# A Curriculum Proposal for Forestry Engineering Studies at Degree Level According to USAEE<sup>1</sup> Guidelines

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#### Abstract

The aim of the present work is to draw up a proposal of core subjects for study courses in Forestry and Natural Environment engineering according to the guidelines from the thematic network, Studies of Agricultural Engineering in Europe (USAEE, 2006) and the Ibero-American Association of Institutes of Engineering Education (ASIBEI, 2005), taking into account the objectives of the Bologna declaration and according to the Spanish legal framework about the European Higher Education Area (EHEA). It provides a summary of the USAEE document which, after an overview of Agricultural Engineering studies in Europe, proposed a 3-year (or 180 European Credit Transfer System, ECTS) programme of studies to obtain the degree of Agricultural engineer (or Biological or Biosystems engineer). The curricular guidelines for engineering courses in Latin America drawn up by the Ibero-American Association of Institutes of Engineering Education (ASIBEI, 2005). Based on that information, this work make a proposal of engineering syllabuse Forest and Natural Environments, a courses structure with the same groups of subjects and number of ECTS credits as recommends the USAEE network, and with a structure which is as similar as possible to engineering studies in Latin America.

#### Introduction

The structural reforms inspired by the Bologna process (1999) constitute an opportunity to reorganize university studies programmes to obtain different titles of degree in AgroForestry and Natural Environment engineering.

A paper of European Commission (2007) starts with the three reform priorities in the Bologna Process and explains the Commission contribution to the realisation of these priorities: quality assurance, the degree system and recognition of degrees and study periods. The

<sup>&</sup>lt;sup>1</sup> University Studies of Agricultural Engineering in Europe (Thematic Network)

Bologna process is more than half-way, the reforms are in the laws, now reforms have to become a reality for students and teachers in everyday university life.

The degree system - towards a European Qualifications Framework (EQF): Ministers in Bergen (2005) adopted the overarching framework for qualifications in the EHEA, comprising three cycles, generic descriptors for each cycle based on learning outcomes and competences, and credit ranges in the first and second cycles. Both the EQF for LLL (Life Long Learning) and the EQF for the EHEA are formulated in generic terms (knowledge, skills and competences to be achieved at a given level of qualification). In order to become operational, EQFs will need to be translated in both National Qualifications Frameworks (NQF) for Member States and Regions and Sectoral Qualifications Frameworks (SQF) for specific disciplines or areas of professional activity. The Commission supports networking of national frameworks and the development of sectoral frameworks at European level.

In Spain, the successive governments, from year 2003, have enacted legislation regarding EHEA (the first, about European Diplome Supplement<sup>2</sup> at 11/09/2003, and relating to European Credit Transfer System at 18/9/2003); the last published at 30/10/2007 (Royal Decree 1393/2007 of 29 October 2007), establishes organization of official university education according to above guidelines of European Commission.

In this work we will focus on the definition and justification of knowledge and skills needed to training education of professionals in engineering Forestry and Natural Environments, according to the general European guidelines, Spanish current regulations and principal guidelines of European Agroforestry and Environmental frameworks to establish core curricula in engineering studies in Agronomy, Forestry and Environment.

#### New Challenges for Spanish Universities: Legal framework

To establish the degree system the last Spanish regulation proposes that the teachings degree have as the main objective a general education of the students, in one or more disciplines, aimed at preparing for the performance of activities of a professional nature.

The current regulation also establishes the basis for developing universities curricula: The degree programmes, master and doctorate (PhD) levels of University education will be impart by the Universities to lead the relevant official titles.

According to the Royal Decree 1393/2007 of 29 October 2007, the fulfilment of the objectives set out in the curriculum leading to degrees university will be measured in European credits

<sup>&</sup>lt;sup>2</sup> The Diploma Supplement is being promoted as part of the single European Framework for Transparency of Qualifications and Competences

(ECTS) and the level of learning achieved by students in official teachings of Degree and Masters Degree, shall be expressed in numerical scores.

The current regulations and for each cycle (Bachelor or Graduate, Master and Doctorate) include a list of the minimum of competences and skills to reach with learning objectives depending on programme degree.



The basic guidelines that Spanish regulations establishes to design degree titles (graduate) are: The studies programmes will have 240 ECTS; they will contain all the theoretical and practical training the student should acquire, such as basic aspects of the branch of knowledge, mandatory or optional subjects, seminars, external practices, work directed, work order Grade or other educational activities. The development and defense of a final-year project will be the end of training of this level.

The University will propose the allocation of the corresponding degree title to any of the following branches of knowledge:

A) Arts and Humanities

B) Science.

C) Health Sciences.

D) Legal and Social Sciences.

E) Engineering and Architecture

For the branch of engineering and architecture, study programme should contain a minimum of 60 credits of basic training, of which at least 36 will be linked to some of the following matters: Graphic Expression, Physics, Informatics, Mathematics, Chemistry, Enterprises.

These matters should be determined in subjects with a minimum of 6 credits each and will be offered in the first half of the studies programme.

The remaining credits to 60, where appropriate, must be configured for core subjects in the same or other branches of knowledge of the above-mentioned. Also it is possible to complete those 60 credits with other matters accounting its basic character for the initial formation of the student or its cross character.

If practices are scheduled outside, they will have a maximum length of 60 credits and should be provided preferably in the second half of the studies programme.

The final-year project will take between 6 and 30 credits, it must be carried out in the final stage of the programme and be oriented to the assessment of skills associated with the title.

#### Spanish engineering studies and the problematic of adaptation to EHEA

In Spain the qualifications in engineering are divided in two levels which are distinguished by length of studies programmes: "higher technical engineering" (first and second cycles) of a total length of 5 years (in some cases of 6 years), with access to PhD studies, and "technical engineering" (first cycle) of a total length of 3 years, with a more professional approach. The impact of Bologna on this scenario is still uncertain (Cuadra, 2007). So, according to the Bologna process, in year 2003, and because an announcement of the National Agency of Quality Evaluation and Accreditation (ANECA), 30 Spanish university institutions of agronomic and forestry engineering get together to prepare a work with the curricula guidelines for the syllabuses of "Agronomy engineer" and "Forestry and Natural Environment engineer" titles of degree (ANECA, 2005).

In this work, to make a proposal of core subjects for the studies of the Forestry and Natural Environment engineer, we are based on the quoted document from ANECA, the guidelines from the thematic network Studies of Agricultural Engineering in Europe (USAEE, 2006) and the Ibero-American Association of Institutes of Engineering Education (ASIBEI, 2005).

### Basis for a Curriculum Proposal for Forestry Engineering and Natural Environment Management

The main objective of the USAEE TN is to establish the core curricula requirements for Agricultural Engineering University studies in Europe (as well as Biosystems and Biological Engineering, or similar titles).

From the point of view of the Forest engineering studies, the SILVA Network, European Academic Network for Forest Sciences and a Standing Committee for Forestry of ICA (Interuniversity Consortium for Agriculture and Related Sciences) has over 40 member

institutions involved in higher forestry education representing most European countries, in co-operation with AFANet - SOCRATES Thematic Network for Agriculture, Forestry, Aquaculture and the Environment and "Improvement of Distance Education in Forestry" (2003). The ultimate aim of SILVA Network is to maintain and improve the high quality, competence and attractiveness of European forestry education in Europe and in a global context.

Moreover, it is interesting to encourage attractiveness and cooperation with other parts of the world. An effective educational network would enhance the attractiveness of European higher education over the other continents. Engineers from Ibero-American countries agreed to promote certification and accreditation in a concerted way, on common basis and approach that allowing to quality assurance and assessment guarantee academic quality of their graduates. In this sense, there are different works and meetings like the project Tuning-Latin America (Gonzalez et al. 2004), Gómez, 2005, ASIBEI journal, 2006,...

Thematic network, USAEE (2006), after an overview of Agricultural Engineering studies in Europe, proposed a 3-year (or 180 European Credit Transfer System, ECTS) programme of studies to obtain the degree of Agricultural engineer (or Biological or Biosystems engineer). The general training course categories include a high percentage of basic and engineering sciences, with the aim of incorporating graduates into the labour market, where they will acquire the necessary specialisation in the workplace. Another degree course is contemplated, also with a duration of 3 years, which would not provide a professional qualification but would qualify the holder to continue to postgraduate level and also facilitate mobility. In this case specialisation would not be acquired in the workplace but in post-graduate university studies. These specialisation modules are also proposed in the USAEE text. The structure of the study programme is shown in Table 1.

| Subject Groups              | Credits | Rates   |
|-----------------------------|---------|---------|
| Basic subjects              | 36-45   | 20-25 % |
| Basic Engineering Sciences  | 72-81   | 40-45 % |
| Basic AgroForestry Sciences | 36-45   | 20-25 % |
| Optional subjects           | 18-27   | 10-15 % |
| Total                       | 180     | 100 %   |

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The curricular guidelines for engineering courses in Latin America drawn up by the Ibero-American Association of Institutes of Engineering Education (ASIBEI, 2005) used information provided by eleven higher education institutions in Latin America (Argentina, Brazil, Colombia, Chile, Mexico, Peru, Uruguay, Venezuela, Portugal and Spain (represented by the Polytechnic University in Madrid). The panorama of Latin American Engineering studies is very heterogeneous and is structured into subject groups which are similar to those proposed by USAEE (Table 2).

Table 2

| Subject Groups              | Rates | Average rates |
|-----------------------------|-------|---------------|
| Basic subjects              | 17-35 | 24 %          |
| Basic Engineering Sciences  | 15-38 | 27 %          |
| Basic AgroForestry Sciences | 15-55 | 29 %          |
| Optional subjects           | 0-20  | 11 %          |
| Total                       | 100%  |               |

Based on the above, this work proposes a course structure with the same subject groups and number of ECTS credits (European Credit Transfer System) as in the USAEE network recommendations, and with a structure which is as similar as possible to engineering studies in Latin America (Table 3).

|                | Table 3                     |         |       |
|----------------|-----------------------------|---------|-------|
| Туре           | Subject Groups              | Credits | Rates |
| Non- technical | Basic subjects              | 45      | 25 %  |
|                | Optional subjects           | 18      | 10 %  |
| Technical      | Basic Engineering Sciences  | 72      | 40 %  |
|                | Basic AgroForestry Sciences | 45      | 25 %  |
|                | Total                       | 180     | 100 % |

# A Curricular proposal for studies in Engineering Forestry and Natural Environments Management

In this section is presented a study programme of 4 years (240 ECTS), according to Spanish regulation. The following tables (4 to 7) contain subjects and credits for each.

| Tabla 4: First | course |
|----------------|--------|
|----------------|--------|

| Subject                | ECTS | Subject matter  | Subject Groups             |
|------------------------|------|-----------------|----------------------------|
| Calculus               | 6    | Mathematics     | Basic                      |
| Algebra                | 6    | Mathematics     | Basic                      |
| Physics                | 6    | Physics         | Basic                      |
| Chemistry              | 6    | Chemistry       | Basic                      |
| Informatics            | 6    | Informatics     | Basic                      |
| Engineering design and | 6    | Technical       | Basic Engineering Sciences |
| computer graphics      |      |                 |                            |
| Business Organization  | 6    | Legal and       | Basic Engineering Sciences |
|                        |      | Social Sciences |                            |
| Thermodynamics         | 5    | Technical       | Basic Engineering Sciences |
| Statics                | 5    | Technical       | Basic Engineering Sciences |
| Optional               | 8    | Humanities      | Basic                      |
| TOTAL                  | 60   |                 |                            |

#### Table 5: Second course

| Subject                     | ECTS | Subject matter | Subject Groups              |
|-----------------------------|------|----------------|-----------------------------|
| Advanced Calculus           | 6    | Mathematics    | Basic                       |
| Statistics                  | 6    | Mathematics    | Basic                       |
| Dynamics                    | 5    | Technical      | Basic Engineering Sciences  |
| Fluid Mechanics             | 5    | Technical      | Basic Engineering Sciences  |
| Thermotechnics              | 5    | Technical      | Basic Engineering Sciences  |
| Electricity and electronics | 5    | Technical      | Basic Engineering Sciences  |
| Edaphology                  | 5    | Sciences       | Basic AgroForestry Sciences |
| Meteorology and             | 5    | Sciences       | Basic AgroForestry Sciences |
| Climatology                 |      |                |                             |
| Optionals (at least 2)      | 10   | Technical      | Basic Engineering Sciences  |
| Optionals                   | 5    | Humanities     | Basic                       |
| Optional                    | 5    | Sciences       | Basic AgroForestry Sciences |
| TOTAL                       | 60   |                |                             |

#### Table 6: Third course

| Subject                | ECTS | Subject matter | Subject Groups              |
|------------------------|------|----------------|-----------------------------|
| Operation Research     | 4    | Mathematics    | Basic                       |
| Dynamical systems      | 4    | Technical      | Basic                       |
| Plant Biology          | 5    | Sciences       | Basic                       |
| Animal Biology         | 5    | Sciences       | Basic                       |
| Biochemistry           | 4    | Chemistry      | Basic                       |
| Ecology                | 5    | Sciences       | Basic                       |
| Optionals (at least 2) | 18   | Technical      | Basic Engineering Sciences  |
| Optionals (at least 2) | 15   | Sciences       | Basic AgroForestry Sciences |
| TOTAL                  | 60   |                |                             |

#### Table 7: Fourth course

| Subject                  | ECTS | Subject matter    | Subject Groups              |
|--------------------------|------|-------------------|-----------------------------|
| Greenhouses and          | 5    | Sciences          | Basic AgroForestry Sciences |
| Nurseries                |      |                   |                             |
| Parks, gardens and urban | 5    | Sciences          | Basic AgroForestry Sciences |
| trees                    |      |                   |                             |
| Landscape                | 5    | Sciences          | Basic AgroForestry Sciences |
| Projects                 | 4    | Technical         | Basic Engineering Sciences  |
| Territory Planning       | 4    | Technical         | Basic Engineering Sciences  |
| Marketing Analysis       | 4    | Technical         | Basic Engineering Sciences  |
| Optionals                | 15   | Technical         | Basic Engineering Sciences  |
| Optionals                | 10   | Sciences          | Basic AgroForestry Sciences |
| Final-year project       | 8    | After to pass the | total of programme subjects |
| TOTAL                    | 60   |                   |                             |

In this proposal the course units are those that appear in the USAEE work (2006): fundamental core basic Engineering Sciences (44 ECTS) and fundamental core basic Agricultural/ Biological Sciences (25 ECTS).

Two modules or specializations are proposed: Forest Production and Forest Industry with optional subjects in Engineering Sciences (28 ECTS) and Agricultural/ Biological Sciences (20 ECTS), classified according to the above subject groups (see table 8).

| Subject Groups                 | Speciality  |   |  |  |  |
|--------------------------------|---|---|--|--|--|
|                                | Forest Production   | Forest Industry   |  |  |  |
| Basic Engineering<br>Sciences  | <ul> <li>GeneraTechnology of<br/>forest products.</li> <li>Surveying and GIS.</li> <li>Remote Sensing.</li> <li>Forest Exploitation.</li> <li>Forest Machinery.</li> <li>Forest tracks.</li> <li>Hydrology .</li> <li>Irrigation systems.</li> <li>Precision Forestry<br/>Technology</li> </ul>                         | <ul> <li>Physics of the wood.</li> <li>General and Industrial<br/>Technology.</li> <li>Surveying and GIS.</li> <li>Forest Exploitation</li> <li>Forest and Industrial Machinery.</li> <li>Forest tracks.</li> <li>Instrumental Analysis.</li> <li>Chemistry of non-woody forest<br/>products.</li> <li>Technology non-woody forest<br/>products</li> <li>Timber Technology</li> <li>Timber Structures</li> <li>Quality control</li> </ul>   |  |  |  |
| Basic AgroForestry<br>Sciences | <ul> <li>Trees Measurement</li> <li>Silviculture.</li> <li>Reforestation.</li> <li>Forest Management and<br/>Assessment.</li> <li>Forest Diseases and<br/>Pests.</li> <li>Forest Fire-Fighting.</li> <li>Hunting knowledge.</li> <li>Forest Genetics.</li> <li>Fishing knowledge.</li> <li>Grazing knowledge</li> </ul> | <ul> <li>Environmental impact<br/>assessment.</li> <li>Forest Diseases and Pests.</li> <li>Management and treatment of<br/>waste.</li> <li>Environmental Management.</li> <li>Silviculture and reforestation.</li> <li>Forest Management and<br/>Assessment.</li> <li>Timber Treatments.</li> <li>Drinking water and wastewater.</li> <li>Sanitary Engineering.</li> <li>Industries of Cork bark, resins and<br/>essentials oil.</li> </ul> |  |  |  |

 Table 8: Subjects of Specialities and Subject groups

To sum up the contents of the previous tables, grouping the first three courses (180 ECTS), we have table 9, and the fourth and last course (60 ECTS) with the previous specialization subjects in table 10.

| Basic         Calculus         5         x           Advanced Calculus         5         x           Advanced Calculus         5         x           Advanced Calculus         5         x           Advanced Calculus         5         x           Optionals         Physics (8)         Physics         8         x           Chemistry (8)         Chemistry         4         x         Biochemistry         4         x           Optionals         Legal and Social Sciences         Economy         5         x         Economy         5         x           Informatics         Estitics         5         x         Economy         5         x           Basic (16)         Physics of modulation         4         x         Economy         4         x           Basic (44)         Engineering design and computer graphics.         5         x         Materials Strength         5         x           Basic (44)         Fluid Mechanics         5         x         Hydrology         4         x           Physics of wood         5         x         Hydrology         4         x         Electricity and electronics         5         x           Basic (28) </th <th>Subject Groups</th> <th>Subject matter</th> <th>Subjects</th> <th>ECTS</th> <th>Туре</th>  | Subject Groups    | Subject matter                    | Subjects                                   | ECTS | Туре |
|---|-------------------|-----------------------------------|--|------|------|
| Basic         Mathematics (24)         Advanced Calculus         5         x           Appera         5         x           Operation Research         4         x           Physics (8)         Physics         8         x           Optionals         Legal and Social Sciences         8         x           Informatics (5)         Informatics         5         x           Isochemistry         4         x         x           Informatics (5)         Informatics         5         x           Economy         5         x         x           Isochemistry         4         x         x           Informatics (5)         Informatics         5         x           Economy         5         x         x           Isocial Sciences         5         x         x           Basic (44)         Fluid Mechanics         5         x           Physics of wood         5         x         x           Basic Engineering         Sciences         5         x           Sciences         Optionals (28)         Forest Exploitation         5         x           Forest Exploitation         5         S         x   |                   | -                                 | Calculus                                   | 5    | x    |
| Mathematics (24)         Agebra<br>Statistics         5         x           Basic         Physics (8)<br>Chemistry (8)         Physics         8         x           Dytionals         Informatics (5)         Informatics (5)         Informatics         5         x           Optionals         Legal and Social Sciences         Economy         5         x           Informatics (5)         Informatics         5         x           Informatics (6)         Informatics         5         x           Informatics (6)         Engineering design and computer graphics.         5         x           Informatics (6)         Statics         5         x         x           Basic (44)         Engineering design and computer graphics.         5         x           Basic (44)         Engineering design and computer graphics.         5         x           Thermodynamics         5         x         1         1         1           Basic Engineering         Spread and Industrial Technology         4         x         2           Optionals (28)         Forest Exploitation         5         1         1         1         1         1         1         1         1         1         1         1         1 <td></td> <td></td> <td>Advanced Calculus</td> <td>5</td> <td>х</td>  |                   |                                   | Advanced Calculus                          | 5    | х    |
| Basic         Statistics         5         x           Operation Research         4         x           Physics (8)         Physics         8         x           Chemistry (8)         Biochemistry         4         x           Informatics (5)         Informatics         5         x           Optionals         Legal and Social Sciences         Technical and Financial Management         5         x           Its         Economy         5         x         5         x           Basic (14)         Engineering design and computer graphics.         5         x         5         x           Basic (144)         Fluid Mechanics         5         x         5         x           Basic (144)         Fluid Mechanics         5         x         5         x           Basic Capineering         Sciences         5         x         7   |                   | Mathematics (24)                  | Algebra                                    | 5    | х    |
| Basic         Operation Research         4         x           Physics (8)         Physics         8         x           Chemistry (8)         Chemistry         4         x           Informatics (5)         Informatics         5         x           Optionals         Legal and Social Sciences         5         x           (18)         Sociology and Ethics         4         -           Sociology and Ethics         5         x         -           Basic (44)         Fugineering design and computer graphics.         5         x           Basic (44)         Fugineering design and computer graphics.         5         x           Basic Engineering         5         x         -         -           Dynamics         5         x         -         -           Basic Engineering         5         water and funduational systems         4         -           Dynamics         5         x         -         -         -           Basic Engineering         Sureving and GIS         5         -         -           Dynamical systems         4         -         -         -           Basic Engineering         Forest and Industrial Machinery         4   |                   |                                   | Statistics                                 | 5    | х    |
| Physics (8)         Physics         8         x           Chemistry (8)         Chemistry         4         x           Informatics (5)         Informatics         5         x           Optionals         Legal and Social Sciences         Economy         5         x           [18]         Legal and Social Sciences         5         x         5         x           Sociology and Ethics         5         x         5         x         5         x           Basic (44)         Engineering design and computer graphics.         5         x         5         x           Basic (44)         Fluid Mechanics         5         x         5         x           Hydrology         4         4         x         7   | Basic             |                                   | Operation Research                         | 4    | х    |
| Chemistry (8)         Chemistry         4         x           Biochemistry         4         x           Informatics (5)         Informatics         5         x           Optionals         Legal and Social Sciences<br>(18)         Technical and Financial Management         5         -           Informatics         Engineering design and computer graphics.         5         x         -           Basic (44)         Full Mechanics         5         x         -           Basic (44)         Full Mechanics         5         x         -           Hydrology         4         x         -         -           Basic (44)         Full Mechanics         5         x         -           Hydrology         4         x         -         -           Thermotechnics         5         x         -         -           Dynamical systems         4         x         -         -           Sciences         Optionals (28)         Forest and Industrial Technology         4         -           Forest Industry         Forest Exploitation         5         -         -           Sciences         Optionals (28)         Forest Industrial Machinery         4         -     <   |                   | Physics (8)                       | Physics                                    | 8    | х    |
| Biochemistry         4         ×           Informatics (5)         Informatics         5         ×           Optionals         Legal and Social Sciences<br>(18)         Economy         5         ×           Sociology and Ethics         5         ×         ×         ×           Basic (44)         Englineering design and computer graphics.         5         ×           Basic (44)         Fluid Mechanics         5         ×           Hydrology         4         ×         ×           Dynamics         5         ×         ×           Basic (44)         Fluid Mechanics         5         ×           Hydrology         4         ×         ×           Thermodynamics         5         ×         ×           Thermodynamics         5         ×         ×           Dynamics         5         ×         ×           Basic Engineering         Optionals (28)         Forest and Industrial Technology         4         ×           Physics of wood         5         ×         ×         ×         ×           Sciences         Optionals (28)         Forest and Industrial Machinery         4         ×           Forest Industry         Fo  |                   | Chemistry (8)                     | Chemistry                                  | 4    | х    |
| Informatics (5)         Informatics         5         ×           Optionals         Legal and Social Sciences<br>(18)         Economy         5         -           Basic (14)         1         Sociology and Ethics         4         -           Basic (44)         Engineering design and computer graphics.         5         ×           Basic (44)         Fluid Mechanics         5         ×           Hydrology         4         ×         -           Dynamics         5         ×         -           Thermodynamics         5         ×         -           Thermotechnics         5         ×         -           Electricity and electronics         5         ×         -           Physics of wood         5         -         -           Sciences         Optionals (28)         Forest Exploitation         5         -           Forest Industry         Forest Tacks         4         -         -           Basic Agrof-orestry         Optionals (28)         Forest Robitation         5         -           Forest Production         5         -         -         -           Portionals (28)         Forest Robitation         5         -         - <td></td> <td></td> <td>Biochemistry</td> <td>4</td> <td>х</td>  |                   |                                   | Biochemistry                               | 4    | х    |
| Optionals         Legal and Social Sciences<br>(18)         Economy         5   |                   | Informatics (5)                   | Informatics                                | 5    | х    |
| Optionals         Legal and Social Sciences         Technical and Financial Management         5           (18)         Legislation         4           Sociology and Ethics         4           Basic (44)         Engineering design and computer graphics.         5         x           Materials Strength         5         x           Basic (44)         Fluid Mechanics         5         x           Hydrology         4         x         Thermodynamics         5         x           Basic Engineering Sciences         Optionals (28)         5         x         Thermodynamics         5         x           Forest Industry         Forest Industry         Forest Exploitation         5         x         1           Forest Industry         Forest Exploitation         5         1   |                   |                                   | Economy                                    | 5    |      |
| (18)     Legislation     4       Sociology and Ethics     4       Engineering design and computer graphics.     5     x       Basic (44)     Materials Strength     5     x       Materials Strength     5     x       Dynamics     5     x       Huid Mechanics     5     x       Hydrology     4     x       Thermodynamics     5     x       Thermotechnics     5     x       Electricity and electronics     5     x       Dynamical systems     4     x       Dynamical systems     4     x       Physics of wood     5     x       General and Industrial Technology     4     x       Physics of wood     5     x       Greneral and Industrial Technology     4     x       Forest Industry     Forest Exploitation     5       Forest Industrial Machinery     4     x       Basic AgroForestry     Sciences     5     x       Basic (25)     Edmites AgroForest Production     5     x       Forest Industrial Machinery     4     x     x       Porest Production     5     x     x       Forest Industrial Machinery     4     x       Basic     20<  | Optionals         | Legal and Social Sciences         | Technical and Financial Management         | 5    |      |
| Basic Engineering     Sociology and Ethics     4       Basic (44)     Engineering design and computer graphics.     5     x       Basic (44)     Naterials Strength     5     x       Huid Mechanics     5     x       Fluid Mechanics     5     x       Thermodynamics     5     x       Dynamical systems     4     x       Physics of wood     5     x       Sciences     Optionals (28)     Forest Exploitation     5       Forest Industry     Forest Stracks     4     x       Basic     Chemistry of non-woody forest products     5     x       General and Industrial Machinery     4     x       Forest Industry     Forest Exploitation     5     x       Forest Industry     Forest Stracks     4     x       Basic     Coptionals (28)     Forest Exploitation     5       Forest Production     Forest Exploitation     5     x       Forest Production     Forest Stracks     4     x       Protest Stracks     4       Basic     (25)   |                   | (18)                              | Legislation                                | 4    |      |
| Basic Engineering design and computer graphics.         5         x           Basic (44)         Statics         5         x           Dynamics         5         x           Dynamics         5         x           Hydrology         4         x           Hydrology         4         x           Thermotechnics         5         x           Dynamical systems         4         x           Physics of wood         5         x           Sciences         Optionals (28)         Forest And Industrial Technology         4           Forest Industry         Forest And Industrial Machinery         4         x           Prysics of wood         5         5         5           Sciences         Optionals (28)         Forest and Industrial Machinery         4         4           Business Organization         5         5         5         5         5           Optionals (28)         Forest Exploitation         5   |                   |                                   | Sociology and Ethics                       | 4    |      |
| Basic (44)         Statics         5         x           Basic (44)         Materials Strength         5         x           Dynamics         5         x           Phydrology         4         x           Thermotechnics         5         x           Electricity and electronics         5         x           Dynamical systems         4         x           Physics of wood         5         x           Basic Engineering Sciences         Optionals (28)         Forest Exploitation         5           Forest Industry         Forest Exploitation         5         x           Forest Stracks         4         4         x           Basic AgroPhroatics (28)         Forest and Industrial Machinery         4         4           Business Organization         5         1         5         1           Optionals (28)         Forest Exploitation         5         1         5         1           Forest Production         Forest Exploitation         5         1         5         1           Forest Production         Forest Stracks         4         1         1         1           Sciences         Basic (25)         Eaphology         5   |                   |                                   | Engineering design and computer graphics.  | 5    | х    |
| Basic (44)         Materials Strength         5         x           Basic (44)         Fluid Mechanics         5         x           Hydrology         4         x           Thermodynamics         5         x           Electricity and electronics         5         x           Dynamical systems         4         x           Dynamical systems         4         x           Electricity and electronics         5         x           Electricity and electronics         5         x           Dynamical systems         4         x           Physics of wood         5         -           General and Industrial Technology         4         -           Sciences         Forest Industry         Forest and Industrial Technology         4           Business Organization         5         -         -           Forest Industry         Forest and Industrial Machinery         4         -           Basic (28)         Forest Production         5         -         -           Forest Production         Forest Machinery         4         -         -           AgroForestry         Basic (25)         Edaphology         5         -         -      <   |                   |                                   | Statics                                    | 5    | х    |
| Basic (44)     Dynamics     5     x       Hydrology     4     x       Thermodynamics     5     x       Thermodynamics     5     x       Thermodynamics     5     x       Electricity and electronics     5     x       Electricity and electronics     5     x       Dynamical systems     4     x       Physics of wood     5     -       General and Industrial Technology     4     -       Basic Engineering     Forest Industry     Forest Exploitation     5       Forest Industry     Forest Exploitation     5     -       Forest Industry     Forest Eracks     4     -       Business Organization     5     -     -       Instrumental Analysis     5     -     -       Optionals (28)     Forest Apolication     5     -       Forest Production     Forest Apolication     5     -       Forest Production     Forest Exploitation     5     -       Forest Production     Forest Apolication     5     -       Forest Production     Forest Apolication     5     -       Forest Production     Forest Apolication     5     -       Forest Production     Forest Stracks     4   |                   |                                   | Materials Strength                         | 5    | х    |
| Basic (44)     Fluid Mechanics     5     x       Hydrology     4     x       Thermodynamics     5     x       Electricity and electronics     5     x       Dynamical systems     4     x       Physics of wood     5     -       General and Industrial Technology     4     -       Sciences     Forest Industry     Forest and Industrial Technology     4       Forest Industry     Forest and Industrial Technology     4       Forest and Industrial Technology     4       Basic (28)     Forest and Industrial Technology     4       Forest Industry     Forest and Industrial Technology     4       Instrumental Analysis     5     -       Chemistry of non-woody forest products     5     -       Optionals (28)     General Technology of forest products     5       Forest Production     Forest Sensing     4     -       Forest Production     Forest stracks     4     -       Forest Machinery     4   |                   |                                   | Dynamics                                   | 5    | х    |
| Basic Engineering<br>Sciences         Optionals (28)<br>Forest Industry         Image: Forest Exploitation<br>Forest Production         5         x           Optionals (28)<br>Forest Industry         Optionals (28)<br>Forest Industry         Forest Exploitation<br>Forest and Industrial Machinery         4         -           Optionals (28)<br>Forest Industry         Forest and Industrial Machinery         4         -           Optionals (28)<br>Forest Industry         Forest Exploitation<br>Forest and Industrial Machinery         5         -           Optionals (28)<br>Forest Production         Forest Exploitation<br>Instrumental Analysis         5         -           Optionals (28)<br>Forest Production         Forest Exploitation<br>Forest Products         5         -           Basic<br>AgroForestry<br>Sciences         Coptionals (28)<br>Forest Industry         Forest Exploitation<br>Forest Machinery         5         -           Basic (25)         Edaphology<br>Forest Industry         5         -         -         -           Optionals (20)<br>Forest Industry         Forest Machinery<br>Forest Management and Pests         4         -         -           Optionals (20)<br>Forest Industry         Forest Management and Assessment         4         -         -           Optionals (20)<br>Forest Industry         Forest Management and Assessment         4         -         -           Forest Industry         < |                   | Basic (44)                        | Fluid Mechanics                            | 5    | х    |
| Basic Engineering<br>Sciences         Optionals (28)<br>Forest Industry         Physics of wood<br>General and Industrial Technology         4         x           Physics of wood         5         x         2         3  |                   |                                   | Hydrology                                  | 4    | х    |
| Basic Engineering<br>Sciences         Optionals (28)<br>Forest Industry         Thermotechnics<br>Electricity and electronics         5         x           Physics of wood         5         -   |                   |                                   | Thermodynamics                             | 5    | х    |
| Basic Engineering Sciences         Optionals (28) Forest Industry         Electricity and electronics         5         x           Dynamical systems         4         x           Physics of wood         5         -           Sciences         Optionals (28) Forest and Industrial Technology         4         -           Forest Exploitation         5         -         -           Forest Industry         Forest and Industrial Machinery         4         -           Forest Industry         Forest and Industrial Machinery         4         -           Forest Industry         Forest and Industrial Machinery         4         -           Forest Stracks         4         -         -           Business Organization         5         -         -           Optionals (28)         GeneraTechnology of forest products         5         -           Forest Production         Forest Exploitation         5         -           Forest Production         Forest tracks         4         -           Basic         Plant Biology         5         -           AgroForestry         Sciences         Basic (25)         Edaphology         5         -           Sciences         Basic (25)         Ecology  |                   |                                   | Thermotechnics                             | 5    | х    |
| Basic Engineering<br>SciencesOptionals (28)<br>Forest IndustryPhysics of wood<br>General and Industrial Technology4×Basic Engineering<br>SciencesOptionals (28)<br>Forest IndustryForest Exploitation5Forest IndustryForest Exploitation5Forest Stracks4Basic Agrophic SciencesCoptionals (28)<br>Forest Production5Forest ProductionForest Production5Basic Agrophorest ProductionForest Stracks4Basic Agrophorest ProductionForest Stracks4Basic (25)Edephology5Basic (25)Basic (25)Edaphology5Coptionals (20)<br>Forest IndustryForest Production5Forest IndustryForest Industry4Coptionals (20)<br>Forest IndustryForest Stracks4Coptionals (20)<br>Forest IndustryForest Anangement and Assessment4Coptionals (20)<br>Forest IndustryTrees Measurement4Coptionals (20)<br>Forest IndustryForest Anangement and Assessment4Coptionals (20)<br>Forest Production.Forest Anangement and Assessment4Forest Production.Forest Anangement and Assessment4Forest Production.Forest Anangement and Assessment4Forest Production.Forest Management and Assessment <t< td=""><td></td><td></td><td>Electricity and electronics</td><td>5</td><td>х</td></t<>   |                   |                                   | Electricity and electronics                | 5    | х    |
| Basic Engineering<br>SciencesOptionals (28)<br>Forest IndustryPhysics of wood5General and Industrial Technology4Forest Exploitation5Forest and Industrial Machinery4Porest and Industrial Machinery4Forest stracks4Business Organization5Instrumental Analysis5Chemistry of non-woody forest products5Chemistry of non-woody forest products5Sciences5Optionals (28)<br>Forest Production5Forest Exploitation5Forest Exploitation5Sciences5Basic<br>AgroForestry<br>Sciences8Basic (25)Plant Biology5AgroForestry<br>Sciences5Basic (26)Edaphology5Optionals (20)<br>Forest IndustryForest Diseases and Pests4Optionals (20)<br>Forest IndustryForest Diseases and Pests4Forest Regrent and referestation.41Silviculture and reforestation.41Forest Industry41Forest Industry51Forest IndustryForest Diseases and Pests4Forest Regrent and Assessment41Forest Production.Forest Management and Assessment4Forest Production.Forest Management and Assessment4Forest Production.Forest Management and Assessment4Forest Production.Forest Management and Assessment4Forest Product   |                   |                                   | Dynamical systems                          | 4    | х    |
| Basic Engineering<br>Sciences       Optionals (28)<br>Forest Industry       General and Industrial Technology       4         Surveying and GIS       5         Forest Industry       Forest Exploitation       5         Forest Industry       Forest and Industrial Machinery       4         Business Organization       5       5         Instrumental Analysis       5       5         Chemistry of non-woody forest products       5       5         General end Industrial Technology       4       5         Optionals (28)       General end Industrial Technology of forest products       5         Forest Production       Forest Exploitation       5       5         Portionals (28)       Forest Exploitation       5       5         Forest Production       Forest Exploitation       5       5         Forest Production       Forest Exploitation       5       5         Basic       AgroForestry       A       4       6         Sciences       Basic (25)       Edaphology       5       5       5         Management and Ireatment of waste.       4       4       6         Optionals (20)       Forest Diseases and Pests       4       4         Forest Industry       Forest Manag   |                   |                                   | Physics of wood                            | 5    |      |
| Basic Engineering<br>SciencesOptionals (28)<br>Forest IndustrySurveying and GIS5Forest Exploitation5Forest and Industrial Machinery4Forest and Industrial Machinery4Business Organization5Instrumental Analysis5Chemistry of non-woody forest products5Optionals (28)<br>Forest Production6Forest Production5Basic<br>AgroForestry<br>Sciences8Basic (25)Basic (25)Basic (25)Plant BiologyAgroForest Industry5Coptionals (20)<br>Forest Industry5Forest Industry4Coptionals (20)<br>Forest Industry6Forest Management and Treatment of waste.4Environmental Impact assessment4Forest Management and Treatment of waste.4Environmental Management4Silviculture.4Coptionals (20)<br>Forest Management and reforestation.4Forest Management and Assessment4Forest Management and Assessment4 <tr< td=""><td></td><td rowspan="5">Optionals (28)<br/>Forest Industry</td><td>General and Industrial Technology</td><td>4</td><td></td></tr<>  |                   | Optionals (28)<br>Forest Industry | General and Industrial Technology          | 4    |      |
| Sciences       Optionals (28)       Forest Exploitation       5         Forest Industry       Forest and Industrial Machinery       4         Business Organization       5         Instrumental Analysis       5         Chemistry of non-woody forest products       5         GeneraTechnology of forest products       5         Remote Sensing       4         Basic       28)         Forest Production       Forest Exploitation         Forest Machinery       4         Hant Biology       5         AgroForestry       Sciences         Basic (25)       Edaphology       5         Coptionals (20)       Forest Diseases and Pests       4         Forest Industry       Management and treatment of waste.       4         Environmental Management       4       Environmental Management         Optionals (20)       Forest Management and Assessment       4  | Basic Engineering |                                   | Surveying and GIS                          | 5    |      |
| Porest and Industrial Machinery       4         Forest stracks       4         Business Organization       5         Instrumental Analysis       5         Chemistry of non-woody forest products       5         Chemistry of non-woody forest products       5         GeneraTechnology of forest products       5         Surveying and GIS       5         Forest Production       5         Forest Production       5         Forest Production       5         Forest Stracks       4         Basic       4         AgroForestry       5         Sciences       Basic (25)         Basic (25)       Edaphology         Meteorology and Climatology       5         Meteorology and Climatology       5         Meteorology and Pests       4         Optionals (20)       Forest Diseases and Pests       4         Forest Industry       4       Environmental Management       4         Silviculture and reforestation.       4       Environmental Management       4         Optionals (20)       Forest Management and Assessment       4       Environmental Management and Assessment       4         Optionals (20)       Forest Management and Assessment   | Sciences          |                                   | Forest Exploitation                        | 5    |      |
| Porests tracks       4         Business Organization       5         Instrumental Analysis       5         Chemistry of non-woody forest products       5         Chemistry of non-woody forest products       5         Surveying and GIS       5         Business Organization       5         Forest Production       5         Forest Production       5         Forest Production       5         Forest Production       5         Basic       Forest Production         AgroForestry       Basic (25)         Basic (25)       Plant Biology         AgroForestry       5         Sciences       Edaphology         Basic (25)       Edaphology         AgroForest Industry       Forest Diseases and Pests         Forest Industry       Management and Assessment         Agroprionals (20)       Forest Management and Assessment         Forest Production.       Trees Measurement         Agroprionals (20)       Forest Management and Assessment         Forest Production.       Agroprional Agroprional Agroprimental Management and Assessment         Agroprimental Management and Assessment       4         Forest Production.       Forest Management and Assessment  |                   |                                   | Forest and Industrial Machinery            | 4    |      |
| Business Organization       5         Instrumental Analysis       5         Instrumental Analysis       5         Chemistry of non-woody forest products       5         Optionals (28)       GeneraTechnology of forest products       5         Forest Production       5       Remote Sensing       4         Basic       Forest Production       5       Forest Exploitation       5         AgroForestry       Sciences       4       Forest tracks       4         Basic (25)       Edaphology       5       Edaphology       5         AgroForestry       Sciences       5       Edaphology       5         Optionals (20)       Forest Industry       Forest Diseases and Pests       4       Environmental Impact assessment       4         Optionals (20)       Forest Management and Assessment       4       Environmental Management and Assessment       4         Optionals (20)       Forest Management and Assessment       4       Environmental Management and Assessment       4         Forest Production.       Forest Management and Assessment       4       Environmental Management and Assessment       4         Reforestation       4       Environmental Management and Assessment       4       Environmental Management and Assessment <t< td=""><td></td><td>Forests tracks</td><td>4</td><td></td></t<>  |                   |                                   | Forests tracks                             | 4    |      |
| Instrumental Analysis5Chemistry of non-woody forest products5Chemistry of non-woody forest products5Genera Technology of forest products5Surveying and GIS5Forest Production5Forest Production5Basic<br>AgroForestry<br>SciencesPlant Biology5Basic (25)Plant Biology5AgroForestry<br>SciencesEdaphology5Coptionals (20)<br>Forest IndustryForest Diseases and Pests4Optionals (20)<br>Forest IndustryForest Diseases and Pests4Environmental Management<br>Silviculture41AgroForest Production.Forest Management and Assessment4Coptionals (20)<br>Forest IndustryForest Diseases and Pests4Annagement and Assessment41Anal Biology51Anal Biology51Animal Biology51Animal Biology51Ecology51Anal Biology51Environmental Impact assessment4Anal Biology41Anal Biology51Anal Biology51Animal Biology51Animal Biology51Animal Biology51Animal Biology51Animal Biology51Animal Biology51Animal Biology51Analysis41   |                   |                                   | Business Organization                      | 5    |      |
| Chemistry of non-woody forest products5GeneraTechnology of forest products5Surveying and GIS5Remote Sensing4Optionals (28)Business Organization5Forest ProductionForest Exploitation5Forest ProductionForest Exploitation5AgroForestryPlant Biology5SciencesBasic (25)Edaphology5AgroForest IndustryForest Diseases and Pests4Optionals (20)Forest Diseases and Pests4Forest IndustryManagement and Assessment4Silviculture and reforestation.4Silviculture.4Solviculture.4Forest Production.Forest Management and Assessment4Forest Diseases and Pests4Forest Diseases and PestsAForest Production.Forest Management and Assessment4Forest Production.Forest Management and Assessment4Forest Diseases and Pests4Forest Diseases and Pests   |                   |                                   | Instrumental Analysis                      | 5    |      |
| Optionals (28)<br>Forest ProductionSSBasic<br>AgroForestry<br>Sciences251Basic (25)Plant Biology5AgroForestry<br>SciencesBasic (25)EdaphologyPotionals (20)<br>Forest Industry51Potionals (20)<br>Forest Production.51Potionals (20)<br>  |                   |                                   | Chemistry of non-woody forest products     | 5    |      |
| Optionals (28)<br>Forest ProductionSurveying and GIS5Forest ProductionRemote Sensing4Basic<br>AgroForestry<br>SciencesNameForest Exploitation5Basic (25)Plant Biology5AgroForestry<br>SciencesBasic (25)Flant Biology5AgroForestry<br>SciencesBasic (25)Edaphology5Basic (25)Edaphology51AgroForestry<br>SciencesForest Industry51Optionals (20)<br>Forest IndustryForest Diseases and Pests41Optionals (20)<br>Forest IndustryForest Management and treatment of waste.41Trees Measurement<br>Silviculture and reforestation.41Optionals (20)<br>Forest Production.Trees Measurement<br>Silviculture.41Optionals (20)<br>Forest Production.Trees Measurement<br>Silviculture.41Optionals (20)<br>Forest Production.Forest Management and Assessment<br>Silviculture.41Optionals (20)<br>Forest Production.Forest Management and Assessment<br>Silviculture.41Profest Diseases and Pests411Silviculture.4111Optionals (20)<br>Forest Production.Forest Management and Assessment<br>Forest Diseases and Pests41Silviculture.4111Silviculture.4111Forest Diseases and Pests411Silviculture.41  |                   | Optionals (28)                    | General echnology of forest products       | 5    |      |
| Optionals (28)<br>Forest ProductionBusiness Organization5Forest ProductionForest Exploitation5Basic<br>AgroForestry<br>SciencesPlant Biology5Basic (25)Edaphology5Basic (25)Edaphology5Optionals (20)<br>Forest IndustryForest Diseases and Pests4Optionals (20)<br>Forest IndustryForest Machinent of waste.4Forest Machiner<br>Forest Industry41Optionals (20)<br>Forest IndustryForest Diseases and Pests4Optionals (20)<br>Forest IndustryForest Management<br>Silviculture and reforestation.4Trees Measurement<br>Silviculture.4Optionals (20)<br>Forest Production.Trees Measurement<br>Silviculture.4Silviculture.41Silviculture.41Silviculture.41Silviculture.41Silviculture.41<  |                   |                                   | Surveying and GIS                          | 5    |      |
| Forest ProductionBusiness Organization5Forest ProductionForest Exploitation5Forest ProductionForest Machinery4BasicPlant Biology5AgroForestryBasic (25)Edaphology5SciencesBasic (25)Edaphology5Optionals (20)Ecology5Forest IndustryForest Diseases and Pests4Optionals (20)Forest Diseases and Pests4Forest IndustryTrees Measurement4Silviculture and reforestation.4Forest Management and Assessment4Silviculture.4Silviculture.4Forest Production.Silviculture.Forest Production.Forest Diseases and PestsForest Production.Forest Management and AssessmentForest Production.Forest Management and AssessmentForest Production.Forest Management and AssessmentForest Production.Forest Management and AssessmentForest Diseases and Pests4Forest Diseases and PestsForest Production.Forest Management and AssessmentForest Diseases and Pests4Forest Diseases and PestsForest Diseases and Pests </td <td></td> <td>Remote Sensing</td> <td>4</td> <td></td>  |                   |                                   | Remote Sensing                             | 4    |      |
| Porest Housian     Porest Machinery     3       Forest Machinery     4       Forest Machinery     4       Basic     Plant Biology     5       AgroForestry     Sciences     Basic (25)     Plant Biology     5       Basic (25)     Edaphology     5     5       Meteorology and Climatology     5     5       Ecology     5     5       Porest Industry     Forest Diseases and Pests     4       Porest Management and treatment of waste.     4       Environmental Management     4       Silviculture and reforestation.     4       Forest Management and Assessment     4       Silviculture.     4       Optionals (20)     Reforestation     4       Forest Production.     Forest Management and Assessment     4       Silviculture.     4       Silviculture.     4   |                   | Forest Production                 | Eusiness Organization                      | 5    |      |
| Basic       Forest Machinery       4         Forests tracks       4         Basic       Plant Biology       5         AgroForestry       Asimal Biology       5         Sciences       Basic (25)       Edaphology       5         Meteorology and Climatology       5       5         Ecology       5       5         Optionals (20)       Forest Diseases and Pests       4         Forest Industry       Management and treatment of waste.       4         Environmental Management       4       5         Silviculture and reforestation.       4       4         Forest Management and Assessment       4       4         Silviculture.       4       4         Forest Production.       Forest Management and Assessment       4         Forest Management and Assessment       4       4         Silviculture.       4       4         Forest Production.       Forest Management and Assessment       4         Forest Diseases and Pests       4       4   |                   |                                   | Forest Machinery                           | 5    |      |
| Basic<br>AgroForestry<br>Sciences       Basic (25)       Plant Biology       5         Plant Biology       5         Animal Biology       5         Edaphology       5         Meteorology and Climatology       5         Ecology       5         Optionals (20)<br>Forest Industry       Forest Diseases and Pests       4         Environmental impact assessment       4         Environmental Management and treatment of waste.       4         Environmental Management       4         Silviculture and reforestation.       4         Forest Management and Assessment       4         Silviculture.       4         Silviculture.       4         Forest Production.       Forest Management and Assessment       4   |                   |                                   | Forest Machinery                           | 4    |      |
| AgroForestry       Basic (25)       Animal Biology       5         Basic (25)       Edaphology       5         Meteorology and Climatology       5         Coptionals (20)       Forest Industry       Environmental impact assessment       4         Forest Industry       Management and treatment of waste.       4         Environmental Management       4         Silviculture and reforestation.       4         Forest Management and Assessment       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Forest Production.       Forest Management and Assessment         Forest Diseases and Pests       4   | Basic             |                                   | Plant Biology                              | 5    |      |
| Sciences       Basic (25)       Edaphology       5         Meteorology and Climatology       5         Meteorology and Climatology       5         Ecology       5         Optionals (20)       Forest Industry         Forest Industry       Forest Diseases and Pests       4         Management and treatment of waste.       4         Environmental Management       4         Silviculture and reforestation.       4         Forest Management and Assessment       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Forest Production.       Forest Management and Assessment       4         Forest Diseases and Pests       4  | AgroForestry      |                                   | Animal Biology                             | 5    |      |
| Obticities       Data (20)       Description  | Sciences          | Basic (25)                        | Edaphology                                 | 5    |      |
| Induction of gy and connationally3Ecology5Ecology5Optionals (20)Environmental impact assessment4Forest IndustryForest Diseases and Pests4Management and treatment of waste.4Environmental Management4Silviculture and reforestation.4Forest Management and Assessment4Silviculture.4Silviculture.4Forest Production.Forest Management and Assessment4Forest Production.Forest Management and Assessment4Forest Management and Assessment4Forest Management and Assessment4Forest Management and Assessment4Forest Diseases and Pests4   | 00101000          | 2010 (20)                         | Meteorology and Climatology                | 5    |      |
| Optionals (20)<br>Forest IndustryEnvironmental impact assessment4Optionals (20)<br>Forest IndustryEnvironmental impact assessment4Management and treatment of waste.4Environmental Management4Silviculture and reforestation.4Forest Management and Assessment4Forest Management and Assessment4Silviculture.4Silviculture.4Silviculture.4Forest Production.Forest Management and Assessment4Forest Diseases and Pests4   |                   |                                   | Feelogy                                    | 5    |      |
| Optionals (20)       Forest Diseases and Pests       4         Forest Industry       Management and treatment of waste.       4         Environmental Management       4         Environmental Management       4         Silviculture and reforestation.       4         Forest Management and Assessment       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Silviculture.       4         Forest Management and Assessment       4         Forest Diseases and Pests       4  |                   |                                   | Ecology<br>Environmental impact assessment | 4    |      |
| Forest Industry       Management and treatment of waste.       4         Management and treatment of waste.       4         Environmental Management       4         Silviculture and reforestation.       4         Forest Management and Assessment       4         Versionals (20)       Trees Measurement       4         Forest Production.       Forest Management and Assessment       4         Forest Production.       Forest Management and Assessment       4   |                   | Optionals (20)                    | Forest Diseases and Pests                  | 4    |      |
| Optionals (20)     Forest Production.     4       Forest Production.     4       Forest Management and Assessment     4       Forest Management and Assessment     4       Silviculture.     4       Silviculture.     4       Silviculture.     4       Forest Management and Assessment     4       Silviculture.     4       Forest Management and Assessment     4       Forest Production.     Forest Management and Assessment     4  |                   | Forest Industry                   | Management and treatment of waste          | 4    |      |
| Silviculture and reforestation.     4       Silviculture and reforestation.     4       Forest Management and Assessment     4       Trees Measurement     4       Silviculture.     4       Silviculture.     4       Silviculture.     4       Forest Production.     Forest Management and Assessment       Forest Production.     Forest Management and Assessment       Forest Diseases and Pests     4  |                   |                                   | Environmental Management                   | 4    |      |
| Forest Management and Assessment     4       Forest Management and Assessment     4       Optionals (20)     Forest Management and Assessment     4       Forest Production.     Forest Management and Assessment     4       Forest Diseases and Pests     4   |                   |                                   | Silviculture and reforestation             | 4    |      |
| Interview     Trees     Measurement     4       Optionals (20)     Forest Production.     Forest Management and Assessment     4       Forest Diseases and Pests     4  |                   |                                   | Forest Management and Assessment           | 4    |      |
| Optionals (20)     Forest Production.       Forest Diseases and Pests     4   |                   |                                   | Trees Measurement                          | 4    |      |
| Optionals (20)     Reforestation     4       Forest Production.     Forest Management and Assessment     4       Forest Diseases and Pests     4  |                   |                                   | Silviculture                               | 4    |      |
| Forest Production.     Forest Management and Assessment     4       Forest Diseases and Pests     4   |                   | Optionals (20)                    | Reforestation                              | 4    |      |
| Forest Diseases and Pests 4   |                   | Forest Production.                | Forest Management and Assessment           | 4    |      |
|   |                   |                                   | Forest Diseases and Pests                  | 4    |      |
| Forest Fire-Fighting   4  |                   |                                   | Forest Fire-Fighting                       | 4    |      |

## Table 9: First level of the degree title (180 ECTS)

| Subject Groups     | Subject matter    | Subjects  | ECTS | Туре |
|--------------------|-------------------|---|------|------|
|                    | Basic (20)        | Projects  | 4    |      |
|                    |                   | Territory Planning                                  | 4    |      |
|                    |                   | Marketing Analysis                                  | 4    |      |
|                    |                   | Technology non-woody forest products                | 5    |      |
| Basic Engineering  | Optionals (15)    | Timber Technology                                   | 5    |      |
| Sciences           | Forest Industry   | Timber Structures                                   | 5    |      |
|                    |                   | Quality Control                                     | 5    |      |
|                    |                   | Hydrogeology  | 5    |      |
|                    | Optionals (15)    | Irrigation Systems                                  | 5    |      |
|                    | Forest Production | Precision Forestry Technology                       | 5    |      |
|                    | Basic (15)        | Greenhouses and Nurseries                           | 5    |      |
|                    |                   | Parks, gardens and urban trees                      | 5    |      |
|                    |                   | Landscape planning                                  | 5    |      |
| Basic AgroForestry |                   | Ecotourism  | 5    |      |
| Sciences           |                   | Timber Treatments.                                  | 5    |      |
|                    | Optionals (10)    | Drinking water and wastewater.                      | 5    |      |
|                    | Forest Industry   | Sanitary Engineering.                               | 5    |      |
|                    |                   | Industries of Cork bark, resins and essentials oil. | 5    |      |
|                    |                   | Hunting knowledge.                                  | 5    |      |
|                    | Optionals (10)    | Forest Genetics.                                    | 5    |      |
|                    | Forest Production | Fishing knowledge.                                  | 5    |      |
|                    |                   | Grazing knowledge                                   | 5    |      |
|                    | 8                 | x   |      |      |

#### Table 10: Second level with specialization subjects (60 ECTS)

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