

Faculty of Biological, Agronomic and Environmental Engineering



BIR 2 Bio-ingénieur (Bioengineer)



Programme management

AGRO Faculté d'ingénierie biologique, agronomique et environnementale

Responsable académique : Jacques Mahillon

Coordinators : 1st year : Pierre Bertin; 2nd year: Patrick Gérin; 3rd year : J. Mahillon

Study objectives

The two year "candidature" programme (1st cycle of university studies) and the third year (BIR21), currently the first year of the second cycle of studies, constitute a coherent whole, equivalent to the bachelor's programme in terms of the European harmonisation directives for higher university studies in the Bologna Declaration. Altogether, this three year course, with the solid subject knowledge and basic skills it provides, paves the way for the "master" level, not only in the Faculty of Biological, Agronomic and Environmental Engineering, but also in other university faculties, both in Belgium and abroad.

During the third year of the course, the student will choose one of the three proposed options : Agronomy (BIR A), Chemistry, (BIR C) or Environment (BIR E). Half of the programme is composed of courses common to the three orientations. The other half offers courses which are specific to each of them. Furthermore, a volume of 2 to 5 credits is reserved for options.

After the three first years, an entirely renovated programme has been in operation since 2004-05 for the 4th year, and since 2005-06 for the 5th year. This ensures the continuity of the programme of the first three years. Its structure and content are set in the spirit of the European harmonisation directives for higher study cursus included in the Bologna declaration.

On the level of the Bio-engineering "licence" studies, the student will choose one of the three options offered for the two final years of his programme. These three options are : "Agronomic Sciences", "Chemistry and Bio-industries" and " Environmental Sciences and Technologies". The polyvalent nature of the course continues to be assured by a certain number of core courses within each of the orientations, but the student also gets training in a specialised subject. He can, in fact, choose from five specialisations of which some are organised jointly in the context of two or three different options. Lastly, a large volume of optional subjects add a real personal touch to his training programme.

Admission conditions

The programme is accessible to holders of a "candidat" diploma in bioengineering or a university title obtained in Belgium or abroad, judged to be equivalent and by means of some minor adaptations to the programme if necessary.

In addition, the special exams called "passerelles" in French, described below, are organised for diploma holders in non-university higher education.

The following diploma holders :

- "candidat" in industrial engineering
- "gradué" (non-university) higher education diploma in the agricultural category : agronomy and garden and landscape architecture
- "gradué" (non-university) higher education diploma in the paramedical sector : medical biology section, dietetics, clinical laboratory and clinical chemistry analyses
- "gradué" (non-university) higher education diploma in the AESI category : normal and secondary sections, general secondary (natural sciences, sciences and geography)
- "gradué" (non-university) higher education diploma in the technical category : chemistry and biochemistry (biotechnology)

are entitled access to the 2nd study cycle of the Faculty of Biological, Agronomic and Environmental Engineering, subject to the passing of a prior preparatory year. The programme of this year, in principal, will be identical to that of the second year of the bachelor programme in bio-engineering, subject to possible minor adaptations depending on the type of course followed.

Diploma holders in :

- industrial engineering of the agricultural category : agriculture section
- industrial engineering of the technical category : chemistry (biochemistry) and textile section

have direct access to the second cycle of studies in the Faculty of Biological, Agronomic and Environmental Engineering.

These students will be able to benefit from an adapted programme depending on their former studies and the orientation followed at UCL (three options).

The programme may comprise a maximum of 150 hours of complementary courses from the 1st and 2nd years of the bachelor programme and, in addition, certain courses from the 2nd cycle may enable the student to benefit from dispensations.

Admission procedure

Applications for equivalence of diplomas and requests relating to the specific exams called " passerelles" and non-university higher education diplomas should be addressed to the Academic Secretary of the Faculty of Biological, Agronomic and Environmental Engineering. The application will include, besides a copy of the diplomas obtained, a detailed description of the programme previously followed (course titles, timetable volumes, a brief description of the contents and the results obtained).

General structure of the programme

The programme comprises three years of studies. In 2005-06, the implementation of the general reform for the bioengineering programmes is effective for the three years of the second cycle.

The range of the different activities outlined in the programme is expressed in two ways : for each course, corresponding, on the one hand to timetable volumes of supervised course work/attendance and, on the other hand to credits (ECTS European system : European credit transfer system). In accordance with this concept, one year of a student's work is divided into 60 credits, all course attendance and work included. The credits are absolute values. They may, however, take a relative value from one programme to another.

The students of the 2nd study cycle have the possibility to follow an interdisciplinary module entitled : "Company Creation". This complementary programme is integrated into the basic programmes of the 2nd cycle in bioengineering, Law, Civil Engineering and Management Engineering. The objective of these interdisciplinary studies is to provide the potential student-creators with the analytical and reflection tools that will help them to create their own company.

Programme content

BIR 21 First year

Core courses in all options

Mathematics, Analysis and Data-processing

<u>BIR1304</u>	Probability and statistics (II)[22.5h+15h] (3 credits) (in French)	Patrick Bogaert
<u>BIR1305</u>	Introduction to systems analysis[10h+20h] (2.5 credits) (in French)	Philippe Baret (coord.), Pierre Defourny, Marnik Vanclooster

Sciences and Matter and Processes Engineering

<u>BIR1310</u>	Transfer phenomena[45h+15h] (4.5 credits) (in French)	Mathieu Javaux, Marnik Vanclooster
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Life Sciences

<u>BIR1321</u>	Biochemistry II : metabolic pathways and their regulation[30h+15h] (3.5 credits) (in French)	Françoise Foury, Michel Ghislain (coord.), Yvan Larondelle
<u>BIR1323</u>	Microbiology[30h+15h] (3.5 credits) (in French)	Jacques Mahillon
<u>BIR1322</u>	General genetics[45h+15h] (5 credits) (in French)	Philippe Baret, Pierre Bertin

This course will be partly followed by the students who have chosen the Chemistry option :

<u>BIR1322A</u>	Génétique générale[30h+15h] (3.5 credits) (in French)	Philippe Baret, Pierre Bertin
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Human Sciences

<u>BIR1344</u>	Operation and management of enterprises[30h+7.5h] (2.5 credits) (in French)	André Nsabimana
<u>ANGL2480</u>	English Communication skills for engineers[30h] (2 credits)	Ahmed Adriouèche, Isabelle Druant, Annick Sonck
<u>BIR1345</u>	Report on the work experience training[60h] (4 credits) (in French)	Pierre Bertin, Joseph Dufey (coord.), Eric Gaigneaux, Richard Lambert

Options

60 hours or 5 credits for the students enrolled on the Agronomy and Environment options

30 hours or 2 credits for the students enrolled on the Chemistry option

Specific courses for the different options

BIR21A : "Agronomy" Option

Sciences and Matter and Processes Engineering

<u>BIR1312</u>	Introduction to analytical chemistry[30h] (2.5 credits) (in French)	Joseph Dufey, Yves Dufrêne, Yves Dufrêne
<u>BIR1313</u>	Integrated exercises in soil and water chemistry[30h] (2.5 credits) (in French)	Bruno Delvaux, Joseph Dufey, Yves Dufrêne

Life Sciences

<u>BIR1324</u>	Animal physiology[30h+7.5h] (3 credits) (in French)	Cathy Debier, Isabelle Donnay
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<u>BIR1325</u>	Physiologie du développement et systématique des plantes d'intérêt agronomique[30h+7.5h] (3 credits) (in French)	Pierre Bertin (coord.), Jean-François Ledent, Stanley Lutts
Globe and Ecosystems Sciences		
<u>BIR1331</u>	Applied ecology[30h+7.5h] (3 credits) (in French)	Alain PEETERS
<u>BIR1332</u>	Soil sciences[30h+7.5h] (3 credits) (in French)	Bruno Delvaux, Joseph Dufey
<u>BIR1333</u>	Bioclimatology[15h+7.5h] (2 credits) (in French)	Thierry Fichet, Guy Schayes (supplée Jean-Pascal van Ypersele de Strihou), Jean-Pascal van Ypersele de Strihou
<u>BIR1335</u>	Field excursions in pedology, agricultural ecology and forestry[22.5h] (2 credits) (in French)	Bruno Delvaux, Joseph Dufey, Alain PEETERS
Human Sciences		
<u>BIR1342</u>	Rural economy[30h+15h] (3.5 credits) (in French)	Bruno Henry de Frahan
BIR21C : "Chemistry" Option		
Sciences and Matter and Processes Engineering		
<u>BIR1311</u>	Thermodynamics[30h+15h] (3.5 credits) (in French)	Yann Bartosiewicz
<u>BIR1314</u>	Physical chemistry I[30h+30h] (4.5 credits) (in French)	Eric Gaigneaux, Daniel Peeters
<u>CHIM2151</u>	A préciser (in French)	
<u>BIR1315</u>	Practical exercises and seminars in analytical chemistry I[30h+30h] (4 credits) (in French)	Christine Dupont (coord.), Yann Garcia
<u>BIR1316</u>	Integrated exercises in chemical analysis[45h] (3 credits) (in French)	Yann Garcia, Paul Rouxhet (coord.)
<u>BIR1317</u>	Chimie organique (3è partie)[30h+15h] (3 credits) (in French)	Jacqueline Marchand
<u>BIR1318</u>	Organic analysis I : separation techniques[30h+60h] (5.5 credits) (in French)	Sonia Collin, Jacqueline Marchand
<u>BIR1319</u>	Colloïdal and surface chemistry[30h] (2.5 credits) (in French)	Christine Dupont, Paul Rouxhet
BIR21E : "Environment" option		
Sciences and Matter and Processes Engineering		
<u>BIR1312</u>	Introduction to analytical chemistry[30h] (2.5 credits) (in French)	Joseph Dufey, Yves Dufrêne, Yves Dufrêne
<u>BIR1313</u>	Integrated exercises in soil and water chemistry[30h] (2.5 credits) (in French)	Bruno Delvaux, Joseph Dufey, Yves Dufrêne
Life Sciences		
<u>BIR1325</u>	Physiologie du développement et systématique des plantes d'intérêt agronomique[30h+7.5h] (3 credits) (in French)	Pierre Bertin (coord.), Jean-François Ledent, Stanley Lutts
Globe and Ecosystems Sciences		
<u>BIR1331</u>	Applied ecology[30h+7.5h] (3 credits) (in French)	Alain PEETERS
<u>BIR1332</u>	Soil sciences[30h+7.5h] (3 credits) (in French)	Bruno Delvaux, Joseph Dufey
<u>BIR1333</u>	Bioclimatology[15h+7.5h] (2 credits) (in French)	Thierry Fichet, Guy Schayes (supplée Jean-Pascal van Ypersele de Strihou), Jean-Pascal van Ypersele de Strihou
<u>BIR1334</u>	Introduction to forestry sciences[30h+7.5h] (3 credits) (in French)	Quentin Ponette
<u>BIR1335</u>	Field excursions in pedology, agricultural ecology and forestry[22.5h] (2 credits) (in French)	Bruno Delvaux, Joseph Dufey, Alain PEETERS
Human Sciences		
<u>BIR1343</u>	Economy of natural resources and the environment[37.5h+7.5h] (3.5 credits) (in French)	Frédéric Gaspart

BIR22 Second year

BIR 22A: Option "Agronomic Sciences "

Core courses for all specialisations

<u>BIRA2101</u>	Biometry : analysis of the variance[30h+22.5h] (4 credits) (in French)	Christian Hafner, Éric Le Boulengé
<u>BIRA2102</u>	Applied biotechnology[30h+0h] (2.5 credits) (in French)	Pierre Bertin, Claude Bragard, Isabelle Donnay
<u>BIRA2103</u>	Economy and management of agricultural production[30h+7.5h] (3 credits) (in French)	Jean-Marie Bouquiaux
<u>BIRC2109A</u>	Génie des procédés : Opérations unitaires[22.5h+7.5h] (2.5	Marc Meurens

	credits) (in French)	
<u>BIRA2104</u>	Agricultural mechanisation[30h+0h] (~) (in French)	Charles Bielders
<u>BIRA2105</u>	Agricultural and rural policies[30h+0h] (2.5 credits) (in French)	Bruno Henry de Frahan, Knud Jorgen Munk (supplée Bruno Henry de Frahan)
<u>BIRA2106</u>	Principles of phytiatry[30h] (2.5 credits) (in French)	Claude Bragard, Anne Legrève
<u>BIRA2107A</u>	Productions animales : Principes[22.5h+7.5h] (3 credits) (in French)	Michel Focant
<u>BIRA2107B</u>	Productions animales : Alimentation[7.5h+7.5h] (1 credits) (in French)	Yvan Larondelle
<u>BIRA2108A</u>	Productions végétales : Principes(4 credits) (in French)	Pierre Bertin, Xavier Draye, Jean-François Ledent
<u>BIRA2108B</u>	Productions végétales : Prairies et fourrages(1 credits) (in French)	Alain PEETERS
<u>BIRA2109A</u>	Systèmes agraires et conduite de l'exploitation agricole : Systèmes agraires[22.5h] (2 credits) (in French)	Alain PEETERS
<u>BIRA2109B</u>	Systèmes agraires et conduite de l'exploitation agricole : Conduite de l'exploitation[22.5h] (2 credits) (in French)	Jean-François Ledent, Alain PEETERS

Courses specific to the different specialisations

S1A: Sciences, Technology and Food Quality

<u>BIR1318A</u>	Analyse organique I : techniques de séparation[30h] (2.5 credits) (in French)	Sonia Collin, Jacqueline Marchand
<u>BRAL2101A</u>	Biochimie des industries alimentaires :Fermentations levuriennes[15h] (1.5 credits) (in French)	Laurence, Marie-Paul Gijs
<u>BRAL2101B</u>	Biochimie des industries alimentaires :Fermentations bactériennes[15h] (1 credits) (in French)	Yvan Larondelle
<u>BRAL2102</u>	Nutritional biochemistry and human food needs[45h+0h] (3.5 credits) (in French)	Yvan Larondelle
<u>BRAL2103A</u>	Chimie des denrées alimentaires : Constituants alimentaires majeurs(1.5 credits) (in French)	Sonia Collin
<u>BRAL2103B</u>	Chimie des denrées alimentaires : TP de chimie des constituants alimentaires majeurs(1 credits) (in French)	Sonia Collin
<u>BRAL2103C</u>	Chimie des denrées alimentaires : Constituants alimentaires mineurs(1.5 credits) (in French)	Sonia Collin
<u>BRAL2103D</u>	Chimie des denrées alimentaires :TP de chimie des constituants alimentaires mineurs(1 credits) (in French)	Sonia Collin
<u>STAT2510</u>	Statistical quality control.[15h] (2.5 credits) (in French)	Bernadette Govaerts
<u>BRAL2104</u>	Food microbiology[30h+30h] (5 credits) (in French)	Jacques Mahillon

Free choice courses for 7 credits

S7A: Water and Soil Resources

<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<u>BRES2102</u>	Soil hydrodynamics : modelling[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BRES2103</u>	Soil physics[30h+22.5h] (4 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BIRE2103</u>	General hydrology[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BIRE2104</u>	Applied soil sciences[30h+30h] (5 credits) (in French)	Bruno Delvaux

Courses according to choice, from the following list for 6 credits

Optional courses are offered on the programme of the 4th and 5th year for a total minimum volume of 12 credits; students will be mindful to balance the division of these courses.

Depending on his project, the student will either prioritise studies in a specific branch of studies or a combination of the 2 domains.

<u>BRES2106</u>	Integrated management of the soil-plant system[52.5h+22.5h] (6 credits) (in French)	Stephan Declerck, Bruno Delvaux, Xavier Draye, Jean-François Ledent, Bernard Toussaint
<u>BRES2104</u>	Hydraulics on open channels[22.5h+15h] (3 credits) (in French)	Mathieu Javaux, Marnik Vanclooster
<u>BRTE2101</u>	Biological physico-chemistry of water and soil[37.5h+22.5h] (5 credits) (in French)	Joseph Dufey, Patrick Gerin
<u>BRES2105</u>	Industrial physics[37.5h+22.5h] (5 credits) (in French)	N.
<u>BRES2107</u>	Material resistance[30h+30h] (5 credits) (in French)	David Johnson, Benoît Raucent,

Jean-François Thimus

Free choice options for 3.5 credits**S8A : Integrated Agronomy - Animal, Vegetal and Economic Production****Core courses:**

<u>BIRA2107C</u>	Productions animales : Améliorations(1 credits) (in French)	Philippe Baret
<u>BIRA2107D</u>	Productions animales : Principes d'hygiène(1 credits) (in French)	Jean-Paul Dehoux
<u>BIRA2108C</u>	Productions végétales : Phytotechnie intégrée en régions tempérées(2 credits) (in French)	Jean-François Ledent

Options from the five following lists for 18.5 credits :

Depending on his project, the student will prioritise studies in a specific subject area (vegetal, animal or economic) or a combination of all of the domains.

• List 1: Vegetal Production

<u>BRAI2101</u>	Population and quantitative genetics[52.5h+0h] (4 credits) (in French)	Philippe Baret, Xavier Draye
<u>BRES2106C</u>	Gestion intégrée du système sol-plante : Fertilisation(2 credits) (in French)	Jean-François Ledent, Bernard Toussaint
<u>BRPP2103A</u>	Phytopathologie(3 credits) (in French)	Claude Bragard
<u>BIRA2109D</u>	Systèmes agraires et conduite de l'exploitation agricole : Domaine végétal(1 credits) (in French)	Jean-François Ledent

• List 2: Animal Production

<u>BRAI2102</u>	Advanced animal physiology and biochemistry[22.5h+0h] (2 credits) (in French)	Cathy Debier, Isabelle Donnay
<u>BRAI2101</u>	Population and quantitative genetics[52.5h+0h] (4 credits) (in French)	Philippe Baret, Xavier Draye
<u>BIRA2107E</u>	Productions animales : Pathologie appliquée(1 credits) (in French)	Cathy Debier, Yvan Larondelle
<u>BIRA2109C</u>	Système agraire et conduite de l'exploitation agricole : Domaine animal(1 credits) (in French)	Michel Focant

• List 3: Economics

<u>BRAI2207</u>	Agricultural market analysis[30h] (2.5 credits) ☒ (in French)	N.
<u>BRAI2209</u>	Company strategy in agro-industrial sector[30h+0h] (2.5 credits) ☒ (in French)	Frédéric Gaspart, Loic Sauvée
<u>ECON2135A</u>	Econométrie : méthodes et applications - 1ère partie[22.5h+22.5h] (4 credits) (in French)	N.
<u>BIR1343</u>	Economy of natural resources and the environment[37.5h+7.5h] (3.5 credits) (in French)	Frédéric Gaspart
<u>BRAI2207</u>	Agricultural market analysis[30h] (2.5 credits) ☒ (in French)	N.
<u>BRAI2209</u>	Company strategy in agro-industrial sector[30h+0h] (2.5 credits) ☒ (in French)	Frédéric Gaspart, Loic Sauvée

• List 4 : Pluridisciplinary courses

Courses taught in the 5th year.

• List 5: Complementary courses

<u>BRES2106A</u>	Gestion intégrée du système sol-plante : Interaction sol-plantes(2 credits) (in French)	Bruno Delvaux, Xavier Draye
<u>BRES2106B</u>	Gestion intégrée du système sol-plante : Processus et cycles biopédologiques(2 credits) (in French)	Stephan Declerck
<u>BRAI2103</u>	Tropical phytotechnology[30h+0h] (2.5 credits) (in French)	Pierre Bertin
<u>BREF2101</u>	Fish farming[22.5h] (2 credits) (in French)	Xavier Rollin
<u>BRAI2104</u>	Tropical zootechnology[22.5h+0h] (2 credits) (in French)	Jean-Paul Dehoux
<u>STAT2520</u>	Design of experiment.[22.5h+7.5h] (5 credits) (in French)	Bernadette Govaerts, Éric Le Boulengé

Free choice courses for 5 credits**S9A : Integrated Protection of Plants**

<u>BRPP2101</u>	Plant pathological agents (viruses, bacteria, fungi and nematodes)[37.5h+22.5h] (5 credits) (in French)	Claude Bragard (coord.), Henri Maraite, Didier Mugniery
<u>BRPP2102</u>	Entomology applied to agriculture[45h+15h] (5 credits) (in French)	Claude Bragard (coord.), Jean-Claude Grégoire, Thierry Hance, Hans Van Dyck
<u>BRES2106B</u>	Gestion intégrée du système sol-plante : Processus et cycles	Stephan Declerck

	biopédologiques(2 credits) (in French)	
<u>BRPP2103</u>	Phytopathology[30h+30h] (5 credits) (in French)	Claude Bragard, Anne Legrève
<u>BRPP2104</u>	Malherbology[15h+7.5h] (2 credits) (in French)	Jean-François Ledent, Alain PEETERS
<u>BIRA2108C</u>	Productions végétales : Phytotechnie intégrée en régions tempérées(2 credits) (in French)	Jean-François Ledent
Free choice courses for 6.5 credits		
S10A : Technologies and Information Management		
<u>BRTI2101</u>	Decision aids and operational research[37.5h+15h] (4 credits) (in French)	Frédéric Gaspart, Michel Herman
<u>STAT2411A</u>	Data Analysis[15h+7.5h] (3 credits) (in French)	Léopold Simar
<u>BIRE2101</u>	Statistical analysis of spatial and temporal data[22.5h+15h] (3 credits) (in French)	Patrick Bogaert
<u>INGI2271</u>	A préciser (in French)	
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
One course according to choice, from the following list :		
<u>COMU2107</u>	A préciser (in French)	
<u>DESO2336</u>	Intellectual Property Rights[30h] (4.5 credits) (in French)	Mireille Buydens, Bernard Remiche
<u>COMU2138</u>	Scientific popularisation: theory and case study[30h] (3 credits) (in French)	Philippe Verhaegen
<u>STAT2520</u>	Design of experiment.[22.5h+7.5h] (5 credits) (in French)	Bernadette Govaerts, Éric Le Boulengé
Free choice courses for 6.5 credits		
BIR 22C: Option "Chemistry and Bio-industries"		
Core courses for all specialisations		
<u>BIRC2101</u>	Analyse biochimique[15h+22.5h] (3 credits) (in French)	François Chaumont, Pierre Morsomme
<u>BIRC2102</u>	Analyse organique II[52.5h+30h] (6.5 credits) (in French)	Sonia Collin, Joëlle Leclercq
<u>BIRC2103</u>	Molecular biology and concepts of genetic engineering[22.5h+22.5h] (3.5 credits) (in French)	Marc Boutry, François Chaumont
<u>BIRC2104</u>	Chimie analytique II[22.5h+30h] (4.5 credits) (in French)	Yann Garcia, Paul Rouxhet
<u>BIRC2105</u>	Chimie physique II[52.5h+22.5h] (6 credits) (in French)	Patricio Ruiz Barrientos, Karim Snoussi
<u>BIRC2106</u>	Chemometrics[22.5h+15h] (3 credits) (in French)	Bernadette Govaerts
<u>BIRC2107</u>	Exercices intégrés en chimie appliquée et bioindustries[45h+0h] (3.5 credits) (in French)	Stephan Declerck, Eric Gaigneaux, Patrick Gerin, Michel Ghislain, Michèle Mestdagh
<u>BIRC2108</u>	Biochemical and Microbial Engineering[30h+30h] (5 credits) (in French)	Spyridon Agathos
<u>BIRC2109</u>	Process engineering : unit operations[52.5h+22.5h] (6 credits) (in French)	Marc Meurens, Patricio Ruiz Barrientos
Courses specific to the different specialisations		
S1C : Sciences, Technology and Food Quality		
<u>BRAL2102A</u>	Biochimie nutritionnelle et besoins alimentaires de l'homme : Nutrition et métabolisme(1.5 credits) (in French)	Yvan Larondelle
<u>BRAL2102B</u>	Biochimie nutritionnelle et besoins alimentaires de l'homme :Besoins alimentaires(1 credits) (in French)	Yvan Larondelle
<u>BRAL2104</u>	Food microbiology[30h+30h] (5 credits) (in French)	Jacques Mahillon
Courses according to choice, from the following list for 5 credits:		
<u>BRAL2103A</u>	Chimie des denrées alimentaires : Constituants alimentaires majeurs(1.5 credits) (in French)	Sonia Collin
<u>BRAL2103B</u>	Chimie des denrées alimentaires : TP de chimie des constituants alimentaires majeurs(1 credits) (in French)	Sonia Collin
<u>BRAL2103C</u>	Chimie des denrées alimentaires : Constituants alimentaires mineurs(1.5 credits) (in French)	Sonia Collin
<u>BRAL2103D</u>	Chimie des denrées alimentaires :TP de chimie des constituants alimentaires mineurs(1 credits) (in French)	Sonia Collin
<u>BRAL2103E</u>	Chimie des denrées alimentaires :Constituants spécifiques de la bière et TP(2.5 credits) (in French)	Sonia Collin
Courses according to choice from the following list for 2.5 credits:		
<u>BRAL2101A</u>	Biochimie des industries alimentaires :Fermentations levuriennes[15h] (1.5 credits) (in French)	Laurence, Marie-Paul Gijs
<u>BRAL2101B</u>	Biochimie des industries alimentaires :Fermentations bactériennes[15h] (1 credits) (in French)	Yvan Larondelle

<u>BRAL2101C</u>	Biochimie des industries alimentaires :Biochimie du maltage et du brassage[15h] (1.5 credits) (in French)	Laurent Mélotte
<u>BRAL2101D</u>	Biochimie des industries alimentaires :TP de biochimie des céréales[0h+15h] (1 credits) (in French)	Sonia Collin
<u>BRAL2101E</u>	Biochimie des industries alimentaires :TP de biochimie de la levure[0h+15h] (1 credits) (in French)	Sonia Collin

Free choice courses for 4 credits**S2C : Biomolecular and Cellular Biology**

<u>BRNA2101B</u>	Biophysique :Protéines et acides nucléiques : structure et stabilité(2 credits) (in French)	Jacques Fastrez, Michèle Mestdagh
<u>BRMC2101</u>	Genetic engineering[22.5h+15h] (3 credits) (in French)	Marc Boutry
<u>BRMC2102</u>	Molecular physiology[22.5h+0h] (2 credits) (in French)	Marc Boutry, Michel Ghislain, Pierre Morsomme

Courses according to choice, from the following list for 4 or 5 credits:

<u>MAPR2300</u>	Process Control[30h+37.5h] (5 credits) (in French)	Georges Bastin, Denis Dochain
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<u>MAPR2145</u>	Process Simulation[30h+15h] (4 credits) (in French)	Denis Dochain, Fernand Thyron

Free choice courses for 8 credits

Modulable volume (7 or 8 credits) depending on the volume of hours of studies for the given choice.

S3C : Nanobiotechnologies, Materials and Catalysis

<u>BRNA2101</u>	Biophysics[52.5h+0h] (4 credits) (in French)	Jacques Fastrez, Michèle Mestdagh
<u>BRNA2102</u>	Material surface characterisation[52.5h+0h] (4.5 credits) (in French)	Yves Dufrêne, Paul Rouxhet
<u>BRNA2103</u>	Chemistry of solids[37.5h+0h] (3 credits) (in French)	Eric Gaigneaux
<u>MAPR2381B</u>	Chimie macromoléculaire[30h] (3 credits) (in French)	Jacques Devaux, Pierre Godard

Free choice courses for 4.5 credits**S4C : Environmental Technologies : Water, Sun, Air**

The students enrolled for this specialisation have the choice between the BIRC 2107 course (core syllabus with BIR22C) and the BRTE 2102 course (BIR22 4E) specialisation

<u>BRTE2101</u>	Biological physico-chemistry of water and soil[37.5h+22.5h] (5 credits) (in French)	Joseph Dufey, Patrick Gerin
<u>BRES2103A</u>	Physique du sol : Théorie(2 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BIR1332</u>	Soil sciences[30h+7.5h] (3 credits) (in French)	Bruno Delvaux, Joseph Dufey

Two courses according to choice, from the following list for 6 to 8 credits

<u>AMCO2191</u>	Geoenvironment[30h+15h] (4 credits) (in French)	Alain Holeyman
<u>AMCO2191A</u>	Géoenvironnement (partie)[30h] (3 credits) (in French)	N.

The AMCO2191 course, Partim A, can only be followed after the BRES 2102 course, Soil Hydrodynamics: Modelling

<u>BRES2102</u>	Soil hydrodynamics : modelling[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>MAPR2680</u>	Treatments of gaseous wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Olivier Françoisse
<u>MAPR2643</u>	Treatment of liquid effluents[30h+7.5h] (4 credits) (in English)	Spyridon Agathos, Léon Duvivier
<u>MAPR2690</u>	Valorisation and Treatment of Solid Wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Joris Proost

Free choice courses for 3 credits

Modulable volume (1 to 3 credits), depending on the volume of study hours for the given choice.

S10C : Technologies and Information Management

The students enrolled for this specialisation are dispensed from taking the BIRC 2106 course, - Chimiometrics.

<u>STAT2411A</u>	Data Analysis[15h+7.5h] (3 credits) (in French)	Léopold Simar
<u>BIRA2101</u>	Biometry : analysis of the variance[30h+22.5h] (4 credits) (in French)	Christian Hafner, Éric Le Boulengé
<u>INGI2271</u>	A préciser (in French)	
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique

A choice of one course from the following list

<u>BIRE2101</u>	Statistical analysis of spatial and temporal data[22.5h+15h] (3 credits) (in French)	Patrick Bogaert
<u>STAT2520</u>	Design of experiment.[22.5h+7.5h] (5 credits) (in French)	Bernadette Govaerts, Éric Le Boulengé

Free choice courses for 4 credits**BIR 22E: "Sciences and Environmental Technologies " option****Core course for all specialisations**

<u>STAT2411A</u>	Data Analysis[15h+7.5h] (3 credits) (in French)	Léopold Simar
<u>BIRE2101</u>	Statistical analysis of spatial and temporal data[22.5h+15h] (3 credits) (in French)	Patrick Bogaert
<u>BIRE2102</u>	Geomatic applied to the environment[30h+22.5h] (4 credits) (in French)	Pierre Defourny
<u>BIRE2103</u>	General hydrology[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BIRE2104</u>	Applied soil sciences[30h+30h] (5 credits) (in French)	Bruno Delvaux
<u>BIRE2105</u>	Water and soil quality[22.5h+7.5h] (2.5 credits) (in French)	Bruno Delvaux, Patrick Gerin, Henri Halen (supplée Bruno Delvaux), Xavier Rollin (supplée Bruno Delvaux)

Students of the S4E specialisation : Environmental Technologies : Water, Sun, Air, are dispensed from taking the Quality of water and soils course.

<u>BIRA2109B</u>	Systèmes agraires et conduite de l'exploitation agricole : Conduite de l'exploitation[22.5h] (2 credits) (in French)	Jean-François Ledent, Alain PEETERS
<u>BIRE2106</u>	Topometry and photogrammetry[30h+22.5h] (4 credits) (in French)	Olivier Cogels, Pierre Defourny

Courses specific to the different specialisations**S4E : Environmental Technologies : Water, Sun, Air**

<u>BIR1319</u>	Colloidal and surface chemistry[30h] (2.5 credits) (in French)	Christine Dupont, Paul Rouxhet
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<u>BRTE2102</u>	Integrated exercises in environmental science and technology[45h+0h] (3.5 credits) (in French)	Patrick Gerin (coord.), Patricio Ruiz Barrientos, Marnik Vanclooster
<u>BIRC2109</u>	Process engineering : unit operations[52.5h+22.5h] (6 credits) (in French)	Marc Meurens, Patricio Ruiz Barrientos
<u>BRTE2101</u>	Biological physico-chemistry of water and soil[37.5h+22.5h] (5 credits) (in French)	Joseph Dufey, Patrick Gerin
<u>BRES2103</u>	Soil physics[30h+22.5h] (4 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BIR1311</u>	Thermodynamics[30h+15h] (3.5 credits) (in French)	Yann Bartosiewicz

Courses according to choice, from the following list for 3 to 4 credits :

These courses according to choice are offered on the programme of the 4th and 5th year for a total volume of 6 to 8 credits; the student will be attentive to balancing the division of these courses.

<u>AMCO2191</u>	Geoenvironment[30h+15h] (4 credits) (in French)	Alain Holeyman
<u>AMCO2191A</u>	Géoenvironnement (partie)[30h] (3 credits) (in French)	N.
<u>BRES2102</u>	Soil hydrodynamics : modelling[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>MAPR2643</u>	Treatment of liquid effluents[30h+7.5h] (4 credits) (in English)	Spyridon Agathos, Léon Duvivier
<u>MAPR2680</u>	Treatments of gaseous wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Olivier Françoisse
<u>MAPR2690</u>	Valorisation and Treatment of Solid Wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Joris Proost

Free choice courses for 4 credits

Modulable volume (4 or 4 credits), depending on the volume of hours of studies for the given choice.

S5E : Territory Reorganisation

<u>BRTI2101</u>	Decision aids and operational research[37.5h+15h] (4 credits) (in French)	Frédéric Gaspart, Michel Herman
<u>BRAT2101</u>	Suburban and rural space development[30h+7.5h] (3 credits) (in French)	Pierre Defourny, Freddy Devillez, Yves Hanin
<u>AMCO2955</u>	Aspects juridiques de l'urbanisme et de l'aménagement du territoire[30h] (3 credits) (in French)	Francis Haumont
<u>BRAT2102</u>	Spatial modelling of territorial dynamics[15h+15h] (2.5 credits) (in French)	Pierre Defourny
<u>BREF2105</u>	Phytosociology[15h+30h] (3.5 credits) (in French)	Freddy Devillez, Anne-Laure Jacquemart
<u>BIRA2105</u>	Agricultural and rural policies[30h+0h] (2.5 credits) (in French)	Bruno Henry de Frahan, Knud Jorgen Munk (supplée Bruno Henry de Frahan)

<u>BRAT2103</u>	Rural sociology and land development[30h] (2.5 credits) (in French)	Daniel Bodson
Courses according to choice, from the following list for 4 credits		
<u>BIRA2107A</u>	Productions animales : Principes[22.5h+7.5h] (3 credits) (in French)	Michel Focant
<u>BIRA2107B</u>	Productions animales : Alimentation[7.5h+7.5h] (1 credits) (in French)	Yvan Larondelle
<u>BIRA2108A</u>	Productions végétales : Principes(4 credits) (in French)	Pierre Bertin, Xavier Draye, Jean-François Ledent
<u>BREF2107B</u>	Sylviculture : Sylviculture appliquée(4 credits) (in French)	Quentin Ponette
Courses according to choice, from the following list for 2.5 credits		
<u>ENVI3006</u>	Droit de l'environnement[30h] (4.5 credits) (in French)	Francis Haumont
<u>ENVI3011</u>	Méthodes d'évaluation et de gestion environnementale[30h] (3 credits) (in French)	Jean-Pierre Tack
Free choice courses for 5 credits		
S6E : Nature, Water and Forests		
<u>BRTI2101A</u>	Aide à la décision et recherche opérationnelle: Aide à la décision(2 credits) (in French)	Frédéric Gaspart
<u>BREF2102</u>	Wood anatomy and properties[30h+30h] (4.5 credits) (in French)	Marc Herman
<u>BREF2103</u>	Dendrometry and inventory of forest resources[30h+22.5h] (4 credits) (in French)	Quentin Ponette
<u>BREF2104</u>	Forestry engineering[22.5h] (2 credits) (in French)	Daniel Bemelmans
<u>BREF2105</u>	Phytosociology[15h+30h] (3.5 credits) (in French)	Freddy Devillez, Anne-Laure Jacquemart
<u>BREF2106</u>	Forest health and protection[22.5h+7.5h] (2.5 credits) (in French)	Claude Bragard, Thierry Hance, Henri Maraite
<u>BREF2107A</u>	Sylviculture : Ecologie forestière(2 credits) (in French)	Quentin Ponette
<u>BREF2107B</u>	Sylviculture : Sylviculture appliquée(4 credits) (in French)	Quentin Ponette
A choice of one course from the following list for 2 credits :		
<u>BIOL2191A</u>	A préciser (in French)	
<u>BREF2101</u>	Fish farming[22.5h] (2 credits) (in French)	Xavier Rollin
Free choice courses for 6 credits		
<i>Modulable volume, depending on the volume of hours of studies for the given choice.</i>		
S7E : Water and Soil Resources		
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<u>BRES2102</u>	Soil hydrodynamics : modelling[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>BRES2103</u>	Soil physics[30h+22.5h] (4 credits) (in French)	Charles Bielders, Marnik Vanclooster
Courses according to choice, from the following list for 14 credits :		
<i>Depending on his project, the students will prioritise either studies in a specific subject (water or soil), or a combination of the two domains.</i>		
<u>BRES2106</u>	Integrated management of the soil-plant system[52.5h+22.5h] (6 credits) (in French)	Stephan Declerck, Bruno Delvaux, Xavier Draye, Jean-François Ledent, Bernard Toussaint
<u>BRES2104</u>	Hydraulics on open channels[22.5h+15h] (3 credits) (in French)	Mathieu Javaux, Marnik Vanclooster
<u>BRTE2101</u>	Biological physico-chemistry of water and soil[37.5h+22.5h] (5 credits) (in French)	Joseph Dufey, Patrick Gerin
<u>BRES2105</u>	Industrial physics[37.5h+22.5h] (5 credits) (in French)	N.
<u>BRES2107</u>	Material resistance[30h+30h] (5 credits) (in French)	David Johnson, Benoît Raucent, Jean-François Thimus
Free choice courses for 5.5 credits		
<i>Modulable volume, depending on the volume of hours of studies for the given choice.</i>		
S10E : Technologies and Information Management		
<u>BRTI2101</u>	Decision aids and operational research[37.5h+15h] (4 credits) (in French)	Frédéric Gaspart, Michel Herman
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<u>INGI2271</u>	A préciser (in French)	
<u>BIRA2101</u>	Biometry : analysis of the variance[30h+22.5h] (4 credits) (in French)	Christian Hafner, Éric Le Boulengé

French)

A choice of one course from the following list for 3 credits :

<u>COMU2138</u>	Scientific popularisation: theory and case study[30h] (3 credits) (in French)	Philippe Verhaegen
<u>DESO2336</u>	Intellectual Property Rights[30h] (4.5 credits) ⊕ (in French)	Mireille Buydens, Bernard Remiche
<u>COMU2107</u>	A préciser (in French)	
<u>STAT2520</u>	Design of experiment.[22.5h+7.5h] (5 credits) (in French)	Bernadette Govaerts, Éric Le Boulengé

Free choice of courses for 9.5 credits**BIR23 Third year****BIR 23A : "Agronomic Sciences Option"****Core courses for all specialisations**

<u>BIRA2201</u>	Projet interdisciplinaire d'agronomie[37.5h] (3 credits) (in French)	Frédéric Gaspart (coord.), Yvan Larondelle, Bernard Toussaint
<u>AGRO2300</u>	Questions in religious sciences[15h] (2 credits) (in French)	Henri Wattiaux
<u>BIRA2200</u>	Mémoire de fin d'études(35 credits) (in French)	N.

Courses specific to the different specialisations**S1A : Sciences, Technologies and Food Quality**

<u>BRAL2201</u>	Food technology[105h+7.5h] (8.5 credits) (in French)	Stéphane Dupire, Marc Meurens
<u>BRTE2201</u>	Human and animal toxicology[22.5h] (2 credits) (in French)	Alfred Bernard
<u>BRTI2101A</u>	Aide à la décision et recherche opérationnelle: Aide à la décision(2 credits) (in French)	Frédéric Gaspart

Free choice of courses for 8 credits**S7A : Water and Soil Resources**

<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
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This course is followed exceptionally during the academic year 2005-06 for the students of the BIR23/7A course

<u>BRES2201</u>	Irrigation, drainage and soil preservation[37.5h+22.5h] (5 credits) (in French)	Charles Bielders, Mathieu Javaux
<u>BRES2202</u>	Seminars on water and soil resources[22.5h] (2 credits) (in French)	Charles Bielders, Bruno Delvaux, Marnik Vanclooster

Free choice courses from the following list for 6 credits :

Depending on his project, the student will prioritise either studies in a particular subject (water or soil), or a combination of the 2 domains.

<u>BRES2203</u>	Soil management and planning in warm regions[22.5h+15h] (3 credits) (in French)	Charles Bielders, Bruno Delvaux
<u>BRES2204</u>	Integrated management of water resources[22.5h+15h] (3 credits) (in French)	Amaury Tilmant
<u>BRES2205</u>	Clay and solid constructions[22.5h+22.5h] (4 credits) (in French)	Sébastien Lambot

Courses according to choice, for a volume of 7 credits

Modulable volume, depending on the volume of the given course choice.

S8A : Integrated Agronomy - Animal, Vegetal and Economic Productions

<u>BRAI2201</u>	Integrated exercises in agronomy[30h] (2 credits) (in French)	Bernard Toussaint
<u>BRES2201A</u>	Irrigation, drainage et conservation des sols: Irrigation et drainage[22.5h+15h] (3 credits) (in French)	Charles Bielders
<u>BRTI2101A</u>	Aide à la décision et recherche opérationnelle: Aide à la décision(2 credits) (in French)	Frédéric Gaspart

Courses according to choice, from the five following list of course headings, for a volume of 9 credits :

- List 1 : Vegetal productions :

<u>BRAI2202</u>	Management of covered off-field cultures[15h+7.5h] (2 credits) (in French)	Pierre Bertin, Claude Bragard
<u>BRAI2203</u>	Genetic diversity and plant amelioration[37.5h] (3 credits) (in French)	Pierre Bertin, Pierre Bertin
<u>BRAI2204</u>	Management of temperate and tropical pastoral systems[30h] (2.5 credits) (in French)	Alain PEETERS

- List 2 : Animal productions :

<u>BRAI2204</u>	Management of temperate and tropical pastoral systems[30h] (2.5 credits) (in French)	Alain PEETERS
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<u>BRAI2205</u>	Genetic diversity and animal amelioration[37.5h] (3 credits) (in French)	Philippe Baret
<u>BRAI2206</u>	Technology and processing of animal products[22.5h] (2 credits) (in French)	Philippe Baret, Pierre Stassart
• List 3 : Economics :		
<u>BRTI2101B</u>	Aide a la décision et recherche opérationnelle:Recherche opérationnelle(2 credits) (in French)	Michel Herman
<u>BRAI2207</u>	Agricultural market analysis[30h] (2.5 credits) ☒ (in French)	N.
<u>BRAI2208</u>	Seminar on rural economy[30h] (2.5 credits) (in French)	Frédéric Gaspart, Bruno Henry de Frahan (coord.)
<u>BRAI2209</u>	Company strategy in agro-industrial sector[30h+0h] (2.5 credits) ☕ (in French)	Frédéric Gaspart, Loic Sauvé
• List 4 : Pluridisciplinary courses :		
<u>BIRE2201</u>	Design and evaluation of projects[22.5h] (2 credits) (in French)	André Nsabimana
<u>BIRE2202</u>	Territorial and environmental diagnosis[7.5h+22.5h] (2.5 credits) (in French)	Pierre Defourny, Frédéric Gaspart, Jean-Paul Malingreau
<u>BRAI2210</u>	Integrated development[30h] (2.5 credits) (in French)	Jean-François Sneessens
<u>BRAT2103</u>	Rural sociology and land development[30h] (2.5 credits) (in French)	Daniel Bodson
• List 5 : Complementary courses		
<u>BRPP2102A</u>	Entomologie appliquée à l'agriculture[22.5h+15h] (3 credits) (in French)	Thierry Hance, Hans Van Dyck
<u>BRAI2211</u>	Agrostology[22.5h+7.5h] (2.5 credits) (in French)	Alain PEETERS
<u>BRAI2212</u>	Rural development economy[30h] (2.5 credits) (in French)	Frédéric Gaspart, Bruno Henry de Frahan
<u>BRAI2213</u>	Evaluation des politiques agricoles[30h] (2 credits) (in French)	Bruno Henry de Frahan
<u>BRAI2215</u>	Phytotechnology of horticultural crops[15h+7.5h] (2 credits) (in French)	Pierre Bertin
<u>BRTE2201</u>	Human and animal toxicology[22.5h] (2 credits) (in French)	Alfred Bernard
<u>ENVI3006</u>	Droit de l'environnement[30h] (4.5 credits) (in French)	Francis Haumont
Free choice courses for a volume of 5 credits		
S9A : Integrated Protection of Plants		
<u>BRTI2101A</u>	Aide à la décision et recherche opérationnelle: Aide à la décision(2 credits) (in French)	Frédéric Gaspart
<u>BRPP2201</u>	Biological control and integrated protection[22.5h] (2 credits) (in French)	Claude Bragard, Thierry Hance
<u>BRPP2202</u>	Phytopharmacology (diagnosis, identification, causative agents and advises)[60h] (5 credits) (in French)	Claude Bragard, Anne Legrève
<u>BRPP2203</u>	Phytopharmacy[22.5h] (2 credits) (in French)	Claude Bragard, Henri Maraite
<u>BRPP2204</u>	Special questions in plant protection[30h] (2.5 credits) (in French)	Claude Bragard, Anne Legrève
Free choice of courses for a volume of 6.5 credits		
S10A : Technologies and Information Management		
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<i>This course is followed exceptionally durant the academic year 2005-06 by the students of BIR23/10A</i>		
<u>BRTI2102</u>	Process modelling and forecasting systems[22.5h+15h] (3 credits) (in French)	Philippe Baret, Patrick Bogaert, Xavier Draye (coord.)
<u>BRTI2201</u>	Complement to the interdisciplinary agronomy project[22.5h] (2 credits) (in French)	Cathy Debier, Frédéric Gaspart
<u>BRTI2202</u>	Special questions in information management[37.5h] (3 credits) (in French)	Philippe Baret, Pierre Defourny
Choice of given courses for a volume of 9 credits		
<i>The students are invited to choose, for this volume of 9 credits of thematic modules to be specified from among "Biology and Genetics", "Information and agriculture", "Environmental Evaluation and Follow-up". The content of these modules will be defined with the Study Advisor.</i>		
BIR 23C : "Chemistry and Bio-industries" Option		
Core courses for all specialisations		
<u>MAPR2330</u>	Reactor Design[30h+30h] (5 credits) (in French)	Denis Dochain

The S10 students are dispensed from taking this course

<u>BIRC2201</u>	Project in industrial chemistry[60h] (5 credits) (in French)	Patrick Gerin
<u>AGRO2300</u>	Questions in religious sciences[15h] (2 credits) (in French)	Henri Wattiaux
<u>BIRC2200</u>	Mémoire de fin d'études(35 credits) (in French)	N.

Courses specific to the different specialisations

S1C : Sciences, Technology and Food Quality

<u>BRTE2201</u>	Human and animal toxicology[22.5h] (2 credits) (in French)	Alfred Bernard
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Choice of courses from the following list for 5 credits :

The partim BRAL2201F "Integrated Project" is obligatory.

<u>BRAL2201A</u>	Technologie alimentaire:Opérations unitaires de séparation[22.5h] (1.5 credits) (in French)	Stéphane Dupire
<u>BRAL2201B</u>	Technologie alimentaire:Opérations unitaires de conservation[15h] (1 credits) (in French)	Marc Meurens
<u>BRAL2201C</u>	Technologie alimentaire:Procédés biotechnologiques[15h] (1 credits) (in French)	Stéphane Dupire
<u>BRAL2201D</u>	Technologie alimentaire:Transformations des produits végétaux et animaux[30h] (2.5 credits) (in French)	Marc Meurens
<u>BRAL2201E</u>	Technologie alimentaire : Contrôle de qualité[15h] (1 credits) (in French)	Marc Meurens
<u>BRAL2201F</u>	Technologie alimentaire : Projet intégré[7.5h+7.5h] (1.5 credits) (in French)	Marc Meurens

Free choice of courses for 6 credits

S2C : Biomolecular and Cellular Engineering

<u>BRMC2201</u>	Bioinformatics : DNA and protein sequences[30h+7.5h] (3 credits) (in French)	Michel Ghislain
<u>BRMC2202</u>	Cell culture technology[22.5h] (2 credits) (in French)	Marc Boutry (coord.), Claude Remacle, Yves-Jacques Schneider

Free choice of courses for 8 credits

Modulable volume, depending on the volume of the given options

S3C : Nanobiotechnologies, Materials and Catalysis

Choice of courses from the following list for 5 or 6 credits :

<u>BRNA2201</u>	Catalysis[37.5h] (3 credits) (in French)	Eric Gaigneaux
<u>BRNA2202</u>	Nano-biotechnologies[22.5h] (2 credits) (in French)	Yves Dufrêne
<u>MAPR2392A</u>	Physique des matériaux polymères[30h] (3 credits) (in French)	N.

Free choice of courses for a volume of 8 credits

Modulable volume, depending on the volume of the given options

S4C : Environmental Technologies : Water, Soil, Air

<u>BRTE2201</u>	Human and animal toxicology[22.5h] (2 credits) (in French)	Alfred Bernard
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Free choice of courses for 11 credits

S10C : Technologies and Information Management

<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
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This course is followed exceptionally during the academic year 2005-06 by the BIR23/10C students

<u>BRTI2101</u>	Decision aids and operational research[37.5h+15h] (4 credits) (in French)	Frédéric Gaspart, Michel Herman
<u>BRTI2102</u>	Process modelling and forecasting systems[22.5h+15h] (3 credits) (in French)	Philippe Baret, Patrick Bogaert, Xavier Draye (coord.)
<u>BRTI2202</u>	Special questions in information management[37.5h] (3 credits) (in French)	Philippe Baret, Pierre Defourny

Choice of one course from the following list :

<u>COMU2107</u>	A préciser (in French)	
<u>DESO2336</u>	Intellectual Property Rights[30h] (4.5 credits) (in French)	Mireille Buydens, Bernard Remiche
<u>COMU2138</u>	Scientific popularisation: theory and case study[30h] (3 credits) (in French)	Philippe Verhaegen

Free choice of courses for a volume of 6 credits

BIR23E : "Environmental Sciences and Technologies" Option

Core courses for all specialisations

<u>BIRE2201</u>	Design and evaluation of projects[22.5h] (2 credits) (in French)	André Nsabimana
<u>BIRE2202</u>	Territorial and environmental diagnosis[7.5h+22.5h] (2.5 credits) (in French)	Pierre Defourny, Frédéric Gaspart,

<u>BIRE2203</u>	credits) (in French) Integrated project in environmental science and technology[60h] (5 credits) (in French)	Jean-Paul Malingreau Charles Bielders, Pierre Defourny, Bruno Delvaux, Freddy Devillez, Joseph Dufey, Mathieu Javaux, Quentin Ponette, Philippe Sonnet (coord.), Marnik Vanclooster Henri Wattiaux N.
<u>AGRO2300</u>	Questions in religious sciences[15h] (2 credits) (in French)	
<u>BIRE2200</u>	Mémoire de fin d'études(35 credits) (in French)	
Courses specific to the different specialisations		
S4E : Environmental Technologies : Water, Soil, Air		
<u>BRES2101</u>	Electronics and measurement[30h+22.5h] (4 credits) (in French)	Francis Labrique
<i>This course is followed exceptionally during the academic year 2005-06 by the BIR23/4E students</i>		
<u>BRTE2201</u>	Human and animal toxicology[22.5h] (2 credits) (in French)	Alfred Bernard
Choice of two courses from the following list for 4 credits :		
<u>AMCO2191</u>	Geoenvironment[30h+15h] (4 credits) (in French)	Alain Holeyman
<u>AMCO2191B</u>	Géoenvironnement(1.5 credits) (in French)	N.
<i>The AMCO 2191 course, Partim B, can only be followed after the BRES2102 course :Soil Hydrodynamics : Modelling</i>		
<u>BRES2102</u>	Soil hydrodynamics : modelling[30h+30h] (5 credits) (in French)	Charles Bielders, Marnik Vanclooster
<u>MAPR2643</u>	Treatment of liquid effluents[30h+7.5h] (4 credits) (in English)	Spyridon Agathos, Léon Duvivier
<u>MAPR2680</u>	Treatments of gaseous wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Olivier Françoisse
<u>MAPR2690</u>	Valorisation and Treatment of Solid Wastes[30h+7.5h] (4 credits) (in English)	Jacques Devaux, Joris Proost
Free choice of courses for a volume of 8 credits		
<i>This volume is modulable, depending on the choice of the given options.</i>		
S5E : Territory Reorganisation		
<u>AMCO3011A</u>	Acteurs, territoires et contextes de développement A[30h] (3 credits) (in French)	N.
<u>BRES2201B</u>	Irrigation, drainage et conservation des sols:Conservation des sols[15h+7.5h] (2 credits) (in French)	Charles Bielders
<u>BRAT2201</u>	Seminars and exercises in land development[22.5h] (2 credits) (in French)	Pierre Defourny, Pierre Defourny (supplée N.), Freddy Devillez
Choice of courses from the following list for 2.5 credits :		
<u>BRAT2102</u>	Spatial modelling of territorial dynamics[15h+15h] (2.5 credits) (in French)	Pierre Defourny
<i>This course will be followed exceptionally in 2005-06</i>		
<u>BRAI2212</u>	Rural development economy[30h] (2.5 credits) (in French)	Frédéric Gaspart, Bruno Henry de Frahan
This course choice is not offered in 2005-06. The students will exceptionally follow the BRAT 2102 course.		
<u>BIRA2103</u>	Economy and management of agricultural production[30h+7.5h] (3 credits) (in French)	Jean-Marie Bouquiaux
<u>AMCO2991</u>	Faisabilité et incidence des projets de développement territorial[30h] (3 credits) (in French)	Dominique Peeters
Free choice of courses for a volume of 5 credits		
<i>This volume is modulable, depending on the choice of the given options.</i>		
S6E : Nature, Water and Forests		
<u>BREF2202</u>	Forest management and economy[60h] (5 credits) (in French)	Daniel Bemelmans, Jean-Louis Blanchez, Quentin Ponette
<u>BREF2107C</u>	Sylviculture : Séminaires et tournée forestière(3 credits) (in French)	Quentin Ponette
<u>BREF2203</u>	Wood transformation and valorisation[30h] (2.5 credits) (in French)	Tomas Avella y Shaw
Choice of one course from the following list :		
<u>BRAI2204</u>	Management of temperate and tropical pastoral systems[30h] (2.5 credits) (in French)	Alain PEETERS
<u>BREF2201</u>	Management principles of animal species in natural environment[15h+15h] (2.5 credits) (in French)	Michel Baguette, Éric Le Boulengé
Free choice of courses for a volume of 4 credits		
<i>This volume is modulable, depending on the choice of the given options.</i>		

S7E : Water and Soil Resources

BRES2101 Electronics and measurement[30h+22.5h] (4 credits) (in French) Francis Labrique

This course is followed exceptionally during the academic year 2005-06 by the BIR23/7E students

BRES2201 Irrigation, drainage and soil preservation[37.5h+22.5h] (5 credits) (in French) Charles Bielders, Mathieu Javaux

BRES2202 Seminars on water and soil resources[22.5h] (2 credits) (in French) Charles Bielders, Bruno Delvaux, Marnik Vanclooster

Choice of courses from the following list for 3 credits :

BRES2203 Soil management and planning in warm regions[22.5h+15h] (3 credits) (in French) Charles Bielders, Bruno Delvaux

BRES2204 Integrated management of water resources[22.5h+15h] (3 credits) (in French) Amaury Tilmant

BRES2205 Clay and solid constructions[22.5h+22.5h] (4 credits) (in French) Sébastien Lambot

Free choice of courses for a volume of 4.5 credits

This volume is modulable, depending on the choice of the given options.

S10E : Technologies and Information Management

BRES2101 Electronics and measurement[30h+22.5h] (4 credits) (in French) Francis Labrique

This course is followed exceptionally during the academic year 2005-06 by the BIR23/10E students

BRTI2102 Process modelling and forecasting systems[22.5h+15h] (3 credits) (in French) Philippe Baret, Patrick Bogaert, Xavier Draye (coord.)

BRTI2202 Special questions in information management[37.5h] (3 credits) (in French) Philippe Baret, Pierre Defourny

Choice of given courses for a volume of 9 credits

The students are invited to choose specific thematic modules from among : "Biology and Genetics", "Information and Agriculture", "Environmental Evaluation and Follow-up", for this volume of 9 credits. The content of these modules will be defined together with the study advisor.

Free choice of courses for a volume of 2.5 credits**Evaluation**

The evaluation focuses on the totality of the theoretical and practical activities.

Positioning of the degree within the University cursus

The university degree in Bioengineering entitles direct access to professional life. It may also grant access to the master's cycle and PhD programme.