 18/03 | 09:00-16:00 | Consultation before the examination | 6 | All staff |
|  | | | | |
| 21/03 |  | Pre-examination individual studies |  |  |
| 22/03 | 09:00-16:00 | **Examination** | 6 | GD, NT, SA |
| 23/03 | 09:00-16:00 | **Examination** | 6 | GD, NT, SA |
|  | | | | |
|  |  | ***Preliminary total: 82 h lectures, 32 h consult., 12 h seminars*** |  |  |

\**Academic hour equal to 45 min*

***Lecturers:***

PG Patrice Godonou

MN Meysam Nazari

SA Stergios Adamopoulos

GD Geoffrey Daniel

DF Dinesh Fernando

JG Jie Gao

JJ Jeevan Jayasuriya

MJ Mohamed Jebrane

NT Nasko Terziev

MS Mats Sandgren

JVB Joran Van Blokland

***Location:*** SLU, Dept. of Forest Biomaterials and Technology

Vallvägen 9D, 750 07 Uppsala, Sweden

***Communication:*** Zoom video/audio

***Language:*** English

***Compulsory:*** Lectures, seminars

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