Courses taught in English

2016-2017

This catalogue presents the **courses taught in English** at the University of Bordeaux on offer to **international students studying within the framework of an exchange program**. Nearly 300 courses are listed within the domains of:

- Law, Political Science, Economics and Management
- Science and Technology
- Health Sciences
- Human Sciences

The catalogue presents the courses either with a **detailed factsheet** or simply the **basic information** (level of studies/n° ECTS/type of teaching). A factsheet for every course will be available shortly.

These courses are taught throughout the different campus sites of the University of Bordeaux. **Please consult with the International Mobility Manager** of your site (see next page) **and the course coordinator** before confirming your choice of courses. You will be guided concerning questions such as whether places are still available for courses, the geographical location of different courses, etc.

Note: the University of Bordeaux campus is one of the largest in Europe (187 hectares). Please make sure when choosing your courses that your agenda permits you to travel the necessary distance from one campus site to the next and to be on time for the start of class! (e.g. to go from Campus Pessac to Campus Bastide by tram, the time needed is approximately 45 minutes).

LEGEND:

Bachelor

- S1 = fall semester, year 1
- S2 = spring semester, year 1
- S3 = fall semester, year 2
- S4 = spring semester, year 2
- S5 = fall semester, year 3
- S6 = spring semester, year 3

Master

- S1 = fall semester, year 1
- S2 = spring semester, year 1
- S3 = fall semester, year 2
- S4 = spring semester, year 2

- ECTS: European Credit Transfer System
- F2F: Face-to-Face teaching
- EL: e-learning

Welcome contacts

Talence Campus

- Science and Technology
- Biology
- IUT de Bordeaux : Science and Technology
- Institute of Vine and Wine Science (ISVV)

Student Life Center

Lucie Ouvrard
Marie-Chantal Gipoulou

bve.talence@u-bordeaux.fr
+33 (0)5 40 00 84 84

International office

Anna Gerykova
Melanie Lecouvey

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+33 (0)5 40 00 69 50

Carreire & Victoire Campus

- Health Sciences
- Human Sciences
- STAPS
- ISPED

Student Life Center

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Karine Lacouture

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International office

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Inchirah Mousset

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+33 (0)5 56 84 86 39

Pessac & Bastide Campus

- Law, Political Science, Economics, Management
- IUT de Bordeaux: Management
- ESPE: School of Education

Student Life Center

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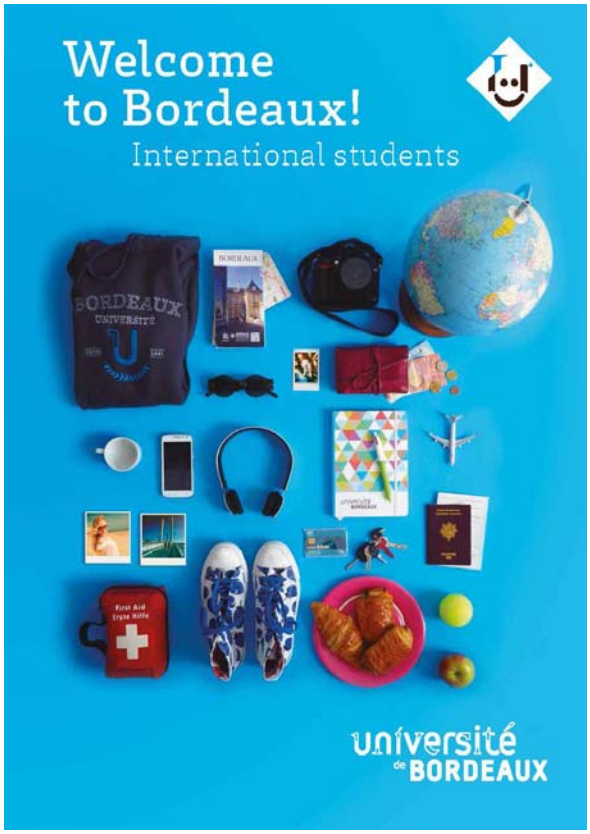
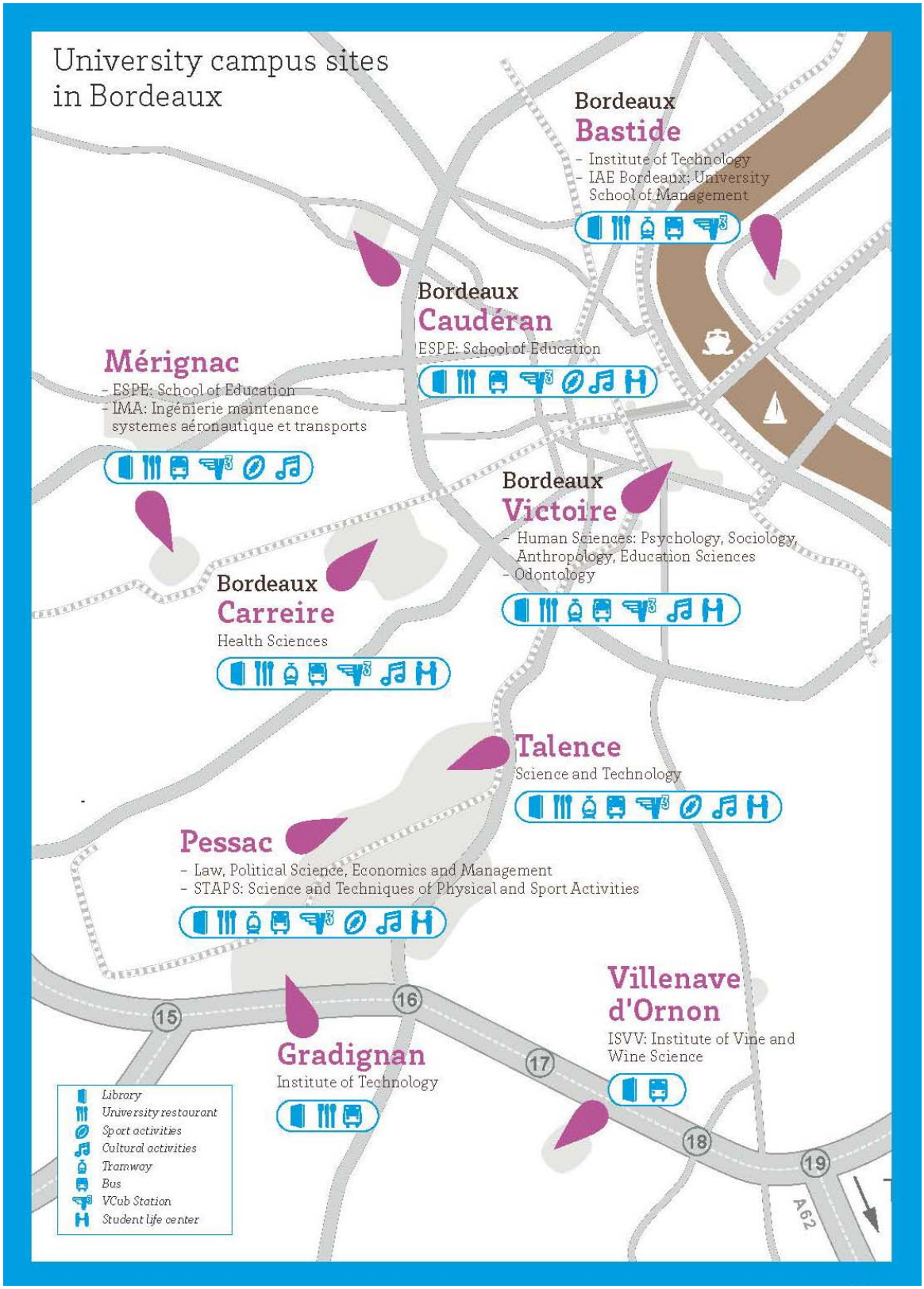


*Make sure you get your copy of our **Welcome Guide for International Students** (also available on our website) to help you settle in Bordeaux.*

Campus sites

The University of Bordeaux campus is one of the largest in Europe (187 hectares)



Disciplines

Law, Political Science, Economics & Management

UNDERGRADUATE DIPLOMA IN TECHNOLOGY
IUT Bordeaux - Campus Bastide

VOCATIONAL BACHELOR
IUT Bordeaux - Campus Bastide

BACHELOR
College of Economics, management and social administration - Campus Pessac

MASTER
IAE – Campus Bastide

MASTER
College of Economics, management and social administration - Campus Pessac

Disciplines

Science and Technology

UNDERGRADUATE DIPLOMA IN TECHNOLOGY

IUT Bordeaux - Campus Gradignan

BACHELOR

College of Science and Technology - Campus Talence

MASTER

College of Science and Technology - Campus Talence

MASTER

College of Health Sciences - Campus Carreire

BIOLOGY

NEUROSCIENCE

PHARMACY

Disciplines

Human Sciences

BACHELOR
College of Human Sciences - Campus Victoire

MASTER
College of Human Sciences - Campus Victoire

- *Law*
- *Political Science*
- *Economics*
- *Management*

UNDERGRADUATE DIPLOMA IN TECHNOLOGY

IUT Bordeaux - Campus Bastide

MARKETING TECHNIQUES _____ p. 16 - 33

- Business communication 2
- Business English 1
- Business English 2
- Business English 3
- Business English 4
- Commercial studies and market research 1
- Commercial studies and market research 2
- Company structures
- Distribution
- E-marketing
- *International environment 2: understanding foreign markets and economic intelligence* ..... *S3 / 4ECTS / F2F*
- *International environment 3 : international sales techniques* ..... *S4 / 3ECTS / F2F*
- International marketing
- Introduction to entrepreneurship
- Introduction to project management
- Marketing basics / Marketing concepts & strategy
- Operational marketing
- *Point of sales marketing* ..... *S3 / 4ECTS / F2F*
- Purchasing
- *Relationship skills development* ..... *S2 / 3ECTS / F2F*

VOCATIONAL BACHELOR

IUT Bordeaux - Campus Bastide

INTERCULTURAL MANAGEMENT FROM A GLOBAL PERSPECTIVE __ p.34 - 47

- Business English 2
- Business in North America: an intercultural approach
- International economics
- International marketing
- *Intercultural negotiation and cultural codes* ..... *S1 / 2 ECTS / F2F*
- *International supply chain management* ..... *S1 / 2 ECTS / F2F*
- International trade techniques: refresher course
- *Interculturality in major economic zones* ..... *S1 / 4 ECTS / F2F*
  & basics in international purchasing
- Logistics and economics of transportation
- Management - International trade
- *Managing international teams/ HRM* ..... *S1 / 2 ECTS / F2F*
- Strategic management /
  Management of international projects

BACHELOR

College of Economics, management and social administration - Campus Pessac

ECONOMICS AND MANAGEMENT _____ p. 48

- *Business game* ..... *S6 / F2F*
- *European economics* ..... *S4 / F2F*
- European institutions
- *European integration* ..... *S6 / F2F*
- *Financial intermediation* ..... *S5 / F2F*
- *Global economic landscape* ..... *S2 / F2F*
- *Global firm* ..... *S6 / F2F*
- *International economic institutions* ..... *S1 / F2F*
- *International migration* ..... *S3 / F2F*

BACHELOR

College of Economics, management and social administration - Campus Pessac

ECONOMICS AND MANAGEMENT - *continued*

- *International trade* ..... *S5 / F2F*
- *European Monetary Union: issues and challenges* ..... *S6 / F2F*
- *Operational marketing* ..... *S5 / F2F*
- *Project management* ..... *S5 / F2F*

MASTER

IAE – Campus Bastide

BUSINESS ADMINISTRATION AND FINANCE – MBA

- *Business and strategic policy* ..... *S2 / 3 ECTS / F2F*
- *Business French* ..... *S2 / 2 ECTS / F2F*
- *Business law* ..... *S1 / 3 ECTS / F2F*
- *Cost accounting and management control* ..... *S1 / 6 ECTS / F2F*
- *Decision-making and corporate finance* ..... *S1 / 3 ECTS / F2F*
- *Economic and business environment* ..... *S1 / 3 ECTS / F2F*
- *Financial accounting* ..... *S1 / 6 ECTS / F2F*
- *Financial statements analysis* ..... *S2 / 5 ECTS / F2F*
- *Information systems* ..... *S1 / 3 ECTS / F2F*
- *Investment and portfolio management* ..... *S2 / 5 ECTS / F2F*
- *Management business game* ..... *S2 / 2 ECTS / F2F*
- *Marketing management* ..... *S2 / 3 ECTS / F2F*
- *Organizational behavior* ..... *S1 / 3 ECTS / F2F*
- *Operations and logistics management* ..... *S1 / 3 ECTS / F2F*
- *Risk management* ..... *S2 / 5 ECTS / F2F*

MASTER

IAE – Campus Bastide

EUROPEAN BUSINESS ADMINISTRATION

- *Banking and finance in Europe* ..... *S2 / 3 ECTS / F2F*
- *Business French I* ..... *S1 / 3 ECTS / F2F*
- *Business French II* ..... *S2 / 3 ECTS / F2F*
- *Corporate finance* ..... *S2 / 3 ECTS / F2F*
- *Decision-making and statistical analysis* ..... *S1 / 3 ECTS / F2F*
- *Economic globalization* ..... *S1 / 3 ECTS / F2F*
- *European economic environment* ..... *S1 / 3 ECTS / F2F*
- *European institutions* ..... *S1 / 3 ECTS / F2F*
- *European law I* ..... *S1 / 3 ECTS / F2F*
- *European law II* ..... *S2 / 3 ECTS / F2F*
- *Financial mathematics* ..... *S1 / 3 ECTS / F2F*
- *Human resources* ..... *S2 / 3 ECTS / F2F*
- *International accounting I* ..... *S1 / 3 ECTS / F2F*
- *International accounting II* ..... *S2 / 3 ECTS / F2F*
- *International strategy* ..... *S2 / 3 ECTS / F2F*
- *Marketing* ..... *S2 / 3 ECTS / F2F*
- *Organizational strategy* ..... *S1 / 3 ECTS / F2F*
- *Organizational theory* ..... *S1 / 3 ECTS / F2F*

MASTER

IAE – Campus Bastide

INTERNATIONAL MANAGEMENT

- *Comparative perspective/ topics linked to management/company visits* ..... *S2 / 9 ECTS / F2F*
- *Cross cultural management* ..... *S1 / 3 ECTS / F2F*
- *Global human resources management* ..... *S1 / 3 ECTS / F2F*
- *Information system* ..... *S1 / 2 ECTS / F2F*
- *International accounting and finance* ..... *S1 / 2 ECTS / F2F*
- *International business law* ..... *S1 / 2 ECTS / F2F*
- *International environment I* ..... *S1 / 3 ECTS / F2F*
- *International environment II* ..... *S2 / 6 ECTS / F2F*
- *International marketing* ..... *S1 / 5 ECTS / F2F*
- *International strategic management* ..... *S1 / 5 ECTS / F2F*
- *International trade practices/ supply chain management* ..... *S1 / 5 ECTS / F2F*
- *Operations project management* ..... *S2 / 3 ECTS / F2F*
- *Serious game* ..... *S2 / 2 ECTS / F2F*

MASTER

College of Economics, management and social administration - Campus Pessac

ECONOMICS _____ p.49 - 57

- *Agent based modelling* ..... *S3 / F2F*
- *Commodity trading* *S1/F2F*
- *Complexity of ecosystems* ..... *S3 / F2F*
- *Computational finance* ..... *S3 / F2F*
- *Contract theory* ..... *S4 / F2F*
- *Corporate finance* ..... *S4 / F2F*
- *Datamining* ..... *S3 / F2F*
- *Decisions in a complex world* ..... *S3 / F2F*
- *Dynamics of networks* ..... *S3 / F2F*
- *Econometrics of big data* ..... *S3 / F2F*

MASTER

College of Economics, management and social administration - Campus Pessac

Discipline	*Marketing Techniques*
Course title	*Business Communication*
Code	*M3203*
Duration Date start Date end	*14 hours* › *September* › *December*
Course coordinator Contact details	*Annaig Prigent* › *annaig.prigent@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: seminars, project.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*Create a business communication plan based on a company brief.*
Content	› *Manage a business communication plan using the right methodology* › *Choose the right tools that correspond to the communication strategy and the objectives of the company* › *Evaluate a communication plan with regard to its objectives* › *Analyze the impact of a campaign*
Methods	*Seminars, projects, etc. (14 hours: 7 seminars of 2h each).*
Assessment procedures	*One business communication plan to be created (group work)*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Notions about a business communication plan*

Please note that the number of places available may be limited for certain classes.

Marketing Techniques

Discipline	*Marketing Techniques*
Course title	*Business English 1*
Code	*M1203*
Duration Date start Date end	*9 weeks* › *September* › *December*
Course coordinator Contact details	*Annaig Prigent* › *annaig.prigent@u-bordeaux.fr* *Janie Godfrey* › *janiegodfrey966@hotmail.com*
Additional contact	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Flipped classroom, case studies, role plays, oral presentations delivered by students.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*A focus on business English with a special emphasis on oral communication.*
Content	› *Understanding the working world (particularities of Anglo-Saxon countries)* › *Searching for an international placement (understanding job ads, preparing CV and cover letters, making phone calls)* › *Completing research, using and referencing sources of information, preparing and delivering professional presentations in groups* › *Participating in meetings, problem-solving in groups*
Methods	*Seminars (36h in-class; 2h or 4h/week), debates, role-plays, group work* *Self-study (20h), group work (20h), exam preparation (20h)* *Details on Moodle for every group*
Assessment procedures	› *Weekly attendance and individual participation: 20%* › *Group presentation: 40% (last 2 classes)* › *CV and cover letters: 40% (October)*
Prerequisites	› *High-school diploma* › *B1/B2 level in English*
Other information	› *Maximum 32 students. Some classes of smaller groups (16)* › *Schedule and other information clearly presented on Moodle.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Business English 2*
Code	*M2205 (compulsory if module M2206 - International Marketing chosen)*
Duration Date start Date end	*8 weeks* › *January* › *April*
Course coordinator Contact details	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Janie Godfrey* › *janiegodfrey966@hotmail.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: seminars and workshops, flipped classroom* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*This module in Business English is focused on companies (in France & abroad), on intercultural communication in business and supports the M2206 module (International Marketing).*
Content	*Upon completion, students are able to describe company structures, discuss corporate culture in different countries, can explain 4 P'S, SWOT & PESTEL tools in a foreign context.*
Methods	*Mini lectures, seminars, workshops involving collaboration on individual projects.* *32 h in class (2h or 4h /week), 20 hours (self-study), 20 hours (group work), 20 hours (exam preparation).*

Assessment procedures	› *Individual attendance, involvement and progress are assessed on a weekly basis (20%)*
	› *Oral vocabulary test (30%)*
	› *Oral presentations:*
	  › *SWOT/PESTEL/4P'S applied to an individual project (25%)*
	  › *Previous professional experience (25%)*

Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Computer and internet knowledge for completing research in class*
Other information	*This course may be chosen independently but is compulsory if module M2206 is chosen.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Business English 3*
Code	*M 3102*
Duration Date start Date end	*7 weeks* › *September* › *November*
Course coordinator Contact details	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Yves Davo* › *yves.davo@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: seminars, workshops, role-plays, debates.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*At the end of the module, students are able to:* › *Discuss and write short essays on their professional experience abroad (international internship),* › *Promote their professional experience abroad to first year students (using marketing tools)* › *Debate and write essays on ethical issues in a business context* › *Master the 5 language skills in a business context.*
Content	› *Preparation of an event (with 300 student participants): "International Placement Fair" in November* › *Preparation for the TOEIC test (session in November)* › *Business ethics (case studies, debates, essays)*
Methods	*Seminars, workshops, role-plays, debates.* *Self-study and preparation (40 hours), group work (20 hours).* *Details on Moodle for every group.*
Assessment procedures	*Individual attendance, involvement and progress assessed.* › *Weekly: 25%* › *Essays: 25%* › *Debates: 25%* › *TOEIC preparation: 25%*
Prerequisites	› *High-school diploma* › *B2 level in English* › *Computer and internet knowledge required for research in class*
Other information	*Maximum 32 students. Some classes of smaller groups (16)* *Schedule and other information clearly presented on Moodle.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Business English 4*
Code	*M4105C*
Duration Date start Date end	*6 weeks* › *March* › *April*
Course coordinator Contact details	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Yves Davo* › *yves.davo@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: seminars, workshops, role-plays, debates* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 4*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*5 skills in a business context: report writing, listening, comprehension, debates & meetings, group projects*
Content	› *Globalization (case studies, meetings, debates)* › *Brand management in an international context (group project)* › *Methodology (business report s, graph descriptions and oral defence)*
Methods	› *Seminars, workshops, role-plays, debates (24h: 2h or 4h/week)* › *Self-study and preparation (40h)* › *Group work (20h)*
Assessment procedures	› *Individual attendance, involvement and progress assessed weekly: 25%* › *Activity report: 25%* › *Oral defence: 25%* › *Group project: 25%*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Computer and internet knowledge required for online course*
Other information	› *Maximum 32 students. Some classes of smaller groups (16)* › *Schedule and other information clearly presented on Moodle.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Commercial Studies and Market Research 1*
Code	*M 1107*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Annaig Prigent* › *annaig.prigent@u-bordeaux.fr*
Additional contact	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*This course deals with:* › *Understanding the different issues of market studies* › *Knowing the different techniques to carry out a market study* › *Completing a literature review*
Content	› *The place of market studies within the marketing process.* › *Different types of market studies.* › *Stages to respect when carrying out an objective, complete and structured literature review.* › *Form requirements when presenting a literature review.*
Methods	› *Seminars (6 seminars of 2h each)* › *Projects, etc.*
Assessment procedures	› *1 multiple choice quiz* › *1 literature review study (group work)*
Prerequisites	› *High-school diploma* › *B1/B2 level in English*

Please note that the number of places available may be limited for certain classes.

Marketing Techniques

Discipline	*Marketing Techniques*
Course title	*Commercial Studies and Market Research 2*
Code	*M2105*
Date start Date end	› *January* › *April*
Course coordinator Contact details	*Annaig Prigent* › *annaig.prigent@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*3 ECTS*
Language of instruction	*French (lectures) and English (seminars).*
Description	*This course deals with:* › *Defining the right devices to be used with regard to the objectives of the study* › *Carrying out a qualitative study* › *Carrying out a quantitative study*
Content	*I. Qualitative study* › *Know the different ways to obtain qualitative information* › *Define the right sample of people to interview* › *Write a facilitating guide to manage a focus group or an individual interview* › *Manage an individual interview for a qualitative study* › *Analyze the qualitative information obtained* › *Present recommendations to firms following results* *II. Quantitative study* › *Write an optimized questionnaire for a quantitative study ; link with the qualitative study* › *Define the right sample of people to interview (number and profile)* › *Use an online tool to administer a questionnaire* › *Analyze results with graphs and cross tabulations* › *Present recommendations to firms following results*
Methods	*Lectures, seminars, project, etc.*
Assessment procedures	› *1 multiple choice quiz* › *1 qualitative study (individual work)* › *1 quantitative study (group work)*
Prerequisites	› *High-school diploma* › *B1-B2 level in English*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Company Structures*
Code	*TU11 M1101*
Duration Date start Date end	*12 hours* › *September* › *December*
Course coordinator Contact details	*Jérôme Lerat-Pytlak* › *jerome.lerat-pytlak@u-bordeaux.fr*
Additional contact	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*Learning objectives and targeted skills:* › *To be able to use the main tools of organizational theory in order to analyze organizations.* › *To be able to identify company malfunctions and propose organizational solutions.*
Content	*Chapter 1: Concept of organization and typologies* › *Definitions of the organization* › *Characteristics of an organization* › *Conditions for appearance of an organization* › *Typologies of organizations* › *The company as an organization* *Chapter 2: The structure of organizations* › *Definitions of the structure* › *Representations of the structure* › *Mechanisms of coordination* › *Parameters for structures analysis* › *Typologies of structures* › *Dynamics of structures* *Chapter 3: The functions within the company* › *Marketing and sales* › *From conception to production* › *The quality function* › *Logistics* › *The managerial function* *Chapter 4: Organizational theory* › *The machine metaphor* › *The organism metaphor* › *The brain metaphor* › *The cultural metaphor* › *The market metaphor*

Methods	*Six case studies are completed during six different supervised working sessions.* *Theoretical teaching material is available via the learning platform and may be studied before the working sessions.*
Assessment procedures	*2 hour written exam (case study) in mid-December.*
Prerequisites	› *High-school diploma* › *B1/B2 level in English*
Other information	*Group of 30 students maximum.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Distribution*
Code	*M2104*
Date start Date end	› *January* › *March*
Course coordinator Contact details	*Tania Sanchez* › *tania.sanchez@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*3 ECTS*
Language of instruction	*French (lectures) and English (Seminars)*
Description	*Upon completion, students have a good view of the food and non-food retail sector. They also know about distribution functions, channel and growth strategies.*
Content	› *Emergence of modern retailing* › *New patterns of retail distribution* › *The main French retailers* › *Functions of distribution* › *Retail networks organization* › *Choice of channel and general channel* › *Distribution growth strategies*
Methods	*Lectures and seminars*
Assessment procedures	› *Summative assessment* › *Written exam and oral presentation (both in English)* › *Written exam (1h) and oral presentation (20 minutes)*
Prerequisites	› *High-school diploma* › *B1-B2 level in English*
Other information	*Seminars: 30 students maximum.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*E- Marketing*
Code	*M4105C*
Date start Date end	› *March* › *May*
Course coordinator Contact details	*Annaig Prigent* › *annaig.prigent@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 4*
ECTS credit points	*3 ECTS*
Language of instruction	*French for lectures / English for seminars*
Description	› *Understanding the issues of on-line marketing* › *Knowing the different strategies and devices used in on-line marketing* › *Carrying out an on-line marketing project*
Content	› *Transformations in marketing as a result of the web* › *Different types of business models used* › *The impact of the web in mix marketing campaigns* › *SEO, SEA, SMO…* › *The management of an on-line marketing project*
Methods	*Lectures, seminars, project, etc.* *18 hours (4 lectures and 5 seminars of 2h each)*
Assessment procedures	*One project to be completed (group work)*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Computer and internet knowledge required for online course* › *Marketing notions*

Please note that the number of places available may be limited for certain classes.

Marketing Techniques

Discipline	*Marketing Techniques*
Course title	*International Marketing (cross-activities)*
Code	*M 2206 (must be chosen with M2205 - Business English 2)*
Date start Date end	› *January* › *April*
Course coordinator Contact details	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Janie Godfrey* › *janiegodfrey966@hotmail.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Work is carried out outside the class after guidelines have been given and posted on Moodle.* *Face-to-face seminars and workshops take place during the Business English 2 classes.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Students are required to use the knowledge acquired in the following courses: Marketing / Foreign Markets / Commercial Communication / Market Research. They work on their innovative product and explain how and why it will be exported.*
Content	*Upon completion, students are able to:* › *Describe their innovative product (technical specificities, USP...)* › *Explain which foreign market they have chosen and why* › *Explain their segmentation, positioning on this market* › *Present their communication plan for this foreign market* *Final presentation in English*
Methods	*Seminars and workshops: theories discussed in class and applied to individual projects. Coaching.*
Assessment procedures	› *Individual oral presentation: 100 % of overall mark.* › *Two teachers to assess the work: 1 English teacher and 1 specialist of marketing or foreign markets or commercial communication.*
Prerequisites	› *High-school diploma.* › *Computer and internet requirement for research in class.* › *Basics in marketing, communication, market research.* › *B1-B2 level in English*
Other information	*Students choosing this module must also be enrolled in the Business English 2 module too. If not, they will not be accepted.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Introduction to Entrepreneurship*
Code	*UE 42 – M4205*
Duration Date start Date end	*6 weeks* › *May* › *June*
Course coordinator Contact details	*Estèle Jouison-Laffitte* › *estele.jouison-laffitte@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching, learning by doing pedagogy.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 4*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	› *In this transversal course, students use knowledge already acquired in various other courses such as marketing, accountancy/finance, law, etc.* › *The course is based on teamwork and autonomous learning; the course coordinator acts more as a "coach" than as a "teacher"*
Content	*The course relies on the Business Model concept and more specifically on the GRP model (see grp-lab.com for more information).* *Firstly, during an interactive lesson (based on flipped classroom method), students are asked to explain to each other the different parts of a business model and, as a team, to describe the business model of an existing company.* *During three classes (4 hours each), in teams of 5 to 6 students, they come up with a business idea and then develop a draft business model to launch the idea.* *Some personal work is required to complete the teamwork in class. In particular, students may have to interact with potential consumers or suppliers in order to create the most realistic project possible.* *The fourth course is dedicated to an individual quiz and the preparation of the oral presentation of the entrepreneurial project.* *Finally, the oral presentation is conducted and ends with a discussion with the teacher about the project presented.*
Methods	*Interactive lessons (based on flipped classroom method), self-study, oral presentation*

Assessment procedures	*Three grades are given to students:* › *A personal grade (based on an individual quiz): 20%* › *A collective grade (based on the study of the business model of an existing company, carried out in small groups of 3 to 4 students) : 30%* › *A collective grade (based on the written and oral presentation of the business model of a new company, carried out in groups of 5/6 students) : 50%*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *A personal laptop may help with group work*

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Introduction to Project Management*
Code	*UE 23 – M2304*
Duration Date start Date end	*3 months* › *February* › *April*
Course coordinator Contact details	*Estèle Jouison-Laffitte* › *estele.jouison-laffitte@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching, learning by doing pedagogy.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 4*
ECTS credit points	*5 ECTS*
Language of instruction	*English*
Description	*The course is based on teamwork and autonomous learning; the course coordinator acts more as a "coach" than as a "teacher".*
Content	*The objective of the course is to help students discover the main techniques of project management (such as Gantt Diagram or functional analysis) by enabling them to practice with a real project conducted in teams of 8 to 10 students.*
Methods	*The course includes a first interactive lesson (based on flipped classroom method) where students are asked to explain to each other some techniques/tools of project management.* *During 7 classes (2 hours each), in teams of 8 to 10 students, they work on a project (they must create a short movie on an imposed subject that changes every year).* *Some personal work is required to complete the teamwork in class. In particular, students need some extra class time to produce the movie.*
Assessment procedures	*Three separate grades are given to students:* › *A personal grade (based on an individual quiz): 20%* › *A collective grade (based on the written presentation of a project management technique): 30%* › *A collective grade (based on the movie they created and the detailed written presentation of this project completed via teamwork): 50%*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *A personal computer may help with group work* › *Team working skills*

Please note that the number of places available may be limited for certain classes.

Marketing Techniques

Discipline	*Marketing Techniques*
Course title	*Marketing Basics / Marketing Concepts and Strategies*
Code	*M 1102 / M 1103*
Duration Date start Date end	*9 weeks* › *September* › *April*
Course coordinator Contact details	*Catherine Madrid* › *catherine.madrid@wanadoo.fr* *Laurence Chérel* › *laurence.cherel@u-bordeaux.fr*
Additional contact	*Sylvie Castets :* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano:* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud :* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: flipped classroom* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semesters 1 & 2*
ECTS credit points	*4 ECTS / 4 ECTS*
Language of instruction	*French (lectures) and English (supervised work & seminars).*
Description	*Upon completion, students should have acquired skills to analyze the market, the competition and the environment for a new product.*
Content	*Marketing concept, market analysis, competitive field, environment, consumer's behaviour and segmentation.*
Methods	*Flipped classroom* › *Marketing Basics: 36h supervised work, 1h self-study preparation.*
Assessment procedures	*During a supervised work session, students apply the theory already learned to an innovative product they have imagined.*
Prerequisites	› *High-school diploma.* › *B1/B2 level in English.* › *Computer and internet knowledge required for the online course.*
Other information	*Read more on* http://www.pfrproduitfilrouge.com

Please note that the number of places available may be limited for certain classes.

Discipline	*Marketing Techniques*
Course title	*Operational Marketing*
Code	*M 2202*
Duration Date start Date end	*7 weeks* › *September* › *April*
Course coordinator Contact details	*Catherine Madrid* › *catherine.madrid@wanadoo.fr* *Laurence Chérel* › *laurence.cherel@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: flipped classroom* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 1 & 2*
ECTS credit points	*3 ECTS*
Language of instruction	*French and English*
Description	*Upon completion, students should have acquired the skills necessary to analyze the market, the competition and the environment for a new product.*
Content	*Marketing strategy, target, positioning, product, price and distribution policies.*
Methods	*Flipped classroom: 36h supervised work, 1h self-study preparation.*
Assessment procedures	*During supervised work, students apply the theory acquired to an innovative product that they have imagined.*
Prerequisites	› *High-school diploma.* › *B1/B2 level in English.* › *Computer and internet knowledge for online course.*
Other information	*Read more on: http://www.pfrproduitfilrouge.com*

Please note that the number of places available may be limited for certain classes.

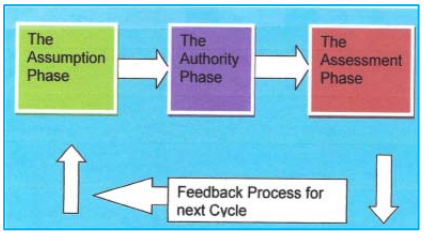
Discipline	*Marketing Techniques*
Course title	*Purchasing*
Code	*M4203 (1/2)*
Duration Date start Date end	*10 hours* › *March* › *March*
Course coordinator Contact details	*Tania Sanchez* › *tania.sanchez@u-bordeaux.fr*
Additional contacts	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr* *Stéphanie Cano* › *stephanie.cano@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 4*
ECTS credit points	*3 ECTS*
Language of instruction	*French (lectures), English (seminars)*
Description	*Upon completion, students should have a good understanding of purchasing issues and methods.*
Content	› *Purchasing function and process* › *Ethics and environmental responsibility in procurement* › *Analysis of market requirements* › *Specifications* › *Product / supplier selection* › *Purchase negotiation* › *Supplier relationship management* › *Contract*
Methods	*Lectures and seminars*
Assessment procedures	› *Summative assessment* › *Written exam and purchase negotiation simulation (both in English)* › *Written exam (1 hour) and purchase negotiation simulation (15 minutes)*
Prerequisites	› *High-school diploma* › *B1-B2 level in English*
Other information	*Seminars in groups of 30 students maximum.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Intercultural Management from a Global Perspective*
Title of the course	*Business English 2*
Code	*UE 2*
Duration Date start Date end	*20 hours (3h per week)* › *September 8th 2016* › *November 16th 2016*
Course coordinator Contact details	*Arnaud Schmitt* › *arnaud.schmitt@u-bordeaux.fr*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud :* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: in-class* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	› *Students should acquire basic knowledge concerning American and British business environments. They should also learn the basics about the dynamics of multi-culturality from an American or British perspective.* › *The course systematically develops linguistic comprehension in terms of reading and listening and also focuses on speaking and writing skills.*
Content	*Some examples of specific chapters (new topics are introduced every year):* › *East vs. West: Culture shock* › *The TTIP* › *Motivation strategies* › *Global trends in the world economy* › *Social networks and recruitment strategies…*
Methods	*Lectures, group work/presentations, listening comprehension (video documents)* *20 hours (14h group tutorials, 4h group work, 2h exam)*
Assessment procedures	› *Assessment based on a 1½ -hour written exam composed of multiple questions (60% of the grade) in December.* › *Group or individual presentation (40% of the grade).* › *Final exam*
Prerequisites	› *High-school diploma* › *B2 level in English* › *Good reading and listening skills, as well as verbal presentation skills.*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Discipline	*Intercultural Management from a Global Perspective*
Course title	*Business in North America: an intercultural approach*
Code	*UE2*
Duration Date start Date end	*3 full consecutive days (8 hours a day).* › *September 26th 2016* › *September 28th 2016*
Course coordinator Contact details	*Sylvie Castets* › *sylvie.castets@u-bordeaux.fr*
Additional contact	*Gabrielle Giraud (assistant)* › *gabrielle.giraud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: seminar style for 24 hours.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*Knowledge/expertise gained upon completion of the course:* › *Based on language immersion, students should improve their TOEIC level by 50 points at the end of the seminar.* › *Each student is expected to be able to convincingly present a topic in English after group work preparation (x2).* › *Students should have sufficient knowledge of North American Markets to be able to make a list of ten micro-economic recommendations for any given North American market.*
Content	*Conference (4h) on comparative analysis between Europe and North America (US and Canada) regarding cultures, institutions, economics and demographics. A PowerPoint presentation is used as visual aid and in printed form for the students.* *Specific chapters:* › *Market sizes and economic output* › *Population comparisons: world players* › *Institutions regulating markets in US and Europe* › *Origins and history that impact markets* › *Immigration* › *Similar societal issues. Cultural differences.* › *Labor market differences* › *North American market attributes* › *Doing business in North America* › *Conclusions and tax rate comparisons*

Content	*Group tutorials and group work (16h) based on a case study of the leading market in Florida: Tourism - cultural and economic impact. Includes reading and debating in small groups about selected studies (either printed or in electronic format), debating and proposals. Oral presentations of each student's recommendations.* *Lectures (4h) on career management as well as an individual competency test to prepare for intercultural management professions.* 
Methods	*3 consecutive days, 24 hours of seminar, using immersion techniques in English. This includes lectures, group case study with obligatory individual participation and expression in English for the students.* *The seminar is structured around the following progression from societal to individual level:* › *Providing a macro- economic and cultural comparative analysis in the context of the Europe-North America axis (lecture)* › *Practising business and micro-economic strategic decision making within the domain of the multi-cultural tourism market (group work and tutorials)* › *Providing each student with a self-assessment method to know the skills required to work within an intercultural management environment (lecture and individual competency test).*
Assessment procedures	› *1st grade out of 20 for a multiple choice questionnaire and half page essay (1h).* › *2nd grade out of 20 based on oral level assessed according to group performance and individual presentations.* *Final grade is an average of the 1st and 2nd grade.*
Prerequisites	› *High-school diploma* › *English TOEIC level of at least 650* › *Pre-seminar reading of some of the material used in class* › *Requires reading and listening skills, understanding of group dynamics, verbal presentation skills, and use of visual aids.*
Other information	***Bibliography*** › *Consumer Behavior in Travel and Tourism [Chon, Pizam, Mansfeld];* › *Tourism Impact, Planning and Management [Mason]* › *Consumer Behavior in Tourism [Horner, swarbrooke])* › *A booklet on Consumer Behavior in Tourism will be printed and given to students during class, as well as a market survey in English on tourism.* › *PowerPoint presentation by Philippe Beau (2016) will be available on paper* › *Career Management Model by Philippe Beau, PhD 9 available in paper)* › *The Learning Style Questionnaire by Kenneth Murrel. Jack Gordon editor. 2004. Pfeiffer Publishers.*

	Internet Sites: › *http://www.buzzfeed.com/hnigatu/19-maps-that-will-help-you-put-the-united-states-in-perspect* › *http://www.federalist-debate.org/index.php/component/k2/item/300-europe-vs-usa-whose-economy-wins* › *http://useconomy.about.com/od/grossdomesticproduct/p/largest_economy.htm* › *http://www.pewglobal.org/2011/11/17/the-american-western-european-values-gap/* › *www.clearwaterflorida.org* › *www.beachchamber.com* › *www.myclearwater.com* › *www.visitflorida.com and www.visitstpeteclearwaters.com*

Please note that the number of places available may be limited for certain classes.

Intercultural Management from a Global Perspective

Discipline	*Intercultural Management from a Global Perspective*
Title of the course	*International Economics*
Duration Date start Date end	*3 sessions* › *21st November 2016* › *25th November 2016*
Course coordinator Contact details	*Daniel Toro-Gonzalez* › *dtoro@unitecnologica.edu.co*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: in-class* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*?*
Language of instruction	*English*
Description	*Globalization is at the center of the economic model. Sustained growth and development have rarely, if ever, been achieved in countries that have refused to open up to trade and investment.* *Trade alone though is not enough. Many other factors contribute to development, including education, infrastructure, governance, and institutions.* *It is only when progress is made on all these fronts that developing countries will be able to harvest the full benefits that come from integration into the global trade and investment system.* *In this sense, the goal of this course is to provide students with a wider vision of the international context of growth and commerce.*

Intercultural Management from a Global Perspective

Content	› *The State of World Trade* › *Protectionism? Tariffs and other Barriers to Trade* › *Trade and Development* › *Trade and Growth* › *Trade and Innovation*
Methods	*The course consists of three lectures and in-class discussions. Material must be read previous to the class and one "take home" problem is set.* *Contact and self-study: 15 hours* › *10 contact hours (3h lectures, 1h group work, 1h individual exam)* › *5 self-study hours (2h private readings, 2h exam preparation, 1h group work).*
Assessment procedures	› *At the beginning of each lecture, 15 minutes are devoted to formative assessment in the context of a question and answer session.* › *At the end of each lecture, 15 minutes are devoted to summative assessment through discussion of the topics presented.*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Basic concepts in economics such as demand, supply, elasticity and perfect and imperfect competition are recommended.*
Other information	***Readings*** › *International Trade: Free, Fair and Open? Patrick Love and Ralph Lattimore. OECD – Organization for Economic Cooperation and Development, 2009* › *Thomas L. Friedman (2006) The World is Flat, New York: Farrar, Straus and Giroux.* › *John Mangan, Candra Lalwani, Tim Butcher and Roya Javadpour (2011) Global Logistics and Supply Chain Management, Second Edition, New York: Wiley.* › *Jean-Paul Rodrigue, Claude Comtois and Brian Slack (2009) The Geography of Transport Systems, Second Edition, New York: Routledge.* *Note: maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Discipline	*Intercultural Management from a Global Perspective*
Course title	*International Marketing*
Code	*UE3*
Duration Date start Date end	*20 hours* › *October* › *October*
Course coordinator Contact details	*Franck Duquesnois* › *franck.duquesnois@u-bordeaux.fr*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*5 ECTS*
Language of instruction	*English*
Description	› *International marketing and new trends* › *Learning of fundamentals in marketing and contextualization of tools in an international environment that is unstable and diverse* › *Examples of the adaptation of tools according to international trends: sustainable development, "Bottom of the Pyramid" markets, digital economy, hard economic times, potential opportunities and new approaches of African markets.*
Content	*I. Introduction to international marketing* › *International marketing ≠ Global marketing?* › *Back to fundamentals of marketing* › *Case studies: IM by SMEs & IM by big firms (articles for reading and discussion)* *II. Looking for growth drivers* › *Segmenting, targeting and positioning* › *Introduction to strategic innovation* › *Introduction to sustainable marketing (vs green washing)* *International marketing & innovation. At any cost?* › *Value creation through sustainable business model* › *Examples from the Bottom of the Pyramid approach* *Putting the "Ps" into question?* › *Optimizing the place in the marketing mix* › *Optimizing the promotion in the marketing mix*

Intercultural Management from a Global Perspective

Methods	*Lectures, case studies: 20 hours* › *Tuesday 11/10: 1.30pm-5.45pm* › *Wednesday 12/10 : 1.30pm-5.45pm* › *Monday 17/10 : 8.30am-1pm* › *Tuesday 18/10: 8.30am-1pm* › *Friday 19/10 : 1.30pm-5.45pm*
Assessment procedures	› *Essay, written exam (2hrs) in November: 80% of overall grade* › *Course work - report (group work): 20% of overall grade*
Prerequisites	› *High-school diploma* › *B1/B2 level in English* › *Fundamental principles of marketing*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Intercultural Management from a Global Perspective

Discipline	*Intercultural Management from a Global Perspective*
Course title	*International Trade Techniques: refresher course*
Code	*UE1*
Duration Date start Date end	*10 hours* › *September* › *October*
Course coordinator Contact details	*Tania Sanchez* › *tania.sanchez@u-bordeaux.fr*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*1 ECTS*
Language of instruction	*English*
Description	*Upon completion, students are able to understand the activities of import export departments and major international trade related documents.*
Content	› *Incoterms* › *International shipping* › *Documentary type of payment* › *Customs clearing* › *Currency risk*
Methods	*Lectures and seminars*
Assessment procedures	› *Summative assessment* › *Written exam (1h)*
Prerequisites	› *High-school diploma* › *B1/B2 level in English*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Discipline	*Intercultural Management from a Global Perspective*
Title of the course	*Logistics and Economics of Transportation*
Duration Date start Date end	*5 sessions* › *28th November 2016* › *7th December 2016*
Course coordinator Contact details	*Daniel Toro-Gonzalez* › *dtoro@unitecnologica.edu.co*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching: in-class* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	?
Language of instruction	*English*
Description	› *The goal of this course is to provide students with an overview of the international growth in commerce. Such an overview is supported by strong economic theory in relation with the economics of transportation.* › *At the end of the course, students are able to identify, describe and analyze the main trends, problems and limits of international trade and logistics using economic theory on transportation.*
Content	*Class 1: Monday 28/11: 14h - 18h15 (4h)* *Introduction to Transport Economics* › *Reading of "Introduction to Transport Economics" (Spurling, 2010)* › *The Global Economy: Emergence and Convergence, Economic Growth and Development (Gapminder); Economic Interdependence.* › *Scale Economies, Transport Costs and Firm Location. Chapter 1 Brueckner "Lectures on urban economics"* *Class 2: Wednesday 30/11: 8h - 12h30 (4h)* › *Global Markets, Global Products, Global Firms: Production and Consumption in a Globalized World (Economies of Scale); The Multinational Enterprise; Sourcing and Outsourcing.* › *Trade and the Global Economy: International Trade; Trade Facilitation (Incoterms); Global Trade Patterns.* › *Downloading of the Global Enabling Trade Report - GETR - 2014* › *Reading of the GETR – 2014, pages 1 to 7.* › *Complete the form about the GETR*

	Class 3: Friday 02/12: 8h -12h30 (4h) › *Transportation and Globalization: Air Carriers and Networks; Maritime Shipping; Airports; Ports; Distribution Centers. Population and Transportation modes (Gapminder)* *Class 4: Monday 05/12: 14h - 18h15 (4h)* *First evaluation* › *Demand for Transportation: Models and Applications. Kenneth A. Small and Clifford Winston. Essays in Transportation Economics and Policy. Chapter 2.* *Class 5: Wednesday 07/12: 8h - 12h30 (4h)* › *Reading of the GETR – 2014, pages 27 to 41 about Latin American Market (in-class discussion).* › *In-class exercises (Demand estimation and Competition)* *Urban Transportation Systems in Developing Countries: emergence of a new transportation system, reshaping the cities. Pricing in transportation*
Methods	*Contact and self-study: 30 hours* › *20 contact hours (5h lectures, 1h group work, 2h individual exams);* › *10 self-study hours (5h private readings, 2h exam preparation, 1h group work).* *Note: material must be read before classes and two "take home" problems are set.*
Assessment procedures	› *At the beginning of each lecture, 15 minutes are devoted to formative assessment in the context of a question and answer session.* › *At the end of each lecture, 15 minutes are devoted to summative assessment through discussion of the topics presented.*
Prerequisites	› *High-school diploma* › *B1-B2 level in English* › *Basic economic concepts such as demand, supply, elasticity and perfect and imperfect competition are recommended.*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Intercultural Management from a Global Perspective

Discipline	*Intercultural Management from a Global Perspective*
Title of the course	*Management – International Trade*
Date start Date end	?
Course coordinator Contact details	*Maria Melin-Bonfils* › *maria.bonfils@wanadoo.fr*
Additional contacts	*Gabrielle Giraud* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*Students cover the following topics:* › *Learning about international negotiation specificities* › *Working in intercultural situations* › *Carrying out commercial negotiations both as sellers and as purchasers within an intercultural setting* › *Elaborating an export-import plan*
Content	*Chapter 1: International negotiation techniques* › *Negotiating styles* › *Negotiation process* *Chapter 2: Notion of culture* › *Interaction of cultural spheres* › *Culture within a corporate context* *Chapter 3: Understanding cultural patterns* › *Cultural dimensions and orientations* *Chapter 4: Cross-cultural negotiation behaviour* › *Cross cultural approach, a way of avoiding cultural conflicts* › *Verbal and non-verbal communication techniques* › *Business codes* *Chapter 5: Cross cultural negotiations – group work*
Methods	*Lectures, group work, report writing, negotiation simulations*
Assessment procedures	› *Negotiations in class: 20%* › *Negotiations in groups: 80%*
Prerequisites	› *High-school diploma* › *B2 level in English language*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Intercultural Management from a Global Perspective

Discipline	*Intercultural Management from a Global Perspective*
Course title	*Strategic Management / Management of International Projects*
Code	*UE 2*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Jérôme Lerat-Pytlak* › *jerome.lerat-pytlak@u-bordeaux.fr*
Additional contact	*Gabrielle Giraud (secretary for Bachelor degree)* › *gabrielle.giraud@u-bordeaux.fr* *Claire Lartigaud (secretary for international programs)* › *claire.lartigaud@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching, personal work including analysis, planning and recommendations for an international project, writing of a final report.* *Campus Bastide (IUT Bordeaux)*
Level	*Bachelor course / semester 5*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Learning objectives and targeted skills:* › *To be able to use the main strategic analysis tools to identify the strengths, weaknesses, opportunities and threats of an international project* › *To be able to use the main project management tools, especially within an international context*
Content	*Introduction – definitions* *Management and stakeholders - Strategic management and project management - Strategic analysis - The limits of the decision - Concepts of organization and project* *External strategic analysis* *Sector - Sectoral field - Market - Macro-environment* *Analysis of the strategic capabilities of the company* *The financial square - National cultures and cultures of firms - Resources and competencies - Models of portfolio* *Strategic choices* *Corporate strategies - Business strategies - SBA and strategic segmentation* *Project management of the project* *The objectives of the project - The tools of implementation - Project and structure*

Methods	*Lectures, personal work and tutorial about an international project. Course (15h) organized over five work sessions with about 40 hours personal work.*
Assessment procedures	*Analysis, planning and recommendations for an international personal project : writing of a final report (about 20 pages)*
Prerequisites	› *High-school diploma* › *B1 level in English* › *General knowledge of the economical environment*
Other information	*Maximum number of students: 28*

Please note that the number of places available may be limited for certain classes.

Economics & Management / Law

Discipline	*Economics & Management / Law*
Course title	*European Institutions*
Duration Date start Date end	*10 weeks* › *September* › *December*
Course coordinator Contact details	*Sébastien Platon* › *sebastien.platon@u-bordeaux.fr*
Additional contact	*Mélanie Fouché* › *melanie.fouche@u-bordeaux.fr* *Lorren N'Guessan* › *lorren.nguessan@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Lectures with online PPT presentations provided beforehand* *Faculty of Economics, Management and Social Administration* › *Campus Pessac*
Level	*Bachelor course / semester 5*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*The learning objective of the course is to acquire basic knowledge concerning the institutional European framework, especially the European Union. Students should have basic knowledge of the Council of Europe, the European Convention on Human Rights, the history, institutions and functioning of the European Union.*
Content	› *Introduction to European Institutions* › *The Council of Europe* › *The European Convention on Human Rights and the European Court of Human Rights* › *The History of the European Union* › *The Member States of the European Union* › *The institutions of the European Union* › *The functioning of the European Union*
Methods	*Lectures* › *18 contact-hour module*
Assessment procedures	*Assessment based on a 1½ -hour written exam composed of multiple questions (100% of the mark) in January. Re-sit possible.*
Prerequisites	› *High-school diploma* › *No prerequisites in terms of specialization (introduction course)* › *Language prerequisite: B2 level in English strongly advised* › *No specific computer or Internet expertise required. However basic knowledge of software/Internet is advised (PPT online)*

Please note that the number of places available may be limited for certain classes.

Economics
International Track

Discipline	*Economics*
Course title	*Econometrics of Causality*
Code	*UE 2.1.5*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Tanguy Bernard* › *tanguy.bernard@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Practical exercises with STATA* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*The objective of this course for students is to acquire theoretical and practical knowledge related to issues of identification and causality in econometrics.*
Content	*The course will rely on the concept of endogeneity as the link between economic theory and statistical tools. Sources of endogeneity (e.g. non-classical measurement errors, omitted variables or simultaneity bias) will be covered in details, along with means to address them (panel data, instrumental variables, experiments, regression discontinuity designs and others). The course will cover both theoretical backgrounds as well as practical use of these approaches for the study of public policies.*
Methods	*Lectures, project:* *12 hours of face-to-face teaching* *15 hours of practical exercises with STATA*
Assessment procedures	*A written exam lasting 2 hours in June*
Prerequisites	*Knowledge of Mathematics, Descriptive Statistics, Probabilities*
Other information	*All lecture slides and tutorial material will be available on line.*

Please note that the number of places available may be limited for certain classes.

Economics
International Track

Discipline	*Economics*
Course title	*Economic Growth*
Code	*UE 1.1.2*
Duration Date start Date end	*One semester* › *September* › *December*
Course coordinator Contact details	*Murat Yildizoglu* › *murat.yildizoglu@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 1*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*The objective of this course is the discussion of different factors conditioning economic growth in modern economies, as well that the interaction of the growth processes with other economic, social and natural phenomena.*
Content	*The course will start with empirical observations and stylized facts characterizing the world-wide growth process, and confront main growth theories in their ability to explain these facts. After having discussed the canonical Solow growth model and its main extensions, we will consider endogenous growth models that have been developed in the literature after the 80s. These models will allow us to discuss important economic and natural phenomena that are interconnected with economic growth: technological innovations; evolution of economic inequalities; role of institutional setups and democracy; environmental aspects of economic growth.*
Methods	*Lectures:* *18h of face-to-face teaching*
Assessment procedures	*Written exam of 3 hours in June*
Prerequisites	*The course assumes that students have a basic understanding of the macroeconomic and microeconomic theories, and of main economic concepts. Even if the course will not insist at all on the mathematical aspects of the growth theories, some understanding of the basic calculus concepts would help.*

Please note that the number of places available may be limited for certain classes.

Economics

Discipline	*Economics*
Course title	*Geography of Innovation*
Code	*UE 2.1.2*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Francesco Lissoni* › *francesco.lissoni@u-bordeaux.fr* *Christophe Carrincazeux* › *christophe.lissoni@u-bordeaux.fr*
Additional contact	*Stéphanie Maria* › *stephanie.maria@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*The course focuses on the role assigned to knowledge externalities as an agglomeration force in economic theory. It also explores related or alternative explanations of the uneven distribution of innovative activities in space.*
Content	*The course covers and compares different approaches, ranging from classic economic geography to the New Economic Geography initiated by Nobel-prize winner Paul Krugman and its subsequent critics, as well as evolutionary economic geography.* *After the course, students should be able to appreciate and criticize the theoretical underpinnings of the vast range of literature linking agglomeration and innovation, and on related policy initiatives such as science parks and other examples. One section of the course deals with recent studies on the international diffusion of innovations.*
Methods	*Lectures and interactive learning (students' presentations of case studies/examples).*
Assessment procedures	*Continuous assessment: in-class presentations and final report*
Prerequisites	*Previous studies (Bachelor level) within the domain of economics in order to have basic knowledge of microeconomics and econometrics.*

Please note that the number of places available may be limited for certain classes.

Economics
International Track

Discipline	*Economics*
Course title	*Introductory Econometrics*
Code	*UE 2.1.4*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Valério Sterzi* › *valerio.sterzi@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Practical exercises with STATA* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*To provide students with a thorough understanding of core techniques of econometrics. Special attention will be devoted to test economic theories and quantify relevant factors for economic policy and other decisions. Students will have practical experience of the application of econometric methods, and be able to use STATA to work with data to estimate models. At the end of this course, students should have become proficient in developing and interpreting linear multiple regression models as applied to a variety of economic problems and data.*
Content	› *Introduction to econometrics* › *Linear regression* › *Regression diagnostic* › *Asymptotic properties of OLS estimators* › *Specification and data issues* › *Logistic regression*
Methods	*Lectures, project:* *12 hours of face-to-face teaching* *15 hours of practical exercises with STATA*
Assessment procedures	*Written exam of 2 hours in June*
Prerequisites	*Knowledge of Mathematics, Descriptive Statistics, Probabilities*
Other information	*All lecture slides and tutorial material will be available on line.*

Please note that the number of places available may be limited for certain classes.

Economics
International Track

Discipline	*Economics*
Course title	*Public Economics*
Code	*UE 2.1.3*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Cécile Aubert* › *cecile.aubert@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*This course aims at providing the theoretical tools to study public policies and intervention, and more generally the reasons for, and consequences of, state involvement in economic activities.*
Content	*This includes issues related to the regulation of public utilities, privatization, capture, public procurement, competition policy and the design of regulatory agencies. The course will particularly cover :* › *Regulatory issues under asymmetric information and competition between public authorities, in public utilities and network industries,* › *Non-benevolent governments, corruption and capture,* › *Specific difficulties for Developing Economies (including a high cost of public funds, scarcity of skilled personnel and of financial resources for regulation authorities, small size of domestic markets, lack of discipline from a financial market...).*
Methods	*Lectures*
Assessment procedures	*Written exam of 3 hours in June*
Prerequisites	*Knowledge of microeconomics. Some knowledge of Game Theory would be helpful.*

Please note that the number of places available may be limited for certain classes.

Economics

Discipline	*Economics*
Course title	***Regulation and Competition Policies***
Code	*UE 2.1.6*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Maider Saint-Jean* › *maider.saint-jean@u-bordeaux.fr*
Additional contact	*Stéphanie Maria* › *stephanie.maria@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Practical exercises with dedicated software* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*This course builds upon the Industrial Economics course and focuses on the implications for state disciplinary interventions on markets.*
Content	*After an historical overview of legislation and institutions dedicated to market discipline, a number of specific topics are discussed, such as: dominant position, collusion, predatory pricing, and regulated monopoly. A section is dedicated to contrasts that may arise between competition policy and the policy of intellectual property rights.* *At the end of the course, student should be able to:* › *Read and understand medium to advanced articles dealing with the discipline of markets* › *Interpret current business news and reports in light of economic theory* › *Understand recent policy interventions in high-technology markets*
Methods	*Lectures and interactive learning*
Assessment procedures	*Final exam in June and continuous assessment*
Prerequisites	*Previous studies (Bachelor level) within the domain of economics in order to have basic knowledge of microeconomics.*

Please note that the number of places available may be limited for certain classes.

Economics

Discipline	*Economics*
Course title	*Social Networks Analysis and Network Economics*
Code	*UE 2.2.2.*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Nicolas Carayol* › *nicolas.carayol@u-bordeaux.fr*
Additional contact	*Stéphanie Maria* › *stephanie.maria@u-bordeaux.fr*
Mode of delivery Location	*Face-to-face teaching* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*The course provides an introduction to the methods and models of social network analysis and its applications to selected economic and organizational issues. It also covers an introduction to economic modelling of network formation.*
Content	*The course first deals with the fundamental concepts of network sociology, such as status, embeddedness, cohesion, social capital, weak ties, brokerage and structural holes. Based on this, related topics on network dynamics and topology are discussed, with special emphasis on the small network problem. Applications to the economics of innovation and spatial economics are provided, as well as an introduction to dedicated software.* *At the end of the course, students should be able to:* › *Read and understand sociological and economic literature on network structures, as applied to the economics of innovation and geography* › *Read and understand medium-to-advanced economic papers on network formation* › *Handle relational data with dedicated software*
Methods	› *Lectures and interactive learning* › *Database exploitation*
Assessment procedures	*Final exam in June and continuous assessment*
Prerequisites	› *Previous studies (Bachelor level) within the domain of economics* › *Basic knowledge of mathematics*

Please note that the number of places available may be limited for certain classes.

Discipline	*Economics*
Course title	*Spatial Econometrics*
Code	*UE 2.2.2.*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Frederic Gaschet* › *frederic.gaschet@u-bordeaux.fr*
Additional contact	*Stéphanie Maria* › *stephanie.maria@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Practical exercises with dedicated software* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*5 ECTS*
Language of instruction	*English*
Description	*This course provides students with the theoretical basics of Spatial Econometrics enabling them to apply such theory empirically.*
Content	› *Firstly, the main problems encountered when working with geo-referenced data are reviewed and the need to apply spatial econometrics is underlined.* › *Secondly, the tools provided by the exploratory data analysis (ESDA) are studied in order to detect the presence of spatial autocorrelation in a given dataset and the concept of spatial weights matrix is introduced (this part includes plotting variables in a map, as well as statistical tests of global and local spatial autocorrelation).* › *Thirdly, an introduction is made to confirmatory spatial econometrics with the regression of spatial models, including the spatial lag model, the spatial error model, and the spatial Durbin model.* › *Fourthly, the consequences of ignoring spatial autocorrelation for the estimation of regression models are addressed.* › *Fifthly, the concept of direct and indirect effect recently introduced by LeSage and Pace (2009) are presented.* › *Finally, the most recent advances in Spatial Econometrics (e.g., spatial panel models) are covered.*
Methods	*Lectures and exercises in computers' room*
Assessment procedures	*Continuous assessment: regular homework and/or presentations in class. A final essay is also required.*
Prerequisites	*Previous studies (Bachelor level) within the domain of economics. Knowledge of econometrics (STATA) is an advantage.*

Please note that the number of places available may be limited for certain classes.

Economics

Discipline	*Economics*
Course title	*Theory of the Firm*
Code	*UE 2.4.2.*
Duration Date start Date end	*One semester* › *January* › *April*
Course coordinator Contact details	*Vincent Frigant* › *vincent.frigant@u-bordeaux.fr*
Additional contact	*Stéphanie Maria* › *stephanie.maria@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* › *Practical exercises, research paper studies* *Faculty of Economics, Management and Social Administration, Campus Pessac*
Level	*Master course / semester 2*
ECTS credit points	*5 ECTS*
Language of instruction	*English*
Description	*The course covers several theories of the firm as an organizational form, with applications both to economics and management. It draws from modern economic and strategic management analysis.*
Content	*After a brief overview of the history of thought within the field, the course dedicates one to two lectures to the following theories: Agency theories (delegation and monitoring); Incomplete contract theories (theories of incentives); Transaction cost theories (boundaries of the firm; coordination and efficiency); Resource-based theories and Dynamic capabilities approach; Relational and cooperative theories of the firm.* *At the end of the course, students should be able to:* › *Read and understand the economic and strategic management literature on the topic, at a medium to advanced level* › *Revisit, with a critical viewpoint, the contents of previous courses, in terms of the hypotheses they have learned concerning firm theory*
Methods	*Lectures and interactive learning*
Assessment procedures	*Continuous assessment*
Prerequisites	*Previous studies (Bachelor level) within the domain of economics in order to have basic knowledge of microeconomics.*
Other information	*Key reference: Michael Dietrich and Jackie Krafft, eds., Handbook on the Economics and Theory of the Firm, Edward Elgar, 2012.*

Please note that the number of places available may be limited for certain classes.

> Science & Technology

UNDERGRADUATE DIPLOMA IN TECHNOLOGY

IUT Bordeaux - Campus Gradignan

APPLIED SCIENCE _____ p. 66 - 85

- Additional English course 1
- Additional English course 2
- Algorithmic /C++ programming
- Atomic and molecular spectroscopy
- Atomic and molecular structures
- Chemical equilibria 1
- Chemical equilibria 2
- Conditioning of analogue signals
- Control of industrial products: analytical chemistry
- Electroanalytical methods
- Electronics for instrumentation
- Electronics of devices and circuits
- Geometrical optics and photometry
- Mathematics-analysis
- Nuclear physics
- Structure and properties of materials
- Techniques for materials characterization
- Vibrations and acoustics

BACHELOR

College of Science and Technology - Campus Talence

CHEMISTRY

- *Analytical chemistry 1* ..... *S4 / 3 ECTS / F2F & EL*
- *Analytical chemistry 2* ..... *S5 / 3 ECTS / F2F & EL*
- *Analytical chemistry 3* ..... *S6 / 2 ECTS / F2F & EL*
- *Biochemistry 1* ..... *S4 / 3 ECTS / F2F & EL*
- *Inorganic 3 and polymer 1 chemistry* ..... *S3 / 6 ECTS / F2F & EL*
- *Inorganic chemistry 1 and 2* ..... *S2 / 6 ECTS / F2F & EL*
- *Inorganic chemistry 4* ..... *S4 / 3 ECTS / F2F & EL*
- *Inorganic chemistry 5* ..... *S5 / 3 ECTS / F2F & EL*
- *Inorganic chemistry 6* ..... *S6 / 3 ECTS / F2F & EL*
- *Mathematics for chemistry 1* ..... *S2 / 3 ECTS / F2F & EL*
- *Mathematics for chemistry 2* ..... *S3 / 3 ECTS / F2F & EL*
- *Mathematics for chemistry 3* ..... *S6 / 2 ECTS / F2F*
- *Organic chemistry 1 and 2* ..... *S2 / 6 ECTS / F2F & EL*
- *Organic chemistry 3 and 4* ..... *S3 / 6 ECTS / F2F & EL*
- *Organic chemistry 5* ..... *S4 / 3 ECTS / F2F & EL*
- *Organic chemistry 6 and 7* ..... *S5 / 6 ECTS / F2F & EL*
- *Organic chemistry 8* ..... *S6 / 3 ECTS / F2F & EL*
- *Physical chemistry 1* ..... *S3 / 3 ECTS / F2F & EL*
- *Physical chemistry 2* ..... *S4 / 3 ECTS / F2F & EL*
- *Physical chemistry 3* ..... *S6 / 3 ECTS / F2F & EL*
- *Practical chemistry 1* ..... *S2 / 6 ECTS / F2F & EL*
- *Practical chemistry 2* ..... *S3 / 6 ECTS / F2F & EL*
- *Practical chemistry 3* ..... *S4 / 6 ECTS / F2F & EL*
- *Practical chemistry 4* ..... *S5 / 6 ECTS / F2F & EL*

BACHELOR

College of Science and Technology - Campus Talence

CHEMISTRY - *continued*

- *Practical chemistry in lab* ..... *S6 / 6 ECTS / F2F*
- *Thematic chemistry A* ..... *S5 / 6 ECTS / EL*
- *Thematic chemistry B* ..... *S5 / 6 ECTS / EL*
- *Thematic chemistry C* ..... *S5 / 6 ECTS / EL*
- *Thematic chemistry D* ..... *S6 / 9 ECTS / F2F & EL*
- *Thematic chemistry E* ..... *S6 / 9 ECTS / F2F & EL*
- *Thematic chemistry F* ..... *S6 / 9 ECTS / F2F & EL*
- *Theoretical chemistry 1* ..... *S2 / 3 ECTS / F2F & EL*
- *Theoretical chemistry 2* ..... *S4 / 3 ECTS / F2F & EL*
- *Theoretical chemistry 3* ..... *S6 / 2 ECTS / F2F & EL*

COMPUTER SCIENCE

- *Array algorithms* ..... *S2 / 6 ECTS / F2F*
- *Probability, statistics and combinatorics* ..... *S4 / 6 ECTS / F2F*
- *Tree data structures and algorithms* ..... *S4 / 6 ECTS / F2F*

GENERAL SCIENCE

- *History of science* ..... *S1 / 6 ECTS / F2F & EL*
- *Introduction to quantum in science* ..... *S4 / 3 ECTS / F2F*
- *Philosophy of science* ..... *S3 / 6 ECTS / F2F & EL*
- *Science communication 1* ..... *S2 / 6 ECTS / F2F & EL*
- *Science communication 2* ..... *S4 / 6 ECTS / F2F & EL*

BACHELOR

College of Science and Technology - Campus Talence

LIFE SCIENCE _____ p. 86 - 87

- *Cell biology: the cell, unity within diversity* ..... *S2 / 3 ECTS / F2F & EL*
- *Cell biology: the cell within the body* ..... *S3 / 3 ECTS / F2F & EL*
- Genetics
- *Genetics: models of pathophysiology* ..... *S3 / 6 ECTS / F2F & EL*
- *Interdisciplinary approaches in biology* ..... *S4 / 6 ECTS / F2F & EL*
- *Methods in experimental biology* ..... *S4 / 6 ECTS / F2F & EL*

MATHEMATICS

- *Fundamental notions in mathematics* ..... *S1 / 6 ECTS / F2F*

PHYSICS

- *How to model physics* ..... *S2 / 6 ECTS / F2F*

MASTER

College of Science and Technology - Campus Talence

APPLIED SCIENCE

Enterprise engineering

- *Enterprise modelling* ..... *S3 / 6 ECTS / F2F*
- *Information system and interoperability* ..... *S3 / 6 ECTS / F2F*
- *Performance and continuous improvement* ..... *S3 / 6 ECTS / F2F*
- *Production management* ..... *S3 / 6 ECTS / F2F*
- *Supply chain management and networked enterprise* ..... *S3 / 6 ECTS / F2F*

MASTER

College of Science and Technology - Campus Talence

CHEMISTRY _____ p. 88 - 141

Advanced materials / FAME / PCCP *

- Applied nanosciences
- Bibliographic project
- Characterizations
- Chemical bond
- Elaboration of inorganic materials
- Energy information and communication
- Innovative and composite materials
- Introduction to colloids and polymer science
- Large scale facilities
- Macromolecular chemistry
- Magnetic and dielectric properties
- *Management and entrepreneurship ..... S3 / 6 ECTS / F2F*
- Master thesis
- Mechanical behavior from fluids to solids
- Molecular simulation and computational chemistry
- Nanomaterials and hybrids
- Numerical methods
- Physical chemistry of polymer solutions
- Photonics, lasers and imaging
- Quantum chemistry and molecular modeling
- Quantum mechanics
- *Self-assembly of polymers and tensioactives ..... S3 / 6 ECTS / F2F*
- Solid state physics
- Spectroscopy
- Structural analysis of solid and surfaces

* *Please note that the chemistry courses listed are part of one or more of the study programs: Advanced Materials / FAME / PCCP.*

MASTER

College of Science and Technology - Campus Talence

CHEMISTRY - *continued* _____ p. 88 - 141

Advanced materials / FAME / PCCP *

- Thermodynamics
- Transformations in materials
- Transitions and phase diagrams

COMPUTER SCIENCE _____ p. 142 - 154

Fundamental computer science: software testing

- Advanced graph theory
- Applied algorithmics and complexity
- Distributed algorithms
- Games, systems and control
- Logic and languages
- Software verification
- Types, specifications and proofs
- Type systems and programming

COMPUTER SCIENCE _____ p. 142 - 154

Image processing and computer vision (IPCV)

- Advanced methods for image processing
- Image and inversion
- Image acquisition and reconstruction
- Variational methods and PDEs for image processing
- Video and indexing

** Please note that the chemistry courses listed are part of one or more of the study programs: Advanced Materials / FAME / PCCP.*

MASTER

College of Science and Technology - Campus Talence

MATHEMATICS _____ p. 155 - 167

Algebra, geometry and number theory (ALGANT)

- Algebraic geometry
- Algorithmic number theory
- Analytic number theory
- Cohomology of groups
- *Elliptic curves* ..... *S3 / 6 ECTS / F2F*
- Geometry
- Number theory
- The key role of certain inequalities at the interface between complex geometry

MATHEMATICS

Pure and applied mathematics

- *Analysis tools for PDEs* ..... *S3 / 6 ECTS / F2F*
- *Control and analysis in infinite dimension* ..... *S3 / 6 ECTS / F2F*
- *Dynamical systems, probabilistic methods for PDEs* ..... *S3 / 6 ECTS / F2F*
- *Harmonic analysis, complex analysis, operator theory* ..... *S3 / 6 ECTS / F2F*
- *Spectral analysis for mathematical physics* ..... *S3 / 6 ECTS / F2F*
- *Stochastic calculus and Markov processes* ..... *S3 / 6 ECTS / F2F*

OCEANOGRAPHY

Science in marine environment and resources (MER) _____ p. 168 - 175

- Biological oceanography
- *Chemical oceanography*
- Dynamic oceanography
- Seafloor geology
- Statistics and data analysis in environmental and geological sciences

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Additional English Course 1*
Code	*V2DP1024 UE1-1 M.1101 (part of)*
Duration Date start Date end	*6 classes* › *September* › *November*
Course coordinator Contact details	*Ms Mathilde Arino* › *mathilde.arino@u-bordeaux.fr*
Additional contact	*Mr Thierry Villard* › *thierry.villard@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching and blended-learning* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*N.A.* *2 hours for assessment*
Language of instruction	*English*
Description	*A focus on language, gestures and cultural differences and misunderstandings. Stereotypes in Europe and worldwide are studied in order to undermine them.*
Content	› *Practicing intercultural understanding* › *English as a communication tool* › *Study of stereotypes between countries*
Methods	*In-class time : seminars & pairwork 12 h* *Estimated self-study time : 12 h*
Assessment procedures	*Summary assessment (oral presentation in twos)*
Prerequisites	*High-school diploma*
Other information	*Students need to pass a placement test assessing language skills and motivation in order to attend this course.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Additional English Course 2*
Code	*V2DP2025 UE2-1 M.2101 (part of)*
Duration Date start Date end	*6 classes* › *January* › *April*
Course coordinator Contact details	*Ms Mathilde Arino* › *mathilde.arino@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching and blended-learning* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*N.A.* *2 hours for assessment*
Language of instruction	*English*
Description	*A focus on the main characteristics of oral English to improve students' understanding and speaking skills.* *Some pronunciation tips and an introduction to phonetics are provided. To apply their oral skills and knowledge on pronunciation, students must complete a song-telling performance.* *After completion, the students should be able to :* › *Identify phonetic symbols and read the phonetic transcription of a word on a dictionary* › *Use the appropriate pronunciation according to the different symbols* › *Apply their knowledge for written and oral productions in general, professional and technical English.*
Content	*This module includes :* › *An introduction to phonetics, phonology, IPA* › *A methodology of multimedia online tools* › *Guidelines for the song-telling performance*
Methods	*In-class time : seminars intertwined with online tasks & feedback 12 h* *Estimated self-study time : 12 h*
Assessment procedures	*Formative and summative assessment (feedback is provided on the educational platform throughout the semester), in addition to the final oral presentation assessment*
Prerequisites	*High-school diploma* *Basic computer skills and internet use for the online course*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	***Algorithmic / C++ Programming***
Code	*V2DP1025, UE1-2 M.1204*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Gregory Zacharewicz* › *gregory.zacharewicz@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*2.5 ECTS*
Language of instruction	*English*
Description	*Learn how to:* › *Write an algorithm from a descriptive text.* › *Obtain some general insights on the methodology to structure a computer program* › *Write C++ code.*
Content	*1. General Introduction* › *1.1. Intro to Computer Science (Hard/Soft)* › *1.2. Notions about Characteristics of an algorithm* *2. Program Structures* › *2.1. Sequence* › *2.2. Alternative* › *2.3. Variables* › *2.4. Assignment of variables* › *2.5. Instructions of I / O (Input / Output)* › *2.6. Conditions on the variables* › *2.7. Counters* › *2.8. Conditional iteration* › *2.9. Predetermined iteration* › *2.10. Procedures* › *2.11. Selection* › *2.12. Array* › *2.13. String* *3. Algorithm writing (best practices)*
Methods	*Five theoretical sessions of 2h classes* *Seven lab sessions of 4h along with a 3h test*
Assessment procedures	*Theoretical test: 1,5h* *Lab test: 3h*
Prerequisites	*High-school diploma.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	***Atomic and Molecular Spectroscopy***
Code	*V2DP3062, UE3-2 M.3303*
Duration Date start Date end	*3 weeks* › *September* › *November*
Course coordinator Contact details	*Astrid Bergeat* › *astrid.bergeat@u-bordeaux.fr*
Mode of delivery Location	› *3 Lab sessions of 4 hours each* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Introduction to the main methods of spectroscopy: atomic emission and absorption spectrometries, molecular absorption spectroscopy in the UV-visible and infrared ranges, fluorescence, Raman and Rayleigh scattering.*
Content	› *Fourier Transform Infrared Spectroscopy* › *Ultraviolet and Visible Molecular Spectroscopy* › *Fluorometry*
Methods	*In-lab time : 12 h* *Estimated self-study time : 10 h*
Assessment procedures	*Experimental reports and one written exam at the end of the course.*
Prerequisites	*High-school diploma.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	***Atomic and Molecular Structures***
Code	*V2DP1026, UE1-3 M.1302 (part of)*
Duration Date start Date end	*15 weeks* › *September* › *December*
Course coordinator Contact details	*Astrid Bergeat* › *astrid.bergeat@u-bordeaux.fr*
Additional contact	*Béatrice McClenaghan*
Mode of delivery Location	› *Face-to-face teaching with exercises* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*1.6 ECTS*
Language of instruction	*English , mixed with French*
Description	*The purpose of this module is to introduce students to the basic concepts of physical chemistry. In this module, students develop knowledge and skills relating to atomic structure, electronic configuration, atomic and molecular orbital shapes, and their relationship to chemical properties and chemical bonding.*
Content	*Part I: Atomic Structure* › *Atomic structure: Subatomic particles, basic structure of an atom, atomic mass / molecular mass and isotopes* › *Classical physics and properties of light: Classical physics (principles laws of mechanics), light interacting with matter, atomic spectra and Bohr's model* › *Quantum mechanical principles: Wave-particle duality, uncertainty relations.* › *Quantum mechanical model of the monoelectronic atom: introduction, the postulates of quantum mechanics, atomic orbitals of the hydrogenic atoms and their energies* › *The structures of many-electron atoms: Schrödinger's equation, the orbital approximation, spin, Electronic configurations, ions, ionic states, electron-matter interaction, atomic spectra, photoelectric effect.* *Part II: Molecular Structure* › *Molecular structure: Lewis structure, Molecules and the properties of bonded atoms* › *Molecular geometry: Valence shell Electron-pair repulsion (Gillespie's rules), applications* › *Quantum chemistry: introduction to the molecular orbital theory, basic Valence Bond Theory, molecular properties* › *Phases of matter: Molecular interactions (van der Waals), hydrogen bonds, solvent properties*

Methods	*In-class time : 38h theoretical classes + 4h tutorials* *Estimated self-study time : 20 h*
Assessment procedures	*2 written exams with exercises (each exam lasts 1h50)*
Prerequisites	*High-school diploma.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Chemical Equilibria 1 – Safety in the Laboratory (EQCH1)*
Code	*V2DP2026, UE2-2 M.1303*
Duration Date start Date end	*6 weeks* › *January* › *March*
Course coordinator Contact details	*Isabelle Muller* › *isabelle.muller@u-bordeaux.fr*
Additional contact	*Angéline Poulon* › *Angeline.poulon@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching with exercises intertwined with lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*2 ECTS*
Language of instruction	*English (Equilibria in aqueous solutions. Good Laboratory Practice)* *French and English (Thermodynamics)*
Description	*After completion, the student should be able to :* › *Use the appropriate concepts to describe a chemical system (chemical change, reaction, extent of reaction, stoichiometry, activity, reaction quotient)* › *Relate the spontaneous change and the Gibbs energy of reaction* › *Determine and use equilibrium constants* › *Determine the heat released or absorbed in a chemical change* › *Work in the chemistry lab according to Good Laboratory Practice* › *Carry out a complexometric titration and express the concentration with its uncertainty* › *Control if a pH-electrode is functional or not*
Content	*Keywords of the course cover:* *Chemical change. Gibbs energy of a system. Activity. Spontaneous change. Reaction enthalpy. Heat in a chemical change. Chemical equilibrium. Reaction quotient. Equilibrium constant.* *Complex. Formation constant of a complex. Competing reactions. Titrations. Monitoring methods. Equivalence point.* *Lab work:* *Good Laboratory Practice: quality and safety.* *Measurement of a reaction enthalpy. Complexometric titrations. Uncertainty in a concentration. Calibration of a glass electrode.*

Methods	*In-class time : Seminars 20 h, Labs 14 h* *Estimated self-study time : 30 h*
Assessment procedures	*2 written exams with exercises (2 x 1 h),* *Lab reports, 1 practical exam about the labs (2 h)*
Prerequisites	› *Basics of chemistry: molecular formula, amount of substance and molar mass, symbolizing chemical reactions, balancing chemical equations.* › *Basics of thermodynamics: temperature, energy of a system, energy change through work or heat, enthalpy, entropy.* › *Basics of metrology: mean value, standard experimental deviation, uncertainty, repeatability.* › *Basics of mechanics: kinetic energy.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course	*Chemical Equilibria 2. Redox Equilibria (EQCH2)*
Code	*V2DP2027, UE2-3 M.2301*
Duration Date start Date end	*2 months* › *March* › *May*
Course coordinator Contact details	*Isabelle Muller* › *isabelle.muller@u-bordeaux.fr*
Additional contact	*Angéline Poulon* › *Angeline.poulon@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching with exercises intertwined with lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*After completion, the student should be able to:* › *Explain how an electrochemical cell works* › *Determine the spontaneous reaction between two redox-pairs* › *Explain how common electrodes work* › *Calculate the solubility of an ionic compound in various solutions* › *Determine whether a precipitation occurs or not* › *Calculate the extent of reaction at equilibrium for various types of reactions (acid-base, complexation, redox, precipitation)* › *Carry out several types of titrations (acid-base, redox, precipitation), choose the monitoring method (e.g. the electrodes or an indicator) and express the concentration with its uncertainty* › *Check if an electrode is functional or not* › *Use an automatic titrator*
Content	*Keywords of the course cover:* *Redox reactions. Electrode potential. Nernst equation. Common reference and measuring electrodes.* *Precipitation/dissolution equilibria. Solubility.* *Acid-base equilibria. Strength of an acid (of a base). Buffer solutions. Competing reactions.* *Lab work: Potentiometric monitoring of a titration (redox reaction and precipitation). Titration of a mixture.* *Indirect titration of dissolved oxygen using Winkler's method.*
Methods	*In-class time : Seminars 16 h, Labs 12 h* *Estimated self-study time : 30 h*
Assessment procedures	*2 written exams with exercises (2 x 1 h),* *Lab reports, 1 written exam about the labs (1 h)*
Prerequisites	*Chemical Equilibria 1. Safety in the laboratory (EQCH1)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Conditioning of analogue signals*
Code	*V2DP3062, UE3-2 M.3301*
Duration Date start Date end	*4 weeks* › *September* › *October*
Course coordinator Contact details	*Prof. Thomas Zimmer* › *thomas.zimmer@u-bordeaux.fr*
Mode of delivery Location	› *Lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*How to apply the concept of synchronous detection for impedance measurement. Students learn about the principle and concept of the synchronous detection and use it to realize an impedance-meter. The impedance-meter consists of three different parts to be fabricated: the sensor, the phase-shifter and the filter circuit.*
Content	*Lab session 1* › *Use of a simulator to understand how the whole system works* *Lab Session 2* › *Understand the synchronous detection* › *Understand the configuration of the impedance-meter* › *Realize the sensor with an OpAmp based inverter circuit* *Lab Session 3* › *Realize and characterize the phase shifter* › *Realize and characterize the multipliers* *Lab Session 4* › *Realize the filters* › *Measure the real and imaginary parts of different dipoles (resistor, inductor, capacitor)* › *Compare the results with a specific impedance-meter instrument*
Methods	*Practical classes: 16 hours*
Assessment procedures	*1 written exam at the end of the 4th session (45 min)* *Assessment of the fabricated circuits*
Prerequisites	*High-school diploma* *Students should have already followed a course about electronics*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Control of industrial products: Analytical Chemistry*
Code	*V2DP3063, UE3-3 M.4202 CM*
Duration Date start Date end	*4 weeks* › *October* › *January*
Course coordinator Contact details	*Astrid Bergeat* › *astrid.bergeat@u-bordeaux.fr*
Mode of delivery Location	› *4 Lab sessions of 4 hours each* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Expertise and Control of Industrial Products by Spectroscopy (preparing samples by chromatography)*
Content	› *Titration of sodium in soft drinks by atomic absorption spectroscopy (AAS)* › *Determination of iron in wine by UV/Visible spectroscopy* › *Determination of quinine in two tonic beverages by fluorometry* › *Identification of food colouring in M&M's sweets and in syrups by column chromatography and spectroscopy UV / Vis*
Methods	*Lab time: 16 h* *Estimated self-study time: 10 h*
Assessment procedures	*Analysis reports*
Prerequisites	*High-school diploma*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Electroanalytical methods (ELCHIM)*
Code	*V2DP3062, UE3-2 M.4104 (part of)*
Duration Date start Date end	*6 weeks* › *September* › *October*
Course coordinator Contact details	*Fabrice Mauvy* › *fabrice.mauvy@u-bordeaux.fr*
Additional contact	*Isabelle Muller* › *isabelle*.muller@u-bordeaux.fr
Mode of delivery Location	› *Face-to-face instruction with exercises and lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*1.25 ECTS*
Language of instruction	*English*
Description	*After completion, the student should be able to:* › *Carry out conductivity calculations and measurements* › *Analyze voltammograms and polarogramms* › *Perform a titration using the 'calibration curve' method or standard additions.*
Content	*Keywords of the course cover:* *Electrolyte. Strong/weak electrolyte. Diffusion. Migration. Faradaic/non-faradaic processes. Conductance. Conductivity. Calibration of a conductimeter. Molar conductivity. Conductimetric titration.* *Voltammetry. 3-electrode method. Rotating Disk Electrode. Polarography.* *Voltammetric titrations (calibration curve and standard additions).*
Methods	*In-class time: Seminars 10 h, Labs 12 h* *Estimated self-study time: 20 h*
Assessment procedures	*1 written exam with exercises (1 h)* *Lab reports*
Prerequisites	*Potentiometry. Nernst equation.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Electronics for Instrumentation*
Code	*V2DP3063, UE3-3 M.3305 CT*
Duration Date start Date end	*3 weeks* › *December* › *December*
Course coordinator Contact details	*Prof. Thomas Zimmer* › *thomas.zimmer@u-bordeaux.fr*
Mode of delivery Location	› *Lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Based on the impedance-meter realized during the lab sessions in "Conditioning of analogue signals", different concepts are investigated:* *The first concept concerns the characterization of a measurement chain in terms of performances, limits and measurement accuracy. Next, students investigate the conversion from analogue measured data to the digital world. They review basics such as the LSB (least significant bit) and its link to measurement resolution. Measurement speed and conversion time will also be studied.* *Finally, students create a digital-to-analogue converter and try to retrieve the initial analogue value. Conversion issues and possible loss of information will be highlighted in this last step.*
Content	*Lab Session 1:* › *Characterization of a measurement chain* *Lab Session 2:* › *Characterization on an analogue-to-digital converter (ADC)* *Lab Session 3:* › *Realization and characterization of a digital-to-analogue converter (DAC) using a R-2R resistor ladder network*
Methods	*Practical classes: 12 hours*
Assessment procedures	*1 written exam at the end of the 3rd session (45 min)* *Assessment of the fabricated circuits*
Prerequisites	*High-school diploma* *Students should have already followed a course about "Electronics" and "Conditioning of analogue signals"*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Electronics of Devices and Circuits*
Code	*V2DP1025, UE1-2 M.2202*
Duration Date start Date end	*8 weeks* › *November* › *January*
Course coordinator Contact details	*Prof. Thomas Zimmer* › *thomas.zimmer@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching with a blended-learning approach (a specific website with exercises and lab sessions is available)* › *http://www.elec-learning.eu/co/eleclearning_web.html (Lab exercises are included)* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*2.5 ECTS*
Language of instruction	*English, practical courses may be in French*
Description	*This course provides a general presentation of basic electronic concepts. The topics concern:* › *Diodes and diode circuits such as rectifiers,* › *Basic transistor principles such as biasing, operating point, load line, small signal analysis* › *Amplifier's quadrupole presentation bringing into play the input and output impedances, the transfer function and their interaction.*
Content	› *Diode and diode circuits* › *Bipolar transistor: basics, operating point and load line* › *Transistor biasing circuits, superposition of DC and AC components* › *Transistor AC equivalent circuit* › *Stabilized amplifier and multi-stage amplifier* › *Output stages and power amplifier*
Methods	*Theoretical classes and exercises: 20 hours* *Lab sessions: 16 hours* *Estimated self-study time: 35 hours*
Assessment procedures	*2 exams, one for the lab (4 hours) and one final exam (2 hours)*
Prerequisites	*High-school diploma* *Students should master the basics of electricity: Ohm's and Kirchhoff's law, Norton's and Thévenin's theorem.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Geometrical Optics and Photometry*
Code	*V2DP2027 UE2-3 M.2303*
Duration Date start Date end	*14 weeks* › *March* › *June*
Course coordinator and contact details	*Dr. Luc Forest* › *luc.forest@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 2*
ECTS credit points	*2 ECTS*
Language of instruction	*English for Geometrical Optics and French for Photometry.* *Practical courses may be in French*
Description	*The course will covers the following topics:* *Snell's law which presents different devices and phenomenon.* *The study of mirrors and thin lenses which explains the functioning of the eye and of the common optical instruments.* *Photometry, which is the application of radiometry, taking into account the particularity of the eye response.*
Content	› *Principles of geometrical optics* › *Plane and spherical mirrors* › *Thin lenses* › *The eye* › *Optical instruments* › *Photometry*
Methods	*Theoretical classes and exercises: 20 hours (Geometrical Optics: 14h and Photometry : 6h)* *Lab sessions: 18 hours*
Assessment procedures	*2 exams, one for the lab (2 hours) and one final exam (2 hours)*
Prerequisites	*High-school diploma* *Knowledge of Radiometry (for the Photometry)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Mathematics – Analysis*
Code	*V2DP1024, UE1-1 M.1105*
Duration Date start Date end	*One semester* › *September* › *January*
Course coordinator Contact details	*Prof. Thomas Zimmer* › *thomas.zimmer@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching, supervision of exercises* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*2.5 ECTS*
Language of instruction	*English*

Description	*The course covers the following tasks:*
	› *Define the domain of definition of a function and if necessary draw it correctly*
	› *Represent a function of a real variable and then of 2 real variables*
	› *Calculate and use the derivative functions and then the partial derivative in order to :*
	  › *Understand the concept of the differential*
	  › *Recognize the closed and exact differential form and integrate it*
	  › *Draw a skeleton for a function of a real variable*
	  › *Determine a Finite power series Expansion at 0 with the TAYLOR formula*

Content	› *Notions about real functions* › *Calculus of derivatives and partial derivatives* › *Use of the concept of the derivative* › *Concepts of limits* › *Equivalent functions* › *Complements on the finite power series expansion at zero*
Methods	*Theoretical classes and exercises: 34 hours* *Estimated self-study time: 34 h*
Assessment procedures	*3 written exams during the semester, each lasting 2 hours approx.*
Prerequisites	*High-school diploma*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Nuclear Physics (PHYNU)*
Code	*V2DP1026, UE1-3 M.1302 (part of)*
Duration Date start Date end	*4 weeks* › *November* › *December*
Course coordinator Contact details	*Isabelle Muller* › *isabelle.muller@u-bordeaux.fr*
Additional contact	*Frédéric Perrot* › *frederic.perrot@u-bordeaux.fr*
Mode of delivery Location	› *Face-to-face teaching with exercises* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 1*
ECTS credit points	*0.4 ECTS*
Language of instruction	*English*
Description	*After completion, students should be able to:* › *Calculate the mass defect and the binding energy of a nucleus* › *Interpret and calculate the release of energy in a nuclear reaction (radioactive decay or induced reaction)* › *Explain why the alpha spectrum is discrete while the beta is continuous* › *Calculate the kinetic energy of the emitted alpha particles and the maximum energy of the emitted electrons* › *Determine the number of radioactive nucleus from the activity of a sample*
Content	*Keywords of the course cover:* *Nucleus. Proton. Neutron. Quarks. Mass defect. Nuclear binding energy per nucleon. Fundamental interactions. Elementary particle.* *Conservation laws in nuclear reactions. Alpha, beta, gamma decay. Fission. Fusion. Decay scheme.* *Activity. Half-life. Primordial / cosmogenic nuclides. Radioactive decay series. Secular equilibrium.*
Methods	*In-class time: seminars 10 h* *Estimated self-study time: 10 h*
Assessment procedures	*1 written exam with exercises (1 h)*
Prerequisites	*High-school diploma* *Basic knowledge of atomic structures (nucleus, electrons) and mechanics (kinetic energy).*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Structure and Properties of Materials*
Code	*V2DP3063, UE3-3 M.3304 CM*
Duration Date start Date end	*3 weeks* › *October* › *November*
Course coordinator Contact details	*Dr. Angéline POULON* › *angeline.poulon@u-bordeaux.fr*
Mode of delivery Location	› *Lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Application of the concept of binary phase diagram. Students learn how to establish them and how to use them to understand microstructure formation. Basic concepts of Metallography are introduced.*
Content	*Lab session 1* › *Pb-Sn Diagram and dental amalgam* › *Simple thermal analysis* *Lab Session 2* › *Pb-Sn Diagram and Bronze* › *Differential Scanning Calorimetry DSC* *Lab Session 3* › *Al-Cu and Fe-C Diagrams* › *Structural hardening and Metallography*
Methods	*Practical classes: 12 hours*
Assessment procedures	*Reports at the end of each session*
Prerequisites	*High-school diploma* *Students should have already followed lectures in Materials Science (Bachelor course / semester 2 and 3)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Techniques for Material Characterization*
Code	*V2DP3063, UE3-3 M.4203 CM*
Duration Date start Date end	*6 weeks* › *November* › *December*
Course coordinator Contact details	*Dr. Angéline POULON* › *angeline.poulon@u-bordeaux.fr*
Mode of delivery Location	› *Lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*2 ECTS*
Language of instruction	*English*
Description	*Introduction to the characterization of materials. From structural (X-ray diffraction) to microstructural (Thermal analysis, Metallography, Energy Dispersive spectroscopy and Scanning Electron Microscope imaging).*
Content	*Lab session 1* › *X-Ray Diffractometer* › *Understanding of the XRD apparatus parameters* *Lab Session 2* › *Optical microscopy (use of the different modes)* › *Metallography on steels* *Lab Session 3* › *Thermogravimetric analysis (TGA)* › *Ceramic degradation mechanism* *Lab Session 4* › *Differential Scanning Calorimetry (DSC)* › *Polymer aging* *Lab Session 5* › *Energy Dispersive spectroscopy and Scanning Electron Microscope imaging* › *Amalgam study* *Lab Session 6* › *Discussions*
Methods	*Practical classes: 24 hours*
Assessment procedures	*Reports at the end of each session* *1 written exam at the end of the period (2h)*
Prerequisites	*High-school diploma* *Students should have already followed lectures in Materials Science (Bachelor course – semester 2 and 3)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Applied Physics and Measurement Engineering*
Course title	*Vibrations and Acoustics*
Code	*V2DP3063, UE3-3 M.3204 CT, UE3-3 M.4202 CT*
Duration Date start Date end	*6 weeks* › *November* › *December*
Course coordinator Contact details	*Dr. Luc Forest* › *luc.forest@u-bordeaux.fr*
Mode of delivery Location	› *Lab sessions* *Campus Gradignan (IUT Bordeaux)*
Level	*Bachelor course / semester 3*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*Acoustical and vibration measurements with the example of a loudspeaker as a mass-spring-damper system. Signal processing (Fast Fourier Transform) is studied through different examples. Musical instruments (flute and clarinet) are studied with the help of Kundt's tube. Different sound level meters are used to manipulate dB and dB (A).*
Content	*Lab Session 1* › *Sound Level Measurement* *Lab Session 2* › *Standing Waves* *Lab Session 3* › *Acoustical Study of a Loudspeaker* *Lab Session 4* › *Temporal and Spectral Visualizations of Acoustic Signals* *Lab Session 5* › *Study of a Loudspeaker in Forced Vibrations* *Lab Session 6* › *Study of a Loudspeaker in Free Vibrations*
Methods	*Practical classes: 24 hours*
Assessment procedures	*6 reports after lab sessions* *1 written exam*
Prerequisites	*High-school diploma* *Students should have followed a course about "Acoustics" as well as about "Vibrations"*

Please note that the number of places available may be limited for certain classes.

Discipline	*Life Science / Biology*
Course title	*Genetics*
Duration Date start Date end	*1 semester* › *January* › *May*
Course coordinator Contact details	*Valérie Schurdi-Levraud* › *valerie.schurdi-levraud@u-bordeaux.fr*
Additional contact	*Sophie Javerzat* › *sophie.javerzat@u-bordeaux.fr*
Mode of delivery	› *E-learning: distance-based with small private online course* › *Face-to-face teaching: in-class, flipped classroom and tutorial sessions* › *Practical work*
Level	*Bachelor course / semester 4*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Learning objectives and outcomes:* › *A broad knowledge of genetic principles and different methods of genetic analysis;* › *An appreciation of how genetic principles and experimentation may be used to understand the biology of diverse organisms (examples are taken among animals, plants, yeast…);* › *Capacity to apply appropriate methods in genetics to solve problems in biology;* › *Capacity for scientific reasoning and problem solving;* › *Capacity in the analysis and interpretation of data derived from direct experimentation and from the literature relevant to a topic in genetics;*
Content	› *Understanding the basis of genetic variation, alleles, genes* › *Mutagenesis effect* › *From genotype to phenotype* › *Gene inheritance in eukaryotes and prokaryotes* › *Genetic determinism, gene mapping,* › *From individual to population genetics* *An interactive and self-directed learning approach will be used with numerous practical examples used.*
Methods	*Lectures, small group projects* › *9h20 distance-based courses (lectures)* › *24h flipped classroom, collaborative activities* › *16h practical (wet lab)* › *132h self-study, flipped classroom preparation, small group work preparation, summative and formative assessment preparation*

Assessment procedures	› *Summative assessment (all semester long)* › *Formative assessment (final exam to be defined)*
Prerequisites	› *B1 level in English* › *High-school diploma and first year of university completed* › *Knowledge of the principles of biology* › *Basic knowledge of genetics*
Other information	› *32 students per group for integrated courses and 16 students per group for practical* › *Selection procedure will be based on level of English and academic criteria*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Applied Nanosciences*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*André del Guerzo* › *andre.del-guerzo@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*These multi-disciplinary courses, presented by chemists, expose the contribution of molecular and supramolecular concepts in various application areas, including renewable energy and information processing. The basic principles that are acquired, such as nano-structuring, design of molecules and of specific supramolecular interactions, will also enable the guided analysis of scientific publications.* › *Understand the molecular elements that generate a specific function in organized supramolecular systems and at the nanoscale.* › *Learn how to the design molecules and organic and inorganic assemblies for applications in nanosciences.* › *Know the principles of important technological applications.* › *Discover the importance of nanostructuring.* › *Learn how to analyze publications in the multidisciplinary field of nanoscience, with the knowledge of the application, (supra-) molecular approaches and characterization techniques.*
Content	***Part I : Molecular Nanosciences*** *Chapter I : Introduction* › *General definition of nanosciences* › *The role of molecular chemistry* *Chapter II: Applications 1: Renewable Energy* › *Photoconversion of solar energy* › *Innovative supramolecular systems for artificial photosynthesis* › *Contribution of molecular and supramolecular chemistry* › *Effects of nano-structuring* *Chapter III: Applications 2: Information Technology* › *New generation of organic screens* › *Organic lighting* › *Organic transistors and artificial noses* *Chapter IV: Future Developments* › *Single molecules and nano-addressable objects* › *Molecular machines*

	Part II: Molecular materials with remarkable properties *Chapter I : Functional molecular materials:* › *Definition, synthesis, examples* › *Molecular materials engineering and building block approach* › *Conducting and magnetic molecular materials* › *Guest-host networks, multifunctional and nanoporous materials* *Chapter II : Applications 3: information storage* › *Bistable molecules and molecular clusters* › *Photoswitchable, photochrom and photomagnetic molecular materials* › *Molecule-magnet and nanomagnetism* *Chapter III : Applications 4 – molecular materials nanoparticles* › *Synthesis in confined media, size effects* › *Organization of functional nano-objects on surfaces* ***Part III (Project-based) Molecular surfaces for biosensors and biochips*** *Chapter I : Principles and definitions* › *General definitions* › *Constitutive elements (bioreceiver, trasnducers)* › *Supporting media functionalization and biomolecules immobilization* *Chapter II : Applications 5 – Biosensors and biochips* › *Biochips (DNA, proteins)* › *Biosensors (electrochemical, optical, piezoelectric)* › *Contribution of nanomaterials to biosensors* › *Individual project* ***Part IV: Tools and Techniques for Nanosciences*** *Chapter I: The techniques used for the study of nano-organic and inorganic systems. The contribution of molecular chemistry for the development of new techniques* *Chapter II: Analysis of experimental data and publications*
Methods	› *Lectures projects and exercise sessions : 51 hours total* › *Self-study: 110 hours (50h private reading, 30h exam preparation, 30h papers analyses)*
Assessment procedures	*Closed-book final exam (3h)*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	› *The teaching team is constituted of André del Guerzo, Corine Mathonière and Luc Vellutini* › *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering)*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Bibliographic Project*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Michaël Josse* › *michael.josse@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Project-based*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Bibliographic analysis about a given research topic. This topic may be continued in the Master Thesis course.* *Students must gather and analyze the international literature (including patents) on a given topic under the supervision of a university staff member. They are in charge of writing a synthesis of the different documents chosen including a critical analysis of the concepts described in these documents.*
Content	*The bibliographic project can cover any of the fields related to the FAME Master. Opportunities may be found through Master Thesis offers or by directly contacting potential supervisors.*
Methods	*Self-study: 150 hours (100h private reading, 35 report and defence preparation, 15h exchanges with supervisor)*
Assessment procedures	*Report, oral presentation*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	*The bibliographic project is usually associated with Master Thesis in M2, but can be conducted independently following supervisor validation. Students enrolled for long internships (more than two months) during their stay at UBx may also consider this course.* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering).*

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Discipline	*Chemistry*
Course title	*Characterizations*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Thierry Toupance* › *thierry.toupance@u-bordeaux.fr* *Vincent Rodriguez* › *vincent.rodriguez@u-bordeaux.fr* *Jean-Marie Schmitter* › *jm.schmitter@cbmn.u-bordeaux.fr* *Christophe Schatz* › *schatz@enscbp.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, practical sessions manuals, final exam written texts)* › *Tutoring in English is available to help people who do not speak French.* › *Exercise sessions are taught in both English and French.*
Description	*The objective of this lecture is to provide students with both theoretical and practical tools enabling them to correlate the experimental data obtained from different analytical techniques and structures mainly in solution of molecular and macromolecular architectures.* *Particular attention is paid to the acquisition, rationalization and interpretation of high resolution NMR, mass, Raman and IR spectra with examples taken from major application domains such as structure determination of organic compounds, lipidomics, and proteomics. Furthermore, both use and applications of static and dynamic light scattering are highlighted to characterize macromolecules in solution along with nanoparticle suspensions.*

Content	***Part 1 : High resolution NMR*** *I. Principles of nuclear magnetic resonance* › *Quantum model (nuclear spin, nuclear magnetic moment, energy of a nuclear spin in a magnetic field, sensitivity, receptivity…)* › *Vector model (the rotating frame)* › *Fourier Transform Pulse Spectroscopy (pulse production, pulse mode, FID, FT, spectrum, relaxation processes)* *II. Spectral parameters and analyses of spectra* › *Chemical shift (origin, rationalization, application in 1H and 13C NMR)* › *Quantitative analysis (integration)* › *Coupling processes (types, origin, examples, application to the molecular structure determination)* *III. 1D NMR : Multi-impulsional NMR sequences* › *Double resonance techniques (Homonuclear and heteronuclear decoupling, NOE effect, examples)* › *Multi-impulsional 1D NMR sequences (Spin-Echo, J-modulated Spin-Echo, DEPT)* *IV. 2D NMR : Basic concepts and applications* › *Introduction to 2D NMR (Principle, Time-scale in 2D NMR experiments, 2D FT, Various plots)* › *Examples of 2D NMR experiments (COSY, HMQC, HMBC).* ***Part 2 : Mass spectrometry*** › *Ionisation modes : electron impact ionisation, chemical ionisation, photoionisation, matrix assisted laser desorption-ionisation, electrospray* › *Principles of mass analyzers (magnetic sector, quadripole, ion trap, orbitrap)* › *Principles of tandem mass spectrometry (MS/MS), multiple mass spectrometry and various experiences accessible with these methodologies* › *Coupling with chromatography (gas and liquid)* › *Principles of quantitative analysis by mass spectrometry (Selected Ion Monitoring, Multiple Reaction Monitoring)* › *Applications: structure determination, quantitative analysis in complex matrices (environmental, biological), lipidomics, proteomics, imaging* ***Part 3 : Vibrational spectroscopy and imaging in materials*** *I. Introduction* › *Fundamental aspects of light/matter interaction* › *Optical molecular spectroscopies* › *Molecular Symmetry* *II. Fourier transform infrared absorption spectroscopy (FTIR)* › *Principles and applications* › *Transmission and reflection FTIR techniques*

	› *IR imaging* *III. Raman Spectroscopy* › *Principles and applications* › *Raman microscopy, Raman imaging* ***Part 4 : Light scattering*** *I. Introduction to light scattering* › *Origin of the light scattering process* › *Reciprocal space and scattering vector* *II. Static light scattering* › *Small particles (<λ/20): Rayleigh scattering, theory and practice* › *Large particles (>λ/20): Rayleigh Gans Debye scattering, theory and practice* › *Static light scattering detection in chromatographic analysis* *III. Dynamic light scattering* *Intensity fluctuations and correlation function* › *Stokes-Einstein equation, notion of hydrodynamic radius* › *Analysis of polydisperse systems* › *Applications*
Methods	*Lectures: 26 * 1h 20 (oral in French, all written support in English)* › *Exercise sessions (in French or English): 12 * 1h 20* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 85 hours (30h private reading, 20h exam preparation, 35h exercise preparation)*
Assessment procedures	› *Written final exam: 3h = 100 % of the overall mark* › *The first session takes place in December (7th-16th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry, physical chemistry and analytical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Chemical Bond*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Cédric Desplanches* › *cedric.desplanches@icmcb.cnrs.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, final exam written texts).* › *Tutoring in English is available to help people who do not speak French.* › *Exercise sessions are taught in both English and French.*
Description	*The objective of this lecture is, via the study of the chemical bonding, to allow students to connect structure / composition and reactivity / properties of compounds, and this for organic molecules, transition metal complexes or solid state compounds. Special attention is paid to the introduction to the frontier orbital approximation and its function in addressing the problems of absolute and relative reactivity, regioselectivity and stereoselectivity in organic chemistry (Woodward-Hoffman rules, electrocyclic reactions, sigmatropic rearrangements,...); properties of transition metal complexes (Tanabe-Sugano diagrams, Marcus law, Curie law) and chemical bond in solids (ionic models, band theory (orbital description of the electronic structure of solids),...)*
Content	***Part 1 : Frontier orbitals and organic chemical reactions*** 1. *Fundamental in quantum chemistry: molecular orbitals of conjugated polyene systems (Hückel theory), frontier orbitals approximation* 2. *Cycloaddition reactions: Woodward-Hoffmann rules, activation mode and reactivity, interactions suprafacial and antarafacial interactions, regioselectivity and stereoselectivity (Alder endo rule)* 3. *Electrocyclic reactions: selection rules and activation mode, conrotatory and disrotatory ring closing/opening, stereoselectivity aspects* 4. *Sigmatropic rearrangements: selection rules (suprafacial and antarafacial), stereoselectivity aspects* 5. *Electrophilic, nucleophilic and radical reactions* 6. *Structural problems: stable conformation, hyperconjugation*

	Part 2 : Molecular inorganic chemistry 1. *Electronic structure of complexes. General information on d elements. d orbitals. Crystal field theory. Tanabe-Sugano diagrams. Charge transfer transitions. Application: spin crossover phenomena.* 2. *Stability and reactivity of complexes. Stability of a complex: thermodynamic and kinetic aspects.* 3. *Modification of chemical properties of the metal and the ligand in a complex. Electron transfer. Marcus law.* 4. *From molecules to molecular materials. Synthesis of polynuclear compounds. Molecular magnetism. Illustration with mono- and dinuclear compounds.* *Part 3 : Chemical bond in solids* 1. *Introduction: classification for solids ; electrons in solids* 2. *Ionic model: crystal energy, Madelung potentials, energy levels (Koopmans theorem), structure of ionic solids (Pauling rules, Brown method)* 3. *Chemical bond and energy levels in simple metals and transition metals* 4. *Band theory: orbital description of the electronic structure in solids.* *Electronic structure of 1D compounds, dimers and n-mers formation (Peirls distorsion), Electronic structure of 2D and 3D compounds. Examples of transition metal oxides: electronic structure and electric properties.*
Methods	› *Lectures: 24 * 1h 20 (oral in French, all written support in English)* › *Exercise sessions (in French or English): 14 * 1h 20* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 125 hours (60h private reading, 30h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*
Assessment procedures	*Assessment methods:* › *Written final exam: 3h00 = 100 % of the overall mark* › *The first session takes place in December.* *In case of failure, a second session is organized, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Elaboration of Inorganic Materials*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Manuel Gaudon* › *gaudon@icmcb-bordeaux.cnrs.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures including exercise sessions are taught in French but all written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts)* › *Tutoring in English is available to help people who do not speak French.* › *Practical sessions are taught in both English and French.*
Description	*This teaching corpus is devoted to the synthesis and elaboration of inorganic materials. In the first section, mining technologies (thermal and electrochemical metallurgy) are presented. The second section deals with the various synthesis routes of inorganic oxides and other ceramics.* *Co-sintering (solid state route), mechano-synthesis, and numerous solution routes (coprecipitation, autocombustion, spray pyrolysis, sol-gel processes and hydrothermal synthesis) are compared. The third section consists of a detailed focus on innovative sol-gel processes with the aim of elaborating nanomaterials with controlled morphology.* *Finally, in the last section, the shaping processes, especially to design thin films (PVD, CVD) are presented. As a result, various competencies about the elaboration of inorganic materials are acquired from an adequate mixture of magisterial lessons, exercises and practical activities.* *Main disciplinary competencies:* › *Fundamental knowledge: Know the different material classes and their main elaboration techniques, to apprehend these different classes and techniques basing on solid-state chemist approach: chemical bond description, structural behaviors, thermodynamic/kinetic competition….* › *From knowledge to know-how: Know how to prepare pure inorganic materials with one target chemical composition, one target crystallographic structure and one target morphology (size/shape).* › *Practical: Try out the adequate scientific approach in order to reproduce an experiment of the literature (with the technical possibilities offered by the Practical laboratories).*

Content	*I. Transformation processes in mineral chemistry (mining): (6 meetings * 1h20)* › *Bayer process: Alumina/Aluminum chemistry* › *Kroll proces: Rutile-Anatase/Titanium chemistry* › *Silicium; Process of silica transformation and purification: illustration besides electronic and photovoltaic requirements.* *II. Synthesis of inorganic powder: (10 meetings * 1h20)* › *All-solid routes for inorganic oxide preparation: Solid-sate route, mechanosynthesis* › *Solution routes for inorganic oxide preparation: Autocombustion, spray-pyrolysis, Sol-Gel processes: Pechini & alkoxide precursors' routes, Precipitation, coprecipitation, hydrothermal synthesis* › *From oxides to other inorganic compounds* *III. Sol-Gel processes and diluted environments: (7 meetings * 1h20)* › *From colloids to sol-gel process* › *Colloids vs Nanoparticles in sol "non-silica systems"* › *Colloids vs Nanoparticles in sol "silica systems"* *IV. From synthesis to shaping of inorganic materials: (9 meetings *1h20)* › *Shaping techniques for thin films production (PVD-CVD), ionic implantation, thermal sprays and thermal diffusion. Illustration of the applicative fields (films for optics, mechanical properties and surface coatings as protective barriers)* › *Materials in industrial catalysis: Phenomenological description. Physico-chemical properties of solid catalysts: preparation and shaping. Focus on Zeolites and parent structures.*
Methods	› *Lectures including exercise sessions: 32 * 1h 20 (oral in French, all written support in English)* › *Practical session (in French or English): 2*4h* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*

Assessment procedures	*Evaluation of practical sessions based on results obtained in the labs and evaluation of the written reports = 10 % of the overall mark* › *Written final exam: 3h 00 = 90 % of the overall mark* › *The first session takes place in December (7th-16th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: undergraduate level in chemistry or in physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Energy, Information, Communication (Materials for Energy and Organic Electronics)*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Georges Habziioannou* › *hadzii@enscbp.fr* *Jean-Louis Bobet* › *jean-louis.bobet@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 3*
ECTS credit points	*6 ECT*
Language of instruction	*English*
Description	*Knowledge and stakes associated to fuel cells, energy storage, battery materials, materials for organic electronics, ... concerning:* › *Thermodynamical and electrochemical properties* › *Materials (solid state and molecular chemistry, material science)* › *Current technological locks*

Content	***General presentation and tutored project (7 lectures)***
	Students form groups and work on the building of a system based on organic and inorganic materials, such as a computer (storage, energy, display, processing, input/output and communication systems).
	
	Fuel cells (4 lectures)
	› *Fundamentals of fuel cells*
	› *Materials for PEMFC*
	› *Water management in PEMFC*
	› *Materials for SOFC*
	› *Limiting factors in the development of fuel cells*
	› *Recent industrial developments of fuel cells*
	
	Batteries: past, present and future (4 lectures)
	
	Hydrogen (4 lectures)
	› *Production*
	  › *Classical production (steam reforming etc.,)*
	  › *New production modes (algae, electrolysis...)*
	› *Direct and indirect uses*
	› *Storage*
	  › *Gases*
	  › *Liquids*
	  › *Solids*
	› *Recent trends*

	Organic electronics (19 lectures) 1. *Introduction, overview* › *Examples of applications of polymer-based electronic devices* › *General features of conjugated polymers* › *Operating principles of a LED* 2. *Electronic Structure* › *Molecular structure / electronic properties relationships of conjugated polymers : orbital treatment* › *Polymers doping and electrical conduction* 3. *Interaction of conjugated polymers with light* › *Non-linear polarization phenomena* › *Optical excitations* 4. *Charge transport in conjugated polymers* › *Charges movement mecanisms* › *Analysis methods at various scales* 5. *Structure of conjugated polymers in the solid state* › *Molecular conformation, local order* › *Morphology* 6. *Synthesis and design* › *Main synthesis methods of conjugated polymers* › *Impact of synthetic tools on electronic properties* 7. *Applications and devices principles*
Methods	› *Lectures projects and exercise sessions: 51 hours total* › *Self-study: 105 hours (50h private reading, 25h exam preparation, 30h project preparation)*
Assessment procedures	› *Closed-book final exam (1h30, 0,67 coeff.)* › *Project oral defence (0h30, 0,33 coeff.)*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	*The teaching team is constituted of Georges Habziioannou and Jean-Louis Bobet.* *Bibliography:* › *Techniques de l'ingénieur, ¨Piles à combustible, Ph.STEVENS et al, D3 340-1 D3 340-28* › *Electrochimie des solides, Ch.DESPORTES et al, ed. PUG* › *La pile à combustible : structure fonctionnement application, M.Boudellal, L'Usine nouvelle, Dunod* › *Polymer Electronics, M. GEOGHEGAN, G. HADZIIOANNOU, Oxford University Press, ISBN 978-0-19-953383-1 (2013)* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering).*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Innovative & Composite Materials*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Francis Rebillat* › *francis.rebillat@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	› *Objectives: Whatever the nature of materials (organic, mineral), their structure can be tailored at different scales as soon as a right choice of manufacturing process is completed. This controlled degree of structuration allows new properties to be obtained, from nanometric to macroscopic scales.* › *Mastered competences: Know how to make a material and to control its microstructure at different scales. Experience the physical and chemical phenomena that permit the modulation and/or modification of the properties (chemical, physical - optic, electric, mechanic...). Approach of the integrative chemistry, to manufacture materials according to requirements of the specifications.*
Content	***I. Methods for the fabrication of amorphous and crystallised ceramics: bulk and thin films*** *I-1 Sintering processes for ceramic including liquid sintering:* › *Mechanisms and parameters controlling the sintering steps* › *Methods for the characterisations of the sintered ceramics* › *Glass metals and vitroceramics* *I-2 Ceramic coatings and thin films* › *Relationship between the processing technics (chemical end physical depositions) and the properties (morphology, composition,)* › *Example of applications (mechanic, optic, tribology...)* ***II. Modifications of metals properties*** › *Reminders on thermodynamics* › *Nucleation mechanism: associated driving force, critical radius...* › *Thermal treatments and control of precipitation states* › *Plastic deformation and precipitation hardening* › *Some examples* ***III. Porous materials*** › *Generalities and definitions* › *Geometrical description* › *Experimental techniques to characterize porous materials* › *Properties and applications*

	IV. Composite materials › *Definition of the concept of composite materials, rule of mixture about properties* › *Various application examples, selection criteria for these materials* › *Introduction to the mechanical damage into composite materials* › *The different kinds of reinforcements : nature and architecture* › *Criteria of failure for brittle materials (Weibull, Griffith...)* › *Organic matrix composites (OMC) (in view of glass, carbon, and organic fiber reinforcement): description of different classes of matrices, main properties of thermosetting and thermoplastic polymers applied to fiber composites materials. Use of crosslinking of liquid resins, and /or processing of thermoplastic molten polymers for bulk pieces* › *Main properties of polymers useful for composites. Fiber / Matrix interactions and bonding* › *Resin impregnation of reinforcements* › *Types of processes of bulk pieces, injection, compression, filament winding, stamping, various types of molding, hand processes, discontinuous, continuous* › *Examples of industrial processes vs. processing type, vs. pieces fabrication, vs. matrix type* › *The MMC (metallic matrix composites): Fiber / Matrix interactions and bonding., impregnation of fibrous textures by a metal, to have an interest in developing such composites* › *The CMC (ceramic matrix composites): specificity of junctions between brittle materials, the transposition of common ceramic manufacturing to the consolidation of fibrous or porous architectures, the thermostrucural applications*
Methods	› *Lectures, projects and exercise sessions: 51 hours total* › *Self-study: 105 hours (65h private reading, 40h exam preparation)*
Assessment procedures	*Closed-book final exam (3h)*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	*Bibliography :* › *Sol-gel process: J. Brinker,* › *J. Philibert, A. Vignes, Y. Bréchet et P. Combrade, Métallurgie du minerai au matériau, éd. Dunod, Paris (France), 1998.* › *P. Boch (sous la direction de), Matériaux et processus céramiques, Paris, Hermès Science Publications, 2001* › *W.D. Kingery, H.K. Bowen, D.R. Uhlmann,Introduction to Ceramics, A Wiley-Interscience Publication, 1975,- C. Filliatre et R. Daviaud, Introduction aux matériaux composites - 1 - Matrices organiques, édition CNRS, 1985* › *R. Naslain, Introduction aux matériaux composites 2. Matrices métalliques et céramiques, édition CNRS et IMC, 1985* › *D. Gay, Matériaux composites, édition Hermès, 1987* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering)*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Introduction to Colloids & Polymer Science*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Cyril Brochon* › *cyril.brochon@u-bordeaux.fr* *Olivier Mondain-Monval* › *mondain@crpp-bordeaux.cnrs.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts).* › *Tutoring in English is available to help people who do not speak French.* › *Exercise sessions are taught in both English and French.* › *Practical sessions are taught in both English and French.*
Description	*Acquiring the basic knowledge of colloids & polymer science: what are colloids & polymers, how they are made, how they do behave in various encountered experimental situations, what are their microscopic structures, what they are used for. Students also acquire the basic principles of microfluidics.* *Students are able to use the acquired knowledge to perform the following actions:* › *Synthesize some basic polymer molecules and colloidal suspensions* › *Know the basic methods to characterize the physical chemical properties of basic colloids & polymer systems* › *Know how to use colloids & polymer systems in some targeted applications* › *Know how to use basic microfluidics to tackle specific fabrication challenges*

Content	
	Part 1 : Polymers *I. Introduction - Definitions* › *Definitions and representation* › *Classification* › *Nomenclature* › *Synthesis paths: polycondensation, chain polymerisation* › *Cohesion in macromolecules* *II. Macromolecular Structures* › *Succession of monomer units* › *Stereochemistry and tacticity* › *Topology, dimensionality* › *Macromolecular dimensions and molecular weight* *III. Conformations of polymer chains* › *Statistical conformations of linear chains (as melt or solution)* › *Regular conformations* *IV. Morphology of polymer materials and phase transitions* › *Amorphous polymers* › *Glass transition : definition, dynamic aspects* › *Semi-cristalline polymers: definition, fusion, crystallisation, thermal analysis* ***Part 2 : Colloids*** *I. Introduction and presentation of colloidal materials* › *Historical view* › *Length scale* › *Some examples* › *Brownian motion* *II. Surface energy* › *Surface tension : macro and microscopic aspects* › *Interfaces : liquid/liquid, liquid/gas, solid/liquid, etc.* › *High and low energy surfaces* › *Laplace pressure* › *Wetting phenomena: contact angle* › *Spreading parameters* › *Capillarity* › *Experimental determination of surface tension* › *Laws of Cassie-Baxter, Wenzel, Zisman* *III. Surface tension in microfluidics* › *Introduction to microfluidics* › *Flow diagram : influence of surface tension* › *Formulation of colloidal materials using microfluidics*

	› *Practical session 1 : Emulsion polymerisation* › *Practical session 2 : Measurement of wetting properties* › *Practical session 3 : A flow phase diagram* › *Practical session 4 : Measurement of surface tension*
Methods	› *Lectures: 19 * 1h 20 (oral in French, all written support in English)* › *Exercise session (in French or English): 7 * 1h 20* › *Practical session (in French or English): 4*4h* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*
Assessment procedures	*Evaluation of practical sessions based on results obtained in the labs and evaluation of the written reports = 30 % of the overall mark.* › *Written final exam: 1h 30 = 70 % of the overall mark* › *The first session takes place in December (7th-16th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Large Scale Facilities*
Duration Date start Date end	*12 weeks (Fall semester)* › *September* › *December*
Course coordinator Contact details	*Arnaud Desmedt* › *arnaud.desmedt@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practical work.*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This lecture aims at discovering the contribution of large scale facilities (neutron source and synchrotron radiation), at fundamental as well as applied levels, in the understanding of structural and dynamical properties of matter ranging from materials to macromolecular science.* *It will lead to improved knowledge of large scale facilities in the field of Materials Science and an improved capacity to call upon large scale facilities in Europe.*
Content	*Lecture course content:* › *Background (3 hours - AD). General considerations, matter/radiation interaction (linear response theory…), sources (neutron and synchrotron radiations), facilities (which information, where and how?), concerned fields of applied and fundamental research, complementarities with other techniques (NMR, light scattering, IR absorption…).* › *Nuclear and Magnetic Structure (8hours - MJ). Specificities of neutron diffraction (ND) and X-ray diffraction (XRD). Nuclear diffraction: complementarities ND/XRD. Scattering and absorption lengths, isotopic effects: ND/XRD contrasts. Neutron Magnetic diffraction: access to magnetic structure. Examples and limits of ND and XRD.* › *Large scale structure (8hours -TSANS). Small angle scattering (SAS) techniques. Complementarities of Neutron and X-ray SAS. Structure and form factors. Modeling small angle scattering data. Application to macromolecular systems of interests for soft materials.* › *X-ray imaging and spectroscopy (8hours - OT). Techniques proper to synchrotron radiation: X-ray absorption techniques and Exafs (contribution of linear and circular polarized beam in the study of crystalline and magnetic anisotropy), scanning imaging techniques (X-ray micro-diffraction, micro-fluorescence and UV/IR microspectrometry) and full-field imaging techniques (soft X-ray spectroscopy, X-ray microtomography)*

	› *Neutron spectroscopy (8hours - AD). Elastic, quasi-elastic and inelastic neutron scattering, structure factors, van Hove formalism, molecular dynamics (from vibrations to Brownian motions). Complementarities with computing science (MD simulations...) and applications in solid-state chemistry, materials science and soft materials.* *Practical course content:* *In addition to the lectures, a practical training project is organized in the neutron facility near Paris (Nuclear reactor "Orphée" of the "Laboratoire Léon Brillouin", http://www-llb.cea.fr) during three days. Each group (5 to 7 students) selects a training project among several options (e.g. nuclear and magnetic structure of relevant crystals, velocity of sound in materials, diffusion of macromolecules in solution, macromolecular arrangement of polymeric materials, etc.). This project gives the students the opportunity to experience the acquired concepts. It should be noted that such a project is subject to obtaining access authorizations.*
Methods	*154 hours:* › *51 contact hours (35h lectures, tutorials)* › *16 practical hours in synchrotron national lab facilities* › *100 hours self-study* › *3 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: practical report evaluation (30% weight of overall mark), oral exam (70% weight of overall mark).* *In case of failure/second session: oral exam (100% weight of overall mark).*
Prerequisites	*Students should have followed "Quantum Mechanics" and "Solid State Physics" (Master / Year 1)*
Other information	*Study material:* › *Free access to the EDP-SFN book collection via www.neutron-sciences.org* › *All lecture materials available on http://www.hydrate.eu* › *Quasielastic Neutron Scattering, M. Bée, Adam Hilger, Bristol and Philadelphia, 1988.* › *Theory of the thermal neutron scattering. » W. Marshall, S.W. Lovesey, Clarendon Press, 1971.* › *Neutrons et Matériaux, W. Paulus et J. Meinnel (Eds), Journal de Physique IV, 2003, vol. 103.* › *Neutrons et Magnétisme, C. Fermon et F. Tasset (Eds), Journal de Physique IV, 2001, vol. 89.* › *Elements of Modern X-Ray Physics, J. Als-Nielsen et D. Morrow, Wiley* › *Neutron and Synchrotron radiation for condensed matter studies, HERCULES Edition de Physique et Springer Verlag (1993)* *Course Homepage: http://www.hydrate.eu/teaching*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Macromolecular Chemistry*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Daniel Taton* › *taton@enscbp.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts).* › *Tutoring in English is available for students who do not speak French.* › *Exercise sessions are taught in both English and French.* › *Practical sessions are taught in both English and French.*
Description	*The course aims at discussing the three main synthesis methods of polymers, including chain-growth and step-growth polymerization reactions, as well as the chemical modification of already existing polymers. Students learn how to:* › *Apply key elementary reactions of molecular chemistry to the construction of macromolecular chains, taking into account the intrinsic reactivity of polymeric growing chains* › *Anticipate the effect of initial experimental conditions on some of the properties of the resulting polymers* › *Master the main concepts consisting in chemically modifying a pre-existing polymer, knowing the possible effect of the macromolecular features of the latter on its reactivity* › *Master principles and concepts associated with the main polymerization processes used in the chemical industry, which mostly includes bulk, solution polymerization, and polymerization in dispersed media*
Content	*I. Introduction: general features of chain-growth and step-growth polymerizations; main polymerizable monomers.* *II. Step-growth polymerization.* › *Monomer functionality: main elementary reactions and side reactions* › *Linear polymers: stoichiometry, molar masses, kinetics, examples* › *Non-linear (3D) polymers: gel point, typical examples* *III. Chain-growth polymerization.* › *Free-radical polymerization: initiation, propagation, transfer and termination; kinetics; copolymerization and reactivity ratios*

	› *Coordination polymerization: Ziegler-Natta, metallocenes* › *Anionic polymerization: initiation, propagation, transfer and termination; "living" anionic polymerization (intro) and block copolymer synthesis* › *Cationic polymerization: initiation, propagation, transfer and termination* *IV. Chemical modification of polymers.* *V. Polymerization techniques.* › *Bulk polymerization; Solution polymerization; Polymerization in dispersed media (suspension vs. emulsion); Interfacial polycondensation* › *Practical session 1: Synthesis of Nylon-11* › *Practical session 2: Free-radical polymerization of styrene in bulk: kinetic investigations* › *Practical session 3: Radical copolymerization of styrene and methyl methacrylate in suspension* › *Practical session 4: Synthesis of acrylic cements*
Methods	› *Lectures: 19 * 1h 20 (oral in French, all written support in English)* › *Exercise session (in French or English): 7 * 1h 20* › *Practical session (in French or English): 4*4h* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*
Assessment procedures	*Evaluation of practical sessions based on results obtained in the labs and evaluation of the written reports = 30 % of the overall mark.* › *Written final exam: 1h 30 = 70 % of the overall mark* › *The first session will take place in December (7th-16th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Magnetic and Dielectric Properties*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Corine Mathonière* › *corine.mathoniere@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Students are able to describe the magnetic properties of molecular compounds and inorganic materials along with selected applications. They acquire the relevant knowledge and become familiar with dielectric and ferroelectric materials used in microelectronics and sensors industries. Students acquire competencies concerning polarizable materials, their shapings and applications.*
Content	***Magnetic Properties*** 1. *Compounds with one single magnetic center* › *Fundamental formula in magnetism and Curie law. Examples. Deviations from the Curie law : consequences of the orbital momentum (1 and 2 order)* › *Tutorial: Application of the Curie law for different ions: transition and lanthanides ions. Expression of the magnetic susceptibility in the case of the presence of the zero-field splitting (complete study with the S=1 spin).* 2. *Compounds with two magnetic centers in interaction* › *Exchange interaction: experiment and theory. Heisenberg Hamiltonian. Kahn's model. Goodenough-Kanamori rules. Comparison of the two models.* › *Tutorial: Examples of dinuclear compounds, prediction of the nature of the interaction.* 3. *Magnetic Ordering. Applications to non-conducting materials.* › *Magnetic ordering: through binuclear system to the solid in the mean-field approximation. Phase transition (notion of the order parameter and the critical temperature Tc). Criteria to get a high Tc (high |J|, high S ...).* › *From molecules to networks: polynuclear compounds and Prussian blue analogs. Ferro- and ferrrimagnetic ordering. Antiferrromagnetic ordering in oxides.* › *Tutorial: Prussian blue analogs AMIICr(CN)6 : can we rationalize the evolution of their TC ?* › *Tutorial: Application of the Goodenough-Kanamori rules to oxides materials.*

	4. *Dynamic Phenomena: magnetic hysteresi.* › *Examples in molecular systems: single-molecule magnets. Approximation of the macrospin (giant spin). Magnetization relaxation. Nanoparticules: Superparamagnetism. Dipolar interactions.* › *Tutorial: study of the Mn12O12 and/or a nanoparticule.* › *Magnetization process. Domains formation and observations. Domain walls.* ***Dielectric properties*** 1. *Background* › *Dipoles, polarisation, dipolar interactions, microscopic models* › *Complex dielectric permittivity, dielectric losses* › *Frequency spectra: relaxations, resonances (...) fundamental relations* › *Measuring dielectric properties: impedance spectroscopy, optical spectroscopies* › *Interfaces between electrodes and dielectric materials* 2. *Low permittivity dielectrics* › *Most used oxide in electronics: amorphous SiO2* › *Other oxides: Al2O3 , MgO, Ta2O5, TiO2* 3. *High permittivity dielectrics* › *Substituted alkali halides : KCl:OH, KCl:Li* › *Ferroelectric materials: spontaneous polarisation, ferroelectric domains* › *Relaxor materials* › *Ferroic and multiferroic materials* 4. *Chemical Bonding / Polarisability / Dielectric permittivity* › *Simple oxides polarisability* › *Case of transition metal oxides* › *Anisotropy and permanent dipole in octahedral symmetry* › *Influence on chemical bonding* 5. *Implementation of dielectric materials* › *Shaping constraints* › *Multilayer ceramic capacitors, contribution of grain boundaries* › *Supercapacitors (Ta, Nb, Al)* › *Thin films, nanoparticles* › *Finite size effects in dielectrics* › *Composites*
Methods	› *Lectures, exercise sessions and practical work: 51h in total.* › *Self-study: 105 hours (50h private reading, 20 hours project/practical preparation and report, 35h exam preparation)*
Assessment procedures	*Closed-book final exam (3h)*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*

Other information	*The teaching team is constituted of: C. Mathonière, C. Desplanches, O. Toulemonde, M. Maglione, M. Josse.* *Bibliography* › *Molecular Magnetism O. Kahn, VCH, 1993.* › *Magnétisme : I fondements et II matériaux et applications, EDPSciences* › *Les diélectriques : propriétés diélectriques des matériaux isolants, Coehlo Roland* › *Physique de l'état solide, Kittel Charles* › *Dielectric Relaxations in Solids, Jonscher, Andrew* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering).*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Master Thesis*
Date start Date end	› *February* › *June*
Course coordinator Contact details	*Sabine Castano* › *sabine.castano@u-bordeaux.fr* *Cédric Desplanches* › *cedric.desplanches@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Internship*
Level	*Master course / semester 4*
ECTS credit points	*24 ECTS*
Language of instruction	*English*
Description	*Research work on a given topic. This topic may follow on from a previous bibliographic project on the same or a related topic.* *Students must carry out research on a given topic under the supervision of a university staff member. They are in charge of writing a report synthesizing the approach, method and results associated with the work including their critical analysis.*
Content	*The Master thesis can cover any of the fields related to the FAME Master. Opportunities may be found through Master Thesis offers or by directly contacting potential supervisors.*
Methods	› *Self-study: 600 hours (450h experimental work, 75 report and defence preparation, 75h exchanges with supervisor)*
Assessment procedures	*Report, oral defence*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	*The Master Thesis is usually associated with the Bibliographic Project in M2, but may be conducted independently. Students must be able to enrol in a long internship (minimum four months, up to 6 months) during their stay at UBx.* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering)*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Mechanical behavior: from fluids to solids*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Guillaume Fleury* › *gfleury@enscbp.fr* *Gérard Vignoles* › *vinhola@lcts.u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	› *Magisterial + integrated tutorials lessons: 26 * 1h 20 (oral in French for magisterial, all written support in English)* › *Practical session (in French or English): 4*4h* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts).* › *Tutoring in English is available to help people who do not speak French.* › *Exercise sessions are taught in both English and French.* › *Practical sessions are taught in both English and French.*
Description	*Learning objectives are to:* › *Know and to master the fundamental laws in fluid and solid mechanics* › *Know the vocabulary and formalism associated to fluid and solid mechanics* › *Know and to run the various mechanical testing procedures* › *Apprehend the structure /properties relationships for the various material classes* › *Apprehend the scaling laws and their relationships to the structural properties of materials.* › *Analyze experimental data as well as model the fluid and mechanical behaviors.*

Content	***1. Flow, deformation and rupture in materials: basics and measurements***
	› *Stress – strain – strain rate*
	› *Elastic relationships*
	  › *Hookean solid – modulus*
	  › *Hooke's law*
	› *Fluid relationships*
	  › *Newtonian fluid– viscosity*
	  › *Stokes equation*

	› *Quasi-static tests*
	› *Rheological tests*
	  › *Poiseuille flow*
	  › *Couette flow*
	  › *Design principle of a rheometer*
	› *Time-resolved tests (relaxation / creep / periodic)*
	› *Fatigue tests*
	› *Stress-cracking tests*
	
	2. Structure / property relationships in various classes of materials
	› *Polymers*
	  › *Enthalpic elasticity*
	  › *Entropic elasticity*
	  › *Phenomenological models and time-temperature superposition principle*
	› *Complex fluids*
	  › *Non-Newtonian, Bingham plastic*
	  › *Polymer rheology*
	  › *Segregation*
	› *Solids*
	  › *Defects in solids (cracks separation modes)*
	  › *Fracture analysis and brittle fracture*
	  › *Aging and sub-critical crack growth*

Methods	*Lectures, tutoring, exercise sessions, practical sessions* › *100 hours self-study (50h private reading, 20h exam preparation, 15h exercise preparation, 15h preparation/report of practical session* › *51h (for French speaking persons); 63 h (for non-French speaking persons)*
Assessment procedures	*Evaluation of practical sessions based on results obtained in the labs and evaluation of the written reports = 20 % of the overall mark* › *Written final exam: 3h = 80 % of the overall mark* › *The first session takes place in December (7th-16th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Molecular Simulation and Computational Chemistry*
Duration Date start Date end	*12 weeks (Fall semester)* › *September* › *December*
Course coordinator Contact details	*Jean-Christophe Soetens* › *jean-christophe.soetens@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practical work.*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Computer simulation is an important tool for the study at a microscopic level in such different systems as isolated molecules, liquids, solutions, polymers, solid state and biological molecule. The goal of this course is to provide an overview of the concepts underlying this scientific approach together with an understanding of the methods, capabilities, and limitations of molecular simulation.* *This course should allow graduate students in chemistry to become familiar with molecular simulation: 1) ability to understand studies reported in literature ; 2) ability to discuss with specialists in this field to develop such applications for their problems ; 3) understand the limits of commercial software and, if possible, how to develop their own tools.* *Moreover, this course provides students in chemistry with a better understanding of the molecular basis of the physical and chemical properties of matter.*

Content	*This course consists of both theoretical lectures and practical computer exercises.* *Basic concepts:* › *Elementary classical statistical mechanics. Ensembles and fluctuations.* › *Molecular interactions.* › *Molecular mechanics.* › *Equilibrium molecular dynamics simulations.* › *Monte Carlo methods.* › *Calculations of properties.* *Advanced methods:* › *Overview of various software applications.* › *Methods of energy minimization.* › *Free energy calculations.* › *Computer graphics visualization.* › *Elaborated interaction models (electrostatics and polarizability).* › *Ewald sum and reaction field methods for treating long-range electrostatic interactions.* *The ability to use a powerful computational environment (computers, software, data handling) is central to this field. Lectures will link the standard molecular simulation methods together with their corresponding algorithms. Experience in computer programing and in computer languages are not prerequisites for this course however, such knowledge will be used if possible.*
Methods	*154 hours:* › *51 contact hours (28 lectures, 23 tutorials)* › *100 hours self-study* › *3 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: intermediate written exam (30% weight of overall mark), final written exam (70% weight of overall mark).* *In case of failure/second session: written exam (70% weight of overall mark), recall of the first session intermediate evaluation (30% weight of overall mark).*
Prerequisites	*Basics of "Quantum Chemistry" (undergraduate level) and "Quantum Mechanics", "Numerical Methods" and "Thermodynamics" (Master / Year 1)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Nanomaterials and Hybrids*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Mona Tréguer-Delapierre* › *mona.treguer@icmcb.cnrs.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*General overview concerning the use of the tools of molecular, macromolecular, sol-gel chemistries and physico-chemistry to elaborate nanomaterials, control the organization and the properties of self-assembled macromolecular structures and organic-inorganic hybrid materials.* ***Learning objectives:*** › *Know the main fabrication processes of inorganic nanomaterials (quantum dots, metals, metal oxide);* › *Be able to describe the basics, fundamental chemistry and physics of nanosystems;* › *Know the basis of block copolymer self-assembly at the bulk state;* › *Know the main properties and applications of block copolymer-based materials as well as the main techniques to characterize them;* › *Manipulate simple physico-chemical concepts to describe functional hybrid materials;* › *Know the main classes and applications of hybrid materials;* › *Be able to propose different synthetic strategies towards functional hybrid materials.*
Content	*1. Nanomaterials* › *General introduction* › *How to fabricate nanoparticles?* › *Confinement effect on physico-chemical properties (catalytic, optical, thermodynamic…)* › *Importance of the shape at the nanometer range scale* › *General conclusion*

	2. Hybrids › *Introduction to hybrid materials* › *Class I hybrids* › *Class II hybrids* › *Hybrid materials for optics* › *Intercalation chemistry - basic concepts* › *2D-hybrid materials* › *Multifunctional hybrid materials* › *Preparation routes and characterization of hybrid nanoparticles of controlled composition and morphology* › *Nano-objects as building blocks: towards new functional materials* *3. Self-Assembly and Self-Organization of Block Copolymers* › *Generalities: incompatibility, phase separation, self-assembly* › *From polymer mixtures to copolymers* › *Bulk structure of "flexible-flexible" block copolymers (phase diagram, order-disorder transition)* › *More complex structures (multi-blocks, stars, "rigid-flexible", cycles)* › *Mixtures of copolymers and heteropolymers: compatibilization* › *Commercialized and potential applications.*
Methods	› *Lectures and exercise sessions: 46 hours in total* › *Practical session (English): 2*4h* › *Self-study: 105 hours (60h private reading, 25h exam preparation, 20h preparation/report of practical session)*
Assessment procedures	*Closed-book final exam (3h)*
Prerequisites	› *Academic level: BSc / Master 1* › *Language prerequisites: English*
Other information	*The teaching team is constituted of: M.Tréguer-Delapierre, S.Ravaine, T.Toupance, R.Backov, G.Hadziioanou* *Bibliography:* › *Functional Hybrid Materials, P. Gomez-Romero, C. Sanchez Eds, Wiley-VCH, Weinheim, 2003.* › *Hybrid Materials, G. Kickelbick Eds, Wiley-VCH, Weinheim, 2007.* › *Developments in Block Copolymer Science and Technology, Ian W. Hamley, John Wiley & Sons, Chichester, 2004.* › *Nanoscience, P.Boisseau, P.Houdy, M.Lahmani Eds, Springer, 2007.* *This lecture is part of the ERASMUS MUNDUS Master FAME (Functional Advanced Materials Engineering)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	***Numerical Methods***
Duration Date start Date end	*12 weeks (Fall semester)* › *September* › *December*
Course coordinator Contact details	*Lionel Truflandier* › *lionel.truflandier@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practicals.*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Learning of numerical tools: analysis and representation of data, graphical tools, numerical analysis and scientific programming for the treatment of problems belonging to physics and chemistry.*
Content	*A. Numerical analysis and scientific computing applied to physics and chemistry problems* › *(Fortran programming language)* › *Solving systems of equations* › *Numerical integration and differential equations* › *Optimization calculations* › *Fourier transform and signal processing* *B. Processing and data representation* › *(Python programming language)* › *Statistical processing* › *Interpolation, fitting methods* › *Graphics and visualization tools* › *Optimization calculations* › *Physics and chemistry applications*
Methods	*155 hours:* › *52 contact hours (16h lectures, tutorials, 36h practicals on computers)* › *100 hours self-study* › *3 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: final written exam (40% weight of overall mark), 2 projects (2*30% weight of overall mark).* *In case of failure/second session: written exam (40% weight of overall mark), recall of the first session project marks (2*30% weight of overall mark).*
Prerequisites	*Students should have basic knowledge of mathematics and physics (undergraduate level)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Physical Chemistry of Polymer Solutions*
Duration Date start Date end	*12 weeks* › *March* › *May*
Course coordinator Contact details	*Jean-Francois Le Meins* › *lemeins@enscbp.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts)* › *Tutoring in English is available to help people who do not speak French* › *Exercise sessions are taught in both English or French* › *Practical sessions are taught in both English or French*
Description	*Learning objectives are:* › *Acquiring the basic concepts of polymer solution thermodynamics* › *Knowing the characteristic physicochemical variables (size, mass, geometry) and essential properties (viscosity, osmotic pressure, solubility…). Being able to use the experimental techniques which permit the measurement of these properties (tonometry, osmometry, viscosimetry, light scattering…)*
Content	***Part 1: Flory-Huggins theory – Scaling laws*** *Introduction* *Thermodynamics of simple mixtures* › *Gibbs energy – chemical potential* › *Ideal solutions, entropy calculation* › *The regular solution model* › *Excess parameters.* › *Solubility and demixtion predictions using the Khi parameter* › *Hildebrand approach* *Flory Huggins theory (Polymer solution)* › *Flory's questions* › *Flory's hypothesis*

	› *Flory expression for the Gibbs energy and the chemical potential* › *Solubility prediction and phase diagrams* › *Osmotic pressure* *Conformations of isolated chains* › *Ideal chain model* › *Real chain model : Flory calculation* *Various concentration regimes and their scaling laws* › *Dilute and semi dilute regime* › *Scaling law in semi dilute solutions* ***Part 2 : Characterization of polymer solutions*** *Introduction : differences with "small" molecules* *Limits of the Flory theory* › *Krigbaum approach: notion of excluded volume* *Characterization methods for polymers or colloidal solutions* *Thermodynamical methods:* › *Osmometry – mass, solvent quality. Scaling laws predictions* › *Tonometry* › *Ebulliometry* › *Cryoscopy* › *Advantages and limits of these techniques* *Hydrodynamical methods:* › *Size exclusion chromatography* *Connection with polymer solution thermodynamics* *Numbers of plateau, efficiency of the columns separation ability* › *Viscosimetry* *Dilute regime: Einstein relation, intrinsic viscosity. Semi-dilute regime : viscosity – concentration variation* *Light scattering* › *General expression of the scattered intensity, contrast* › *Static light scattering: RG, MW, second Virial coefficient A2.* › *Dynamic light scattering : RH* › *Examples* *Perspectives: different applications.*

Methods	› *Lectures: 20 * 1h 20 (oral in French, all written support in English)* › *Exercise session (in French or English): 7 * 1h 20* › *Practical session (in French or English): 4*4h* › *Tutoring (for non-French speaking persons): 9 * 1h 20* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*
Assessment procedures	*Evaluation of practical sessions based on results obtained in the labs and evaluation of the written reports = 30 % of the overall mark.* › *Written final exam: 1h 30 = 70 % of the overall mark* › *The first session will take place in the beginning of May (2nd-12th).* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failed students. This 2nd session takes place at the end of June (26th-30th).*
Prerequisites	› *Academic level: BSc as well as notions in polymer science and thermodynamics* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Photonics, Lasers and Imaging*
Duration Date start Date end	*12 weeks (Fall semester)* › *September* › *December*
Course coordinators Contact details	*Véronique Jubera* › *veronique.jubera@u-bordeaux.fr* *Vincent Rodriguez* › *vincent.rodriguez@u-bordeaux.fr* *Sébastien Bonhommeau* › *sebastien.bonhommeau@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practical work.*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This course deals with the photonics field based on spectroscopic characterization of objects, molecules and materials with optical properties. It introduces the laser as a source but also as a tool for creating or modifying these properties. The notion of imagery is exposed through micro-Raman, nano-Raman characterization or micro-luminescence for mapping these objects.* *The course also focuses on characterization techniques that are based on second order nonlinear optical processes. These are powerful techniques in the field of chemical physics that probe molecules, nanoparticles, supramolecular architectures and materials in general.*
Content	*Lectures:* › *Introduction to luminescence spectroscopy* › *From spectral response to structure description* › *Local response: imaging* › *Introduction to quadratic non-linear optics* › *Second Harmonic Generation: from molecules to nanoparticles and interfaces* › *Second Harmonic Generation imaging* › *Introduction to plasmons and plasmonics* › *Technique for molecular sensing at minute concentration* › *Surface-Enhanced Raman Spectroscopy (SERS): principle and applications to biochemistry, biology, art…* › *Technique for nanoscale chemical imaging, Tip-Enhanced Raman Spectroscopy (TERS): principle and applications to biology and materials science*

	Practical work: *Lasers will be presented and used in the frame of optical spectroscopic and imaging experiments. Practical exercises will be performed within research facilities in Bordeaux (SIV, PYLA…)*
Methods	*154 hours:* › *51 contact hours (34h lectures/tutorials, 2h practicals)* › *100 hours self-study* › *3 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: project evaluation (30% weight of overall mark), final written exam (70% weight of overall mark).* *In case of failure/second session: written exam (70% weight of overall mark), recall of the project evaluation (30% weight of overall mark).*
Prerequisites	*Students must have followed courses from the Master (Year 1) in "Spectroscopy" and chemical bonding.* *Students should also have knowledge of Symmetry and Solid Sate Description (crystalline environment).*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Quantum Chemistry and Molecular Modeling*
Duration Date start Date end	*12 weeks (Spring semester)* › *March* › *June*
Course coordinator Contact details	*Frederic Castet* › *frederic.castet@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practicals.*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Understanding the concepts of quantum chemistry at the appropriate level to undertake molecular modeling. Determination of geometries, electronic and optical properties of organic molecules, and simulation of reaction processes using quantum chemistry software.*
Content	*Lectures:* › *The Hartree-Fock method* › *Pople and Dunning basis sets* › *Semiempirical models* › *Configuration Interaction* › *Moller-Plesset Perturbation Theory* › *Density Functional Theory* › *Time-Dependent Density Functional Theory* *Examples of practical exercises:* › *Structure and electronic properties of organic molecules* › *Molecular isomers* › *Potential energy surfaces* › *Simulation of classical organic reactions* › *Simulation of the optical properties of organic molecules 1: absorption* › *Simulation of the optical properties of organic molecules 2: emission* › *Simulation of photochemical processes*
Methods	*155 hours:* › *52 contact hours (16h lectures, tutorials, 36h practicals on computers)* › *100 hours self-study* › *3 hours written assessment exam*

Assessment procedures	*Type of assessment / first session: final written exam (60% weight of overall mark), project (40% weight of overall mark).* *In case of failures/second session: written exam (60% weight of overall mark), recall of the first session project mark (40% weight of overall mark).*
Prerequisites	*Students must have basic knowledge of "Quantum Chemistry" (undergraduate level) and "Quantum Mechanics" (Master / semester 1)*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Quantum Mechanics*
Duration Date start Date end	*12 weeks (fall semester)* › *September* › *December*
Course coordinator Contact details	*Alain Fritsch* › *alain.fritsch@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials.*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Quantum mechanics lies at the core of the understanding of electronic properties and the concepts of matter cohesion, organization and transformation together with all the response properties associated to the physics of measurement. The objective of this course is to provide students with the principles and formalism of quantum mechanics together with various illustrative applications casted in a consistent framework.* *Beyond the few exactly solvable case studies, this course intends to focus specifically on approximate quantum mechanics so as to make students aware of the notions of modelling. This includes variation and perturbation schemes, based on the analysis of the physical relevance of quantum fluctuations with respect to the level of understanding and accuracy required in a given problem.* *At the end of the course, students are able to formalize a problem in terms of quantum models that can be tackled either variationaly or using perturbation theory.* *Moreover, this course provides chemistry students with a better understanding of the molecular basis of the physical and chemical properties of matter.*

Content	*Lectures:* › *Mathematical tools: Vector spaces, Hermitian product, Matrices and linear algebra.* › *Quantum states, Superposition principle, Hilbert spaces.* › *Observables: Operators, Matrix representation, Measurement and eigenvalue equations, Mean values.* › *The Schrödinger equations Time dependent and time independent.* › *Restricted Hilbert spaces: Variation theory and the linear variation method.* › *Rayleigh-Schrödinger perturbation theory.* › *Variation-Perturbation and effective hamiltonians* › *Time dependent perturbation theory* › *Interaction with an electromagnetic field - Multipolar decomposition* › *Transition moments, polarisability and selection rules* › *Einstein theory in the optical domain* › *Inelastic scattering* › *Phenomenological Raman scattering theory*
Methods	*154 hours:* › *51 contact hours (28h lectures, 23h tutorials)* › *100 hours self-study* › *4.5 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: intermediate written exam (30% weight of overall mark), final written exam (70% weight of overall mark).* *In case of failure/second session: written exam (70% weight of overall mark), recall of the first session intermediate evaluation (30% weight of overall mark).*
Prerequisites	*Students must have basic knowledge of "Quantum mechanics" (undergraduate level).*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Solid State Physics*
Duration Date start Date end	*12 weeks (spring semester)* › *March* › *June*
Course coordinator Contact details	*Cedric Crespos* › *cedric.crespos@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, practical work on computers, project.*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The objective of this course is to provide students with the basics of solid state physics. Prerequisites of statistical physics and quantum theory are required and will be illustrated throughout the lectures using practical examples.* *The main models of electronic structure in periodic systems are exposed (fermi free electron gas, nearly free electrons perturbation theory, tight-binding model) and illustrated by simple benchmark examples. An introduction to the physics of lattice dynamics is also proposed at the end of the course in a class devoted to the theory of Phonons in solids.*
Content	*Lectures:* › *Elementary classical and quantum aspects of the free electron theory of metals.* › *Electrons in a weak periodic potential: Bloch's Theorem, perturbation theory applied to periodic potentials, band structure, Fermi surfaces and Brillouin zones, nearly free electrons model.* › *General properties of semiconductors.* › *The Tight-Binding model, a chemist's view of bonding in solids.* › *Phonons and lattice vibrations: classical and quantum theories of the Harmonic crystals, normal modes, elementary theory of the phonon dispersion relation, electron-phonon interaction.* *Practical work:* › *Computational procedure for the study of periodic systems* › *Energy minimization and ground-state properties calculations.* › *Structural optimization, Lattice relaxation, minimum energy paths determination for gas-surface interactions.* › *Ab-Initio molecular dynamics.* › *Calculation of phonon frequencies, electron-phonon interactions, NMR chemical shifts, and spectroscopic properties calculation.*

Methods	*154 hours:* › *51 contact hours (20h lectures, 16h tutorials, 15h practical work on computer)* › *100 hours self-study* › *3 hours assessment project*
Assessment procedures	*Type of assessment / first session: written exam (60% weight of overall mark) at the end of the semester, project evaluation (40% weight of overall mark).* *In case of failure/second session: written exam (60% weight of overall mark) at the end of the semester, project evaluation (recall of the first session mark).*
Prerequisites	*Students must have basic knowledge (undergraduate level) of "Quantum mechanics" and "Statistical Physics".*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Spectroscopy*
Duration Date start Date end	*12 weeks (spring semester)* › *March* › *June*
Course coordinator Contact details	*Vincent Rodriguez* › *vincent.rodriguez@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials, practicals.*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	› *Understanding the fundamentals of light-matter interaction, molecular optical spectroscopy (electronic transitions and molecular vibrations)* › *Analysis and interpretation of the spectra in the infrared and near-infrared* › *Analysis and interpretation of the Vibrational Spectra in Raman scattering* › *Analysis techniques of IR specular reflection (internal and external) and diffuse reflection* › *Acquire knowledge and master common vibrational techniques for analyzing mass materials, thin films, interfaces, etc.* › *Optical constants in materials* › *Acquired skills: mastering the techniques of IR spectroscopy and scattering Raman and understanding the spectra obtained*
Content	*Lectures:* › *Light Matter Interaction* › *Molecular symmetry and vibrational analysis* › *FTIR spectroscopy* › *Raman spectroscopy* › *Applications in molecular science* › *Optical constant in materials* › *IR specular (ATR, IRRAS) and diffuse (DRIFT) reflection techniques IR analysis of anisotropic and chiral material* › *Raman spectroscopy in materials* › *Raman imaging and microspectroscopy*
Methods	*138 hours:* › *45 contact hours (20h lectures, 16h tutorials, 9h practicals)* › *90 hours self-study* › *3 hours written assessment exam*

Assessment procedures	*Type of assessment / first session: final written exam (60% weight of overall mark), project (40% weight of overall mark).* *In case of failure/second session: written exam (60% weight of overall mark), recall of the first session project mark (40% weight of overall mark).*
Prerequisites	*Students must have basic knowledge of "Spectroscopy" (undergraduate level).*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Structural Analysis of Solid and Surfaces*
Date start Date end	› *September* › *November*
Course coordinator Contact details	*Etienne Gaudin* › *etienne.gaudin@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but all written supports are available in English (lectures, exercises, practical session manuals, final exam written texts).* › *Tutoring in English is available to help non-French speakers.* › *Exercise sessions are taught in both English and French.* › *Practical sessions are taught in both English and French.*
Description	*The learning objectives of the course are:* › *Being able to classify the major classes of physical and chemical characterizations according to the different interactions of radiation with matter* › *Knowing surface characterization methods such as electron microscopy* › *Being able to use a space group from the "International Tables for Crystallography" to describe a crystal structure* › *Knowing X-ray diffraction on powder: theory, calculation of diffractions patterns (position and intensity of peaks), crystallite size.* › *Knowing X-ray diffraction of single-crystals: theory, determination of space group, introducing to phase problem.*
Content	*Part 1 : Symmetry and crystallography* ***A. Periodic atomic arrangement*** › *Symmetry Elements* › *Crystallographic point groups* › *Space group, International Tables for Crystallography* ***B. X-ray diffraction*** › *General skills: production, detectors, protection, equipment, etc.* › *Interaction of X-ray with matter* › *Direct and reciprocal space* › *Laue conditions* › *Diffusion, structure and form factors* › *X-ray diffraction on powder: Analysis of powder patterns, Rietveld refinement, crystallite size (from Scherrer to Warren-Averbach)*

	› *X-ray diffraction on single-crystal : space group determination, solving of phase problem (direct method, Patterson method)*
	› *Diffractometers*
	
	C. Practical session
	Study of the structure from a cif file for a given compound. Calculation of precession images, calculation of structure factors.
	
	Part 2 : Surface analysis
	
	Introduction
	1. *Optical microscopy: principles & techniques*
	2. *Electron microscopy: principles & techniques*
	  › *Transmission electron microscopy*
	  › *Scanning electron microscopy*
	3. *Near field microscopy techniques*
	  › *Scanning Tunnel Microscopy*
	  › *Atomic Force Microscopy*
	4. *Photo-electrons spectroscopies: UPS and XPS.*
	5. *Auger and X fluorescence spectroscopies*

Methods	› *Lectures and tutorials : 32 * 1h 20 (oral in French, all written support in English)* › *Practical session (in French or English): 2*4h* › *Tutoring (for non-French speakers): 12h* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session)*
Assessment procedures	*Evaluation of practical sessions based on evaluation of the written reports = 10 % of the overall mark* › *Final written exam: 3h00 = 90 % of the overall mark* › *The first session takes place in December (7th-16th).* *In case of failure, a second session is organized, either as a written or an oral exam depending on the number of failed students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Chemistry*
Course title	*Thermodynamics*
Duration Date start Date end	*12 weeks (Fall semester)* › *September* › *December*
Course coordinator and contact details	*Jean-Christophe BARET* › *jean-christophe.baret@u-bordeaux.fr* *Frederic NALLET* › *frederic.nallet@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials.*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*Part A (3 ECTS) English / Part B (3 ECTS) French*
Description	*The objectives of the course are to explain the macroscopic behaviour of thermodynamic systems by a microscopic description revealing the universal characteristics of their study.*
Content	*Lectures – part A: Statistical Thermodynamics* › *Phenomenological Thermodynamics* › *A more general approach to statistical thermodynamics* › *Overview of systems made of identical particles without interaction* › *Applications of Boltzmann statistics* › *Another statistic - example of the black body radiation* *Lectures – part B:* ***Taught in French*** *"Transitions de Phase"* › *Rappel : Le modèle des solutions régulières et ses conséquences. Quelques résultats expérimentaux empruntés au magnétisme, ordre magnétique, l'exemple ferromagnétique.* › *La transition para-ferromagnétique: le modèle d'Ising, diagramme de phases à l'approximation champ moyen, lien avec le modèle des solutions régulières. Le voisinage du point de Curie.* › *Introduction à la théorie de Landau. Qu'est-ce qu'une brisure spontanée de symétrie, un exemple simple de mécanique; La brisure de symétrie associée à la transition para-ferromagnétique, paramètre d'ordre associé. Introduction du développement de Landau. Généralisation, autres types de développements, transitions faiblement du premier ordre. Quelques exemples empruntés aux cristaux liquides.*

Methods	*154 hours:* › *51 contact hours (28h lectures, 23h tutorials)* › *100 hours self-study* › *4.5 hours written assessment exam*
Assessment procedures	*Type of assessment / first session: intermediate written exam (30% weight of overall mark), final written exam (70% weight of overall mark).* *In case of failures/second session: written exam (70% weight of overall mark), recall of the first session intermediate evaluation (30% weight of overall mark).*
Prerequisites	*Prerequisites: basics of "Thermodynamics" (undergraduate level).*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Transformations in Materials: Diffusion, Transfer, Kinetics, Industrial Processes*
Date start Date end	› *January* › *April*
Course coordinator Contact details	*Gérard Vignoles* › *vinhola@lcts.u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts).* › *Computer sessions are taught in both English and French.* › *Tutored project is delivered in English and French.*
Description	*This lecture introduces the kinetics of transformations encountered when studying materials in a broad sense, i.e. including their fabrication and shaping, their behavior in use.* *Various topics of chemical kinetics, diffusion and other transfer phenomena in gases, solids, and liquids are treated, with a phenomenological view, and in relation with the underlying microscopic mechanisms.* *Application of these concepts to the study of transformation processes and situations of materials physicochemical evolution in use are covered at the end of the course.* *After this course, students should have a global vision of transformation phenomena, the capability of identifying them in a practical situation, and of quantifying them if needed.*

Content	*1. Chemical Kinetics* › *Overview of complex chemical reaction mechanisms (e.g. radicalar chain reactions)* › *Basic notions of catalysis. Application to heterogeneous catalysis.* *2. Diffusion & transfer phenomena* › *Overview* › *Phenomenology of transfer; Fick's laws, Fourier, Newton laws, etc.* › *Microscopic aspects of diffusion: random walks, Brownian motion* › *Practical transfer/reaction problems in industrial processes and materials science* *3. Computer exercises : solving transfer and kinetics problems* *4. Tutored project: study of industrial chemical processes* *5. Mini-colloquium: presentation of the tutored projects*
Methods	› *Lectures: 22 x 1h 20 (oral in French, written support in English)* › *Computer sessions (in French or English): 4 x 2h 40* › *Teaching supports available on the Moodle platform* › *Tutored project: 8 x 1h 20* › *Presentations by the students: 2 x 2h 40*
Assessment procedures	*1st session:* › *Written final exam: 1h30 = 60 % of the overall mark* › *Project (presentation/group 0h30) = 40 % of the overall mark* › *The first session takes place in April.* *In case of failure, a second session is organized for the final written exam, either as a written final exam or as an oral session depending on the number of failing students. This 2nd session takes place at the end of June.* *Whatever the results of the first session, the initial project mark will be reported as 40 % of the final overall mark.*
Prerequisites	› *Academic level: BSc + basic notions in chemical kinetics* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Chemistry

Discipline	*Chemistry*
Course title	*Transitions and Phases Diagrams*
Date start Date end	› *January* › *April*
Course coordinator Contact details	*Jerome Roger* › *jerome.roger@u-bordeaux.fr* *Yann Le Petitcorps* › *yann.lepetitcorps@u-bordeaux.fr*
Additional contact	*Corinne Jalibert* › *corinne.jalibert@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 2*
ECTS credit points	*6 ECTS*
Language of instruction	› *Main lectures are taught in French but written supports are available in English or French (lectures, exercises, practical session manuals, final exam written texts)* › *Tutoring in English is available to help people who do not speak French.* › *Exercise sessions are taught in both English and French.* › *Practical sessions are taught in both English and French.*
Description	*This course is focused on the stability and equilibrium of phases. It deals with the thermodynamic description of phases and their transformations.*
Content	***1. Phase transitions*** › *The goal of this course is to describe phase transitions of pure substances and binary mixtures. The link between a microscopic description of the system and its macroscopic behavior is at the core of the course.* › *Physical transformations of pure substances: chemical potential; condition of equilibrium between phases. Microscopic modeling (Van Der Waals model). Stability condition of thermodynamic potentials, binodal and spinodal, critical points.* › *Physical transformations of Binary mixtures: Chemical potential of a component in a mixture. Colligative properties. Microscopic models of mixtures (ideal solutions, regular solutions). Equilibrium in a liquid/liquid two-phase system. Stability condition of a mixture. Binodal and spinodal in liquid/liquid phase separation.*

	› *Liquid/vapor equilibrium in mixtures: Influence of the composition on the boiling point. Application to distillation. Azeotrope.* › *Practical course: Thermodynamics of mixtures.* ***2. Phase Diagrams*** *This teaching deals with the thermodynamics of solid and liquid solutions. The aim is an advanced mastering of binary and ternary phases diagrams.* *Program:* › *Thermodynamics of the solid and liquid solution* › *Diagrams of binary and ternary phases (invariant transformations, peritectic, eutectic,...; solidification paths)* › *Free enthalpy diagrams in function of temperature and composition.* › *Gas-solid interactions (Ellingham diagram).*
Methods	› *Lectures: 35 x 1h 20 (oral in French, written support in English)* › *Practical session (in French or English): 1 x 4h* › *Teaching supports available on the Moodle platform* › *Self-study: 105 hours (50h private reading, 20h exam preparation, 20h exercise preparation, 15h preparation/report of practical session).*
Assessment procedures	› *Written final exam: 3h00 = 100 % of the overall mark* › *The first session will take place in April.* *In case of failure, a second session is organized for the final exam, either as a written final exam or an oral session depending on the number of failing students. This 2nd session takes place at the end of June.*
Prerequisites	› *Academic level: BSc* › *Selection criteria: basic knowledge in chemistry and/or physical chemistry* › *Language prerequisites: English or French*
Other information	› *Selection procedure: evaluation of the students CV*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Advanced Graph Theory*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Paul Dorbec* › *paul.dorbec@u-bordeaux.fr*
Additional contact	*Eric Sopena* › *eric.sopena@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: tutorial sessions*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Graph theory is a very general model that can represent various problems, from networks (of any kind) to hierarchized structures such as data bases. The general knowledge of graph theory provided in this course is useful for recognizing and dealing with the problems modelized.*
Content	*This teaching presents advanced notions of graph theory and presents students with some classical proof techniques on graphs, illustrated on graph coloring and domination. Some classical problems and conjectures are also presented.*
Methods	*Lectures and exercise sessions : 24 tutorial sessions*
Assessment procedures	*Continuous assessment and final exam*
Prerequisites	› *Previous studies (Bachelor level) within the domain of computer science or similar* › *Level B2 CEFR in English*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Applied Algorithmics and Complexity*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Philippe Duchon* › *philippe.duchon@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The goal of this course is to give somewhat generic algorithmic techniques to deal with computational intractability (typically, NP-completeness) when one needs practical solutions. The focus is on techniques with guaranteed performance: either exact algorithms, or algorithms with a guaranteed approximation ratio.*
Content	*Examples of NP-hard and NP-complete problems. Examples of polynomial-time reductions. Exact solving techniques: exhaustive search, SAT-solvers, pseudo-polynomial algorithms. Optimization problems and approximation algorithms. Introduction to fixed-parameter tractability (FPT).*
Methods	*Lectures and practical work:* › *48h of face-to-face teaching* › *100h personal work*
Assessment procedures	*Short written examination, practical work (writing software to solve some NP-hard problem)*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar* › *Basic knowledge of algorithmic techniques and complexity theory*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Distributed Algorithms*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Cyril Gavoille* › *cyril.gavoille@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, tutorial sessions*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*This course is an introduction to distributed algorithms. The various models and constraints of distributed computing are presented. Some classical distributed algorithms are analyzed and it is demonstrated how to define new distributed algorithms.*
Methods	*Lectures and exercise sessions : 24 tutorial sessions*
Assessment procedures	*Continuous assessment and final exam*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Games, Systems and Control*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Anca Muscholl* › *anca.muscholl@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: tutorial sessions, practical work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This course is an introduction to game theory applied to systems verification and synthesis.*
Content	*Various types of games are presented: two player games on finite graphs, stochastic games, distributed games, and multi-player games.*
Methods	*Lectures and practical work : 48 tutorial sessions*
Assessment procedures	*Continuous assessment and final exam*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Logic and Languages*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Marc Zeitoun* › *marc.zeitoun@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This course is an introduction to the logic of finite model such as words, trees and finite graphs.*
Content	*This course deals with both the expressiveness of the considered logics, using the Ehrenfeucht-Fraïssé games, as well as the complexity of fundamental decision problems.*
Methods	*Lectures and exercise sessions: 24h lectures, 24h tutorials*
Assessment procedures	*Continuous assessment and final exam*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar*

Please note that the number of places available may be limited for certain classes.

Computer Science

Discipline	*Computer Science*
Course title	*Software Verification*
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Jérome Leroux* › *jerome.leroux@u-bordeaux.fr*
Additional contact	*Grégoire Sutre* › *gregoire.sutre@u-bordeaux.fr* *Emmanuel Fleury* › *emmanuel.fleury@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This course presents shared data structures, like BDD (Binary Decision Diagrams), CEGAR algorithms, and SAT solving techniques based on interpolation.*
Content	*The following techniques are presented: symbolic verification of finite models, static analysis, and verification through abstraction.*
Methods	*Lectures and practical work: 24h lectures, 24h tutorials*
Assessment procedures	*Continuous assessment and final exam*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Types, Specifications and Proofs*
Duration Date start Date end	*6 weeks* › *September* › *January*
Course coordinator Contact details	*Pierre Castéran* › *pierre.casteran@lu-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Type systems, when they are powerful enough, can express precise program specifications. As a result, correctness proofs of these programs can be implemented by type checking. These techniques will be illustrated within the functional programming framework.*
Methods	*Lectures and practical work with the Coq proof assistant:* › *24 h of face-to-face teaching* › *50h personal work (lab sessions)*
Assessment procedures	*Project on machine; report and oral defence*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar* › *Basics in logic, functional programming and discrete maths*
Other information	*This teaching is strongly correlated with TSP: Type Systems and Programming.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Computer Science*
Course title	*Type Systems and Programming*
Duration Date start Date end	*6 weeks* › *September* › *January*
Course coordinator Contact details	*Philippe Narbel* › *philippe.narbel@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: lectures, tutorials*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Type systems provide an effective tool for the validation and correction of programs. This course introduces and illustrates several type systems from their theoretical foundations to their applications in programming languages.*
Methods	*Lectures and practical work: 12h lectures, 12h machine tutorial*
Assessment procedures	*Project on machine and report*
Prerequisites	› *Level B2 CEFR in English* › *Previous studies (Bachelor level) within the domain of computer science or similar* › *Basics in logic, functional programming and discrete maths*
Other information	*This teaching is strongly correlated with TSP: Types, Specifications and Proofs.*

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Computer Sciences

Discipline	*Computer Sciences*
Course title	*Advanced methods for image processing*
Duration Date start Date end	*6 weeks* › *September* › *January*
Course coordinator Contact details	*Aurélie Bugeau* › *aurelie.bugeau@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*The objective of this class is to present some recent image processing methods. In particular, students discover the non-local approaches, discrete modeling and graph-cuts for problems such as segmentation or image enhancement.*
Content	› *Markov Random Fields, discrete energies, Graph Cuts, segmentation* › *Patch-based methods, PatchMatch* › *Application to image editing and computational photography*
Methods	*Integrated class:* *24h face-to-face teaching* *50h personal work*
Assessment procedures	*Written examination and practical work*
Prerequisites	› *Level B2 CEFR in English* › *Basic knowledge of image and signal processing*

Please note that the number of places available may be limited for certain classes.

Discipline	*Engineering Sciences*
Course title	*Image and Inversion*
Duration Date start Date end	*12 weeks* › *October* › *January*
Course coordinator Contact details	*Jean-François Giovannelli* › *jean-francois.giovannelli@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The course deals with methods, models and algorithms for inverse problems in imaging. The subject matter of the course is exemplified through a variety of application field (medical, astrophysical, geophysical, remote-sensing, non-destructive evaluation...) and several imaging modalities (scanner, tomography, echography, optical imaging, MRI...). The core of the course deals with problems such as: deconvolution, Fourier synthesis, inverse Radon, denoising... The focus is on the deconvolution problem.*
Content	› *The first chapter deals with standard linear methods (inverse filter, Wiener, shortly Kalman...) based on quadratic criteria. They often strike an interesting compromise between the quality of the restored images on the one hand and ease of implementation and numerical efficiency on the other hand.* › *The second chapter resorts to non-quadratic convex criteria (differentiable or not) and the optimization step relies on half-quadratic techniques. It allows for efficient edge-preserving image restoration.* › *The third point is devoted to constraints, mainly positivity and support. Implementation is based on augmented Lagrangian and Alternative Direction Methods of Multipliers (ADMM). These approaches result in resolution improvement of computed images.* › *The last point deals with unsupervised and myopic problems. They are partially open questions, crucial in practical applications and attractive from a theoretical standpoint. A possible solution takes advantage of a Bayesian interpretation of the previously mentioned scheme and allows for self-tuned and self-calibrated methods.*
Methods	*Face-to-face teaching (50h): lectures (20 hours), tutorial classes (10 hours), practical work (20 hours).* *100h personal work.*
Assessment procedures	*Written examination (3 hours) and practical work.*
Prerequisites	› *Level B2 CEFR in English* › *Basic knowledge of linear algebra (matrix, eigenvalue, positive-definite matrix...).*

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Computer Sciences

Discipline	*Computer Sciences*
Course title	*Image Acquisition and Reconstruction*
Duration Date start Date end	*6 weeks* › *September* › *January*
Course coordinator Contact details	*Pascal Desbarats* › *pascal.desbarats@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*The objective of this course is to study the processing chain from the acquisition (surface: laser scanner, volume CT scanner, MRI) to 3D printing.*
Methods	*Lectures and practical work:* *24h face-to-face teaching* *50h personal work*
Assessment procedures	*Written examination and practical works*
Prerequisites	› *Level B2 CEFR in English* › *Basic knowledge of image and signal processing*

Please note that the number of places available may be limited for certain classes.

Mathematics and Interactions

Discipline	*Mathematics and Interactions*
Course title	*Variational Methods and PDEs for Image Processing*
Code	
Duration Date start Date end	*12 weeks* › *September* › *January*
Course coordinator Contact details	*Jean-François Aujol* › *jean-francois.aujol@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The objective of this class is to present variational approaches and partial differential equations in image processing. Students learn to mathematically model image processing problems and to bring the desired qualitative property of the model in terms of mathematical modeling.* *Students master the fundamentals in order to be able to adapt classical variational models and PDE to situations they might encounter in their future professional life.* *Practical lab sessions illustrate the theoretical principles developed during the course.*
Methods	*Lectures and practical work:* *50h face-to-face teaching* *110h personal work*
Assessment procedures	*Written examination and practical work*
Prerequisites	› *Level B2 CEFR in English* › *Basic knowledge of mathematical analysis and linear analysis*

Please note that the number of places available may be limited for certain classes.

Computer Sciences

Discipline	*Computer Sciences*
Course title	*Video and Indexing*
Duration Date start Date end	*6 weeks* › *September* › *January*
Course coordinator Contact details	*Jenny Benois-Pineau* › *jenny.benois-pineau@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, personal work*
Level	*Master course / semester 3*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*The objectives of this course are to study and practice effective methods of video analysis and indexing.* *The class covers video analysis and indexing methods for a wide range of applications in various sectors of information and communications technology: medical imaging, mobile services, computer networks, security, assistance, social networks, new forms of artistic creation, etc.*
Content	*Students first study and implement the fundamental techniques of motion estimation in image sequences.* *They then learn to model how videos are interpreted by humans. This work is based on the characteristics of motion and contrast, and on models of animated scenes.* *Finally, the students study some methods for describing and indexing moving images, based on both temporal descriptors from motion estimation and spatial descriptors.*
Methods	*Lectures and practical work:* *24h face-to-face teaching, 50h personal work*
Assessment procedures	*Written examination and practical work*
Prerequisites	› *Level B2 CEFR in English* › *Basic knowledge of Image Processing Algorithms, Programming in C++*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Algebraic Geometry*
Duration Date start Date end	*This course is given during the fall semester.* › *September* › *December*
Course coordinator Contact details	*Qing Liu* › *qing.liu@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* › *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Core Master course / semester 3*
ECTS credit points	*9 ECTS*
Language of instruction	*English*
Description	*This course is an introduction to Algebraic Geometry.*
Content	*Program:* › *Preliminary on commutative algebra (tensor product, localization, Hilbert theorem)* › *Sheaves and their cohomologies* › *Affine schemes, schemes, morphisms of schemes* › *Projective schemes* › *Topological properties (irreducible components, connected components, dimension)* › *Algebraic properties (reduced schemes, integral schemes, noetherian schemes)* › *Some classes of morphisms (morphisms of finite type, proper morphisms, projective morphisms)* › *Fiber products and base change* › *Algebraic curves (equivalence with the function fields of one variable; divisors)* *Bibliography:* › *Q. Liu: Algebraic Geometry and Arithmetic curves, Oxford GTM 6, Oxford Univ. Press, 2006.* › *R. Hartshorne: Algebraic geometry, Graduate Texts in Math., 52, Springer-Verlag, 1977.*
Methods	*Lectures and exercise sessions:* *57 course hours and 200 hours of personal study*
Assessment procedures	*Exams take place in December*

Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Algorithmic Number Theory*
Duration Date start Date end	*This course is given during the fall semester.* › *September* › *December*
Course coordinator Contact details	*Karim Belabas* › *karim.belabas@u-bordeaux.fr*
Additional contact	*Gilles Zemor, coordinator of the CSI track of the Master in Mathematics and Applications* › *gilles.zemor@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Advanced Master course / semester 3*
ECTS credit points	*6 ECTS.*
Language of instruction	*English*
Description	*The course uses classical and modern factorization algorithms to present important ideas and techniques in computational number theory.*
Content	*Program:* › *Ubiquitous Fast Fourier Transform,* › *Reduction of Z-modules and lattices,* › *Factorization of univariate polynomials over $\mathbb{F}_q$, $\mathbb{Q}$ and $\mathbb{C}$* › *Primality testing and integer factorization,* › *Computational algebraic number theory: maximal orders, class groups and units of number fields.* *The emphasis is on important ideas throughout and asymptotically fast algorithms, as opposed to technical details necessary for efficient implementations.* *Bibliography* › *K. Belabas: course notes, http://www.math.u-bordeaux1.fr/~kbelabas/teach/N1MA9W11/book.pdf* › *J. von zur Gathen and J. Gerhard: Modern computer algebra, Cambridge University Press, New York, 1999.* › *H. Cohen: A course in computational algebraic number theory, Graduate Texts in Mathematics, vol. 138, Springer-Verlag, Berlin, 1993.* › *R. Crandall and C. Pomerance: Prime numbers, second ed., Springer, New York, 2005, A computational perspective.*
Methods	*Lectures and programming sessions:* *48 course hours and 120 hours of personal study.*
Assessment procedures	*Exams take place in December*

Prerequisites	*The first three parts are elementary. In the last two, we will sketch then use basic properties of elliptic curves over $\mathbb{C}$ and over finite fields, and standard algebraic number theory.* *Moreover, applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program and the CSI (Cryptology and Information Security) master program mastercsi.labri.fr.* *For further information on the ALGANT program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Analytic Number Theory: advanced course 1*
Duration Date start Date end	*This course is given during the fall semester.* › *September* › *December*
Course coordinator Contact details	*Yuri Bilu* › *yuri.bilu@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Advanced Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*A basic course of Analytic Number Theory.*
Content	*Topics to be covered include, but are not limited to:* › *Arithmetical functions* › *The distribution of prime numbers* › *Riemann zeta function and Dirichlet L-functions* › *Connections with Algebraic Number Theory* *Bibliography* › *G. Tenenbaum: Introduction to Analytic and Probabilistic Number Theory, Cambridge Studies in Advanced Mathematics, 1995.*
Methods	*Lectures:* *33 course hours and 120 hours of personal study.*
Assessment procedures	*Exams take place in December.*
Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Cohomology of groups: advanced course 2*
Duration Date start Date end	*This course is given during the spring semester.* › *January* › *April*
Course coordinator Contact details	*Dajano Tossici* *dajano.tossici@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* › *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Advanced Master course / semester 4*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The goal of this course is the definition and the study of the cohomology of groups. It is an invariant which is associated to a G-module A, i.e. an abelian group A equipped with an action of a group G.*
Content	*Program:* *We will start with the general construction of the cohomology in the abelian categories. Later we will focus on the main case, i.e. the derived functor associated to the functor of fixed points by an action of a group over an abelian group. We will pay more attention to the case of finite groups.* *According to the timetable and the concerns/interests of the students, we will consider one or more of the following subjects.* › *Local class field theory* › *Brauer group.* › *Galois cohomology and Galois descent.* *Bibliography* › *H.Cartan-S.Eilenberg: Homological Algebra Princeton University Press, 1956.* › *Grothendieck: Sur quelques points d'algèbre homologique, I Tohoku Math. J. (2) Volume 9, Number 2 (1957), 119-221.* › *J.S Milne: Class field Theory, http://www.jmilne.org/math/CourseNotes/cft.html* › *J.P. Serre: Local Fields, Graduate Texts in Mathematics 67, Springer-Verlag, 1979; Second edition, 1995*
Methods	*Lectures:* *33 course hours and 120 hours of personal study.*

Assessment procedures	*Exams take place in May*
Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Geometry*
Duration Date start Date end	*This course is given during the fall semester.* › *September* › *December*
Course coordinator Contact details	*Vincent KOZIARZ* › *vincent.koziarz@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* › *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Core Master course / semester 3*
ECTS credit points	*9 ECTS*
Language of instruction	*English*
Description	*This lecture is an introduction to Complex Geometry and its tools.*
Content	*Program:* › *Introduction to holomorphic functions of several variables* › *Complex manifolds, de Rham and Dolbeault cohomology* › *Sheaves and cohomology* › *Vector bundles, connections and curvature* › *Harmonic theory on compact complex manifolds, Hodge theory* › *Kähler manifolds, Hodge decomposition* › *Line bundles, first Chern class, notions of positivity for the curvature, Kodaira vanishing theorem* › *Kodaira embedding theorem* *Bibliography* › *J.-P. Demailly: Complex analytic and algebraic geometry, available on the web page of J.-P. Demailly.* › *P. Griffiths et J. Harris: Principles of algebraic geometry, Wiley & Sons, 1978* › *S. Kobayashi: Differential geometry of complex vector bundles, Princeton University Press, 1987* › *C. Voisin: Hodge theory and complex algebraic geometry I & II, Translated from the French by Leila Schneps. Cambridge Studies in Advanced Mathematics, 76 & 77. Cambridge University Press, Cambridge, 2007* › *R.O. Wells: Differential analysis on complex manifolds, Graduate Texts in Mathematics 65, Springer Verlag,1980*

Methods	*Lectures and exercise sessions:* *57 course hours and 200 hours of personal study*
Assessment procedures	*Exams take place in December*
Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*Number Theory*
Duration Date start Date end	*This course is given during the fall semester.* › *September* › *December*
Course coordinator Contact details	*Denis Benois* › *denis.benois@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* › *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Core Master course / semester 3*
ECTS credit points	*9 ECTS*
Language of instruction	*English*
Description	*The first section of the course will cover basic material, depending on the students' background. The second section will study in more depth one or several more advanced subjects.*
Content	*Program:* *Part 1:* › *Dedekind rings* › *Valuations* › *Local fields* › *Number fields* › *The Dedekind zeta function* *Part 2 (one or more of):* › *A survey of class field theory* › *Local fields: ramification groups, Herbrand function* › *L-functions* › *Diophantine equations* *Bibliography* › *P. Samuel: Théorie algébrique des nombres, Hermann, Paris, 1967* › *J. Neukirch: Algebraic number theory, GMW 322, Springer, 1999* › *Z. Borevich, I. Shafarevich: Number theory, Academic Press,1966* › *J.W.S. Cassels, A. Fröhlich (eds): Algebraic number theory, Academic Press 1967* › *J.-P. Serre: Corps locaux, Hermann Paris 1997*
Methods	*Lectures and exercise sessions:* *57 course hours and 200 hours of personal study*
Assessment procedures	*Exams take place in December*

Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Discipline	*Mathematics*
Course title	*The key role of certain inequalities at the interface between complex geometry and algebraic geometry: advanced course 2*
Duration Date start Date end	*This course is given during the spring semester.* › *January* › *April*
Course coordinator Contact details	*Alain Yger* › *alain.yger@u-bordeaux.fr*
Additional contact	*Christine Bachoc, coordinator of the ALGANT/AGTN tracks of the Master in Mathematics and Applications* › *christine.bachoc@u-bordeaux.fr*
Mode of delivery	*Face-to-face classes*
Level	*Advanced Master course / semester 4*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*In this course, the role of certain inequalities at the interface between complex geometry and algebraic geometry will be studied.*
Content	*Program:* › *Kähler Geometry within the context of weighted projective spaces and more generally of toric varieties.* › *Positivity in Complex Geomety and its interface with Algebraic Geometry.* › *Morse inequalities and their applications, including stochastic aspects.* › *Green-Griffiths-Lang conjecture from its original formulation up to recent generalizations (by J.P. Demailly, S. Diverio, J. Merker, E. Rousseau).* › *Hyperbolicity and Kobayashi conjecture: a pedestrian approach.* *Bibliography* › *J.-P. Demailly: Complex analytic and algebraic geometry, available online on Demailly web page* › *J.-P. Demailly: Holomorphic Morse inequalities and the Green-Griffiths-Lang conjecture, Pure and Applied Mathematics Quarterly 7 (2011) 1165-1208.* › *J-P. Demailly: Recent progress towards the Kobayashi and Green-Griffiths-Lang conjectures, available online on Demailly web page* › *R. Lazarsfeld: Positivity in Algebraic Geometry, I-II, Springer Verlag 2004 & 2007.* › *A. Yger: Géométrie différentielles complexe, notes d'un cours de M2 dispensé à Niamey (Niger), https://cel.archives-ouvertes.fr/cel-00469403v3*

Methods	*Lectures:* *33 course hours and 120 hours of personal study.*
Assessment procedures	*Exams take place in May*
Prerequisites	*Applicants should:* › *Have completed, with good results, a Bachelor of science degree in Mathematics or equivalent with a special focus on Algebra, Geometry and Number Theory;* › *Have thorough proficiency in written and spoken English.*
Other information	*This course is part of the ALGANT Joint Master Program.* *For further information on the program structure, partner institutions, scholarship opportunities, etc., please visit the ALGANT website: http://algant.eu/*

Please note that the number of places available may be limited for certain classes.

Oceanography

Discipline	*Oceanography*
Course title	*Biological Oceanography*
Code	*S1ST7201*
Duration Date start Date end	*8/9 weeks* › *September* › *December*
Course coordinator Contact details	*X. de Montaudouin* › *xavier.de-montaudouin@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, field work, lab practicals and self-study hours*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Several contrasting marine ecosystems are described and analysed through the main structuring strengths of pelagic and benthic communities. This module is part of the interdisciplinary first semester and also aims to demonstrate through concrete examples that marine biology is part of oceanography. A practical course takes place at the marine station (Arcachon) where students spent 2.5 days in order to apply the main theoretical concepts taught during lectures (adaptation to marine life, link between spatial heterogeneity and diversity, diversity calculation, use of gears like dredges, planktonic nets, etc.).*
Content	*Lectures (31h) concern theoretical aspects of biological oceanography that must be known and understood by students from a large disciplinary panel. The main idea is to analyse ecosystems with contrasted structuring strengths: spatial heterogeneity in seagrass, high pressure and no light in deep-sea fans, turbidity in estuaries, etc.* *Field courses (20h): 8h concerning plankton ecology, 8h concerning seagrass ecology, 4h concerning coastal fishes.*
Methods	*51h face-to-face teaching and 110h self-study.* *51h corresponds to 31 hours of lectures and 20 hours of field course at the Marine Station (2.5 days at Arcachon).* *110h consists of 60 hours writing two reports (50% of final mark) and 50 hours preparing written exams (50% of final mark).*

Assessment procedures	*1st session:* › *2 reports (Plankton and Seagrass) written after the field course at the marine station (50% of overall mark).* › *1 written exam of 1.5 h (50% of the overall mark).* *2nd session:* › *Marks of the two reports are retained (50%).* › *1 written exam of 1.5 h OR an oral exam (50% of the overall mark).* *The student needs a mark of 100/200 to validate this module.*
Prerequisites	› *Correct written and oral competencies in English.* › *Knowledge of basic software (e.g. word, Excel).* › *Statistical knowledge (which will be improved in a concomitant module of data analysis.*

Please note that the number of places available may be limited for certain classes.

Oceanography

Discipline	*Oceanography*
Course title	*Dynamic Oceanography*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Nadia Senechal* › *nadia.senechal@u-bordeaux.fr*
Additional contact	*Marie-Josee Billa* › *marie-josee.billa@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, field work*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The fundamental concepts in dynamic oceanography are covered including:* › *The Navier Stokes equation,* › *Application in the geostrophic approximation both in oceanic and atmospheric circulation,* › *Application in the Ekman transport.* *Descriptions of oceanic circulation are provided both at the large scale and at the regional scale. Atmospheric circulation and coupling with oceanic circulation are also presented. Emphasis is placed on fluid motion description and measures.*
Content	*Lectures concern theoretical aspects of dynamic oceanography and applications to specific environments. Data collected during the field work is analyzed. The main idea is to provide a strong background on oceanic and atmospheric circulation.* *Field work concerns fluid motion measures and description. The students deploy current profilers and other oceanographic instruments.*

Oceanography

Methods	*A total of 151 hours: these hours are placed within other modules of the first semester during 8 to 9 weeks.* *51 and 100 contact and self-study hours, respectively.* › *51 contact hours corresponds to 45 lecture hours and 6 hours of field work on an oceanographic cruise (Gironde Estuary).* › *100 self-study hours consists of 50 hours writing two reports (50% of final mark) and 50 hours preparing written exams (50% of final mark).*
Assessment procedures	*1st session:* › *1 report (Plankton and Seagrass) written after the field work (30% of overall mark).* › *1 written exam of 1.5 h (50% of the overall mark).* › *1 oral exam of 20min (20% of the overall mark).* *2nd session:* › *Marks of the report and the oral exam are retained (50%).* › *1 written exam of 1.5 h OR an oral exam (50% of the overall mark).* *The student needs a mark of 100/200 to validate this module.*
Prerequisites	› *Correct written and oral competencies in English.* › *Knowledge of basic software (e.g. word, Excel).* › *Bachelor degree level knowledge in Earth and/or Life Sciences, or Physics, or Chemistry*

Please note that the number of places available may be limited for certain classes.

Oceanography

Discipline	*Oceanography*
Course title	*Sea-floor Geology*
Code	*S1ST7204*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*J.-L. Schneider* › *jean-luc.schneider@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, computer lab, field studies, personal work (report writing).*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	› *Research techniques used in marine geology* › *Morphological marine geological structures (mid-ocean ridges, subduction zones, passive margins, oceanic basins, oceanic islands and plateaus).* › *Geodynamics and petrogenetic processes.* › *Marine sediments (clastic, biogenic and authigenic)* › *This module is part of the interdisciplinary first semester and also aims to demonstrate trough examples that marine geology is part of oceanography.* › *Field studies on marine sediment deposits (1,5 days).* › *Computer lab on marine data processing (in relationship with data acquisition on an oceanographic research vessel)*
Content	*Lectures concern theoretical aspects of geological oceanography that must be known and understood by students from a large disciplinary panel. The main idea is to analyze marine geological structures, rocks and sediments from the system to sample scales.* *Field studies: present-day sedimentation and Miocene marine sedimentary rocks.*

Oceanography

Methods	*51 hours of face-to-face teaching:* › *7 lectures of 3 hours (21 h),* › *3 computer labs of 3 hours - marine data processing (9 h),* › *9 hours of field work around the Arcachon lagoon and Bordeaux (Miocene sedimentary marine formations).* › *1 written exam (1.5 hour)* › *120 hours self-study (60 private reading, 30 writing assessment (report on marine data processing and field studies report).*
Assessment procedures	*1st session:* › *2 reports (marine data processing and field studies report): 50% of overall mark.* › *1 written exam of 1.5 h (50% of the overall mark).* *2nd session:* › *Marks of the reports are retained (50%).* › *1 written exam of 1.5 h OR an oral exam (50% of the overall mark).* *The student needs a mark of 100/200 to validate this module.*
Prerequisites	› *Correct written and oral competencies in English.* › *Knowledge of basic software (e.g. word, Excel).* › *Bachelor degree level knowledge in Earth and/or Life sciences, or Physics, or Chemistry*

Please note that the number of places available may be limited for certain classes.

Oceanography

Discipline	*Oceanography*
Course title	*Statistics and Data Analysis in Environmental and Geological Sciences*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*B. Lubac* *Bertrand.lubac@u-bordeaux.fr*
Mode of delivery	*Face-to-face-teaching, self-study hours.*
Level	*Master course / semester 1*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Introduction to basics in statistics and data analysis in environmental and geophysical sciences. Practical work is conducted using the R environment.*
Content	*Lectures and practical work concern :* *1.Introduction* › *Generalities and Definitions* › *Research Stages in Environmental and Geological Sciences* *2.Random Variable* › *Discrete Random Variable* › *Binomial Distribution* › *Continuous Random Variable* › *Normal Distribution* › *Chi-Square, Student, and Fisher Distribution* *3.Sample and Population: Statistical Inference* › *Statistical Inference* › *Method of Maximum Likelihood* › *Confidence Intervals* › *Tests of Hypotheses fora Normal Population* › *Analysis of Variance (Anova)* *4.Bivariate Analysis* › *Bivariate Analysis and Correlation* › *Bivariate Normal or Two Dimensional Normal Distribution* › *Tests of Correlations* *5.Regression Analysis* › *Multiple Linear Regression* › *Statistical Tests in Multiple Regression*

	6. Multivariate Analysis › *Factor Analysis* › *Empirical Orthogonal Function* › *Cluster Analysis* *7.Time-Series Analysis*
Methods	*51h face-to-face teaching and 110h self-study.* *51h corresponds to 24 hours of lectures and 27 hours practical work.* *110h consists of 55 hours preparing written exams (50% of final mark) and 55 hours preparing practical exams (50% of final mark).*
Assessment procedures	*1st session:* › *1 practical exam of 1.5 h (50% of overall mark).* › *1 written exam of 1.5 h (50% of the overall mark).* *2nd session:* › *1 written exam of 1.5 h OR an oral exam (50% of the overall mark).* *The student needs a mark of 100/200 to validate this module.*
Prerequisites	› *Correct written and oral competencies in English.* › *Basics in descriptive statistics.* › *Bachelor level in life and/or earth sciences, or physics, or chemistry*

Please note that the number of places available may be limited for certain classes.

> Health Sciences

MASTER

College of Health Sciences - Campus Carreire

BIOLOGY _____ p. 179 - 187

Bordeaux biology agrosciences

- Biotechnologies: issues and strategies
- Molecular basis of plant microbe interaction
- Plant breeding
- Plant cell metabolism
- Plant development and reproduction
- Quantative and population genetics and evolution

NEUROSCIENCE

Neuroscience and biotechnology, Euro-Mediterranean program (ISIS)

- Bio Informatics and biotechnology
- *Cellular neurobiology/physiology*..... *S1 / 9 ECTS*
- Developmental neurobiology
- Functional neuroanatomy
- Integrative and system biology
- Language and communication
- Mechanisms of neurological diseases
- Medical neuroscience and neuroimaging
- Molecular and cellular neuroscience
- Neural basics of cognition
- Neuropharmacology

NEUROSCIENCE _____ p. 188 - 201

NeuroBIM / Neurasmus

- *Addiction*..... *S3 / 6 ECTS / F2F*
- Cellular and molecular neurobiology
- Cognitive neuroscience
- *Drug discovery & pharmaceutical industries*..... *S3 / 3 ECTS / F2F*
- *Experimentation in behavioral studies*..... *S3 / 6 ECTS / F2F*

MASTER

College of Health Sciences - Campus Carreire

NEUROSCIENCE _____ p. 188 - 201

NeuroBIM / Neurasmus

- continued

- Functional neuroanatomy
- *Higher brain functions* ..... *S1 / 4 ECTS / F2F*
- *Molecular neurobiology and development* ..... *S1 / 4 ECTS / F2F*
- Neural networks
- Neuropharmacology
- Neurophysiology
- *Pathophysiology of neurological & psychiatric diseases* ..... *S3 / 6 ECTS / F2F*
- *Pre-clinical and clinical neuropharmacology* ..... *S3 / 6 ECTS / F2F*
- *Research project literature survey and methodology* ..... *S3 / 9 ECTS / F2F*
- Scientific communication
- *Statistics and neural modelling* ..... *S1 / 3 ECTS / F2F*
- *Tutored project* ..... *S1 / 3 ECTS / F2F*

PHARMACY

Analytical chemistry for drugs and natural products

- *Access to Euro- Mediterranean market of drugs and other health products* ..... *S1 / 3 ECTS / F2F*
- *Drug design & pharmaceutical technology for drugs and natural products* ..... *S1 / 3 ECTS / F2F*
- *English & communication skills* ..... *S1 / 3 ECTS / F2F*
- *Microbiology control and quality* ..... *S1 / 3 ECTS / F2F*
- *Project management: drug control and natural products* ..... *S1 / 9 ECTS / F2F*
- *Quality control applied to drugs* ..... *S1 / 3 ECTS / F2F*
- *Quality by design & chemometry* ..... *S1 / 3 ECTS / F2F*
- *Research and analytical development* ..... *S1 / 3 ECTS / F2F*

Discipline	*Biology*
Course title	*Biotechnologies: issues and strategies*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Frédéric Delmas* › *frederic.delmas@u-bordeaux.fr*
Additional contact	*Florence Lartigaut* › *florence.lartigaut@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, inversed class, international conferences/seminars, group work and lab teaching.*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Throughout this course, students improve their knowledge of the most recent aspects of plant biotechnologies in terms of methodologies and approaches. These include GMOs technologies and regulations, genome editing as well as metabolic engineering. The course focuses on examples to help understand various strategies used to set up research or industrial projects in this domain.*
Content	› *Seminars are given by professionals of the plant biotechnology sector* › *Inversed classes are organized to work on the latest Biotechnologies available in Plant Sciences (transplastomic, chemical biology, high value protein expression…)* › *Lab teaching allows the students to experiment with techniques used in Plant Biotechnology (molecular biology, plant transformation, microscopic analysis…)*
Methods	*Lectures, inversed class, seminars with professionals and lab teaching.* *158 hours:* › *48 contact hours (8h lectures, 8h professional seminars, 16h lab teaching, 14h group work, 2h exam);* › *110 hours self-study (50h private reading, 50h exam preparation, 10h group work preparation)*

Assessment procedures	› *Formative assessment in case of lab teaching* › *Written exam and group presentation* › *Duration of assessment: 2 hours*
Prerequisites	› *Students must have 1st year Master knowledge of biological science, plant biology and biotechnology* › *Language prerequisites: a good level of English*
Other information	*Maximum number of students permitted: 14*

Please note that the number of places available may be limited for certain classes.

Discipline	*Biology*
Course title	*Molecular Basis of Plant Microbe Interactions*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Sylvie German-Retana* › *german@bordeaux.inra.fr* *Eric Gomès* › *eric.gomes@bordeaux.inra.fr*
Additional contact	*Florence Lartigaut* › *florence.lartigaut@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: seminars, inversed classes, group work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Learning objectives:* › *Strengthen students' knowledge in the field of molecular basis of Plant Microbe Interactions.* › *Present updated state of the art methods in the field through case studies on both model and crop plants.* › *Highlight the usefulness of the concepts/methodologies presented during the course for crop protection*
Content	*Different patho-systems (plant viruses, bacteria, fungi and oomycetes) and symbiotic interactions (mycorrhiza) are studied.*
Methods	*Lectures, seminars, inverted class, scientific paper analysis and oral presentation:* *158 hours:* › *48h in-class (12h lectures, 12h professional seminars with INRA researchers, 22h group work, 2h exam)* › *110h self-study (50h private reading, 50h exam preparation, 10h group work preparation)*
Assessment procedures	› *Written exam (2 hours)* › *Scientific paper group presentation* *Rules for failure: an overall grade of 10/20 is necessary to pass the exam.*
Prerequisites	› *Students must have 1st year Master knowledge of biological science, plant biology, biotechnology or microbiology* › *Language prerequisites: good level of scientific English*
Other information	*Maximum number of students: 17*

Please note that the number of places available may be limited for certain classes.

Discipline	*Biology*
Title of the course	*Plant Breeding*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Valérie Schurdi-Levraud* › *valerie.schurdi-levraud@u-bordeaux.fr*
Additional contact Secretary	*Pierre-François Bert* › *pierre-françois.bert@ u-bordeaux.fr* *Florence Lartigaut* › *Florence.lartigaut@u-bordeaux.fr*
Mode of delivery	› *Face-to-face teaching: in-class, seminars, flipped classroom* › *Distance-learning*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language	*English*
Description	*Students learn how to:* › *Integrate theoretical and practical knowledge in a design study for a breeding program;* › *Integrate genotyping and phenotyping methods* › *Connect breeding methods, techniques and breeding goals depending on species, parental choice, breeding strategy, population genetics, selection methods, traits of interest that are crucial for successful practical breeding* › *Integrate legal rules and variety development, breeder's rights and patents* › *Integrate advanced statistics and bioinformatics* *The project concerns the set up of a breeding program for a specific crop (student choice) with specific goals (breeding for: resistance to pathogens, tolerance to abiotic stresses, fruit quality, biomolecule production…)*
Content	› *Principles of selection and genetic gain, response to selection* › *Germplasm resources, collecting, analysing, classifying* › *International rules on germplasm resources* › *Population improvement and cultivar development (breeding for lines, hybrids, clones, populations)* › *High through-put phenotyping* › *Breeding strategies and methods including molecular breeding (MAS, genomic selection) and biotechnologies* › *Multiple traits selection* › *Genotype by environment interaction* › *Protecting varieties and intellectual property* › *Plant Breeding international network and organization* *A focus is carried out on crop breeding but also on the breeding of local species such as pine, grapevine, fruit trees, strawberries, tomato, sunflower, etc.*

Methods	› *In-class (42h): face-to-face including at least 10h with researchers and breeders (30h), project study (12h)* › *Company visits (16h)* › *Distance-learning: self-study (10h)* › *Personal work (122h)*
Assessment procedures	*Assessment is carried out via:* › *Essay and group presentation of the personal project* › *Quality of the proposal, report and presentation*
Prerequisites	› *Students must have completed a first year of Master in Biological science* › *Knowledge of quantitative and population genetics and evolution basis or basic knowledge of genetics/genomics* › *Knowledge of statistics and R*
Other information	*Due to course content such as personal projects and company visits, the number of students may be limited.*

Please note that the number of places available may be limited for certain classes.

Biology

Discipline	*Biology*
Course title	*Plant Cell Metabolism*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Eric Gomès* › *eric.gomes@bordeaux.inra.fr* *Patrick Moreau* › *patrick.moreau@u-bordeaux.fr*
Additional contact	*Florence Lartigaut* › *florence.lartigaut@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: seminars, inversed classes, group work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Learning objectives:* › *Strengthen students' knowledge in the field of Plant Cell Metabolism.* › *Present updated state of the art methods in the field through case studies on Arabidopsis and other plant models.* › *Highlight the usefulness of the concepts/methodologies presented during the course for conducting research projects.*
Content	› *Content of the course is related to different aspects of cell compartmentalisation of metabolic pathways and their regulations and "modelling".* › *The use of state of the art technologies in Molecular Biology, Biochemistry, Cell Imaging and Modeling approaches to address the cell compartmentalization of metabolic pathways will be highlighted by literature case studies.*
Methods	*Lectures, seminars, inverted class, scientific paper analysis and oral presentation.* *158 hours:* › *48h in-class (9h lectures, 14h professional seminars with INRA or CNRS researchers, 23h group work, 2h exam)* › *110 hours self-study (50h private reading, 50h exam preparation, 10h group work preparation).*
Assessment procedures	› *Written exam (2 hours)* › *Scientific paper group presentation* › *Rules for failure: an overall grade of 10/20 is necessary to pass the exam.*
Prerequisites	› *Students must have 1st year Master knowledge of Biological Science, Plant Biology/Physiology, Plant Biotechnology* › *Language prerequisites: good level of scientific English*
Other information	*A maximum number of 40 students is recommended for this course.*

Please note that the number of places available may be limited for certain classes.

Biology

Discipline	*Biology*
Course title	*Plant Development and Reproduction*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Philippe Gallusci* › *philippe.gallusci@u-bordeaux.fr*
Additional contact	*Florence Lartigaut* › *florence.lartigaut@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: seminars, inversed classes, group work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*The course covers:* › *Most recent advances in plant development and reproduction with up to date approaches including genetic, reverse genetic and NGS based approaches.* › *Epigenetic mechanisms in plants and their functions in plant development and reproduction.* › *Genetic and molecular mechanisms underlying plant development control, and possible biotechnological applications.* › *Case studies using recent article on various plant model to analyse mechanisms controlling plant development*
Content	› *Content of the course is related to different aspects of plant development, and analysis of the mechanisms that control it.* › *The use of state of the art technologies in Molecular Biology, (including omics), Developmental Biology, Cell Imaging approaches to address various aspects of plant development, reproduction and applications in Plant Biotechnologies will be highlighted by literature case studies.*
Methods	*Lectures, seminars, inverted class, scientific paper analysis and oral presentation.* *158 hours:* › *50h in-class (9h lectures, 14h professional seminars with INRA or CNRS researchers, 23h group work, 2h exam)* › *110 hours self-study (50h private reading, 50h exam preparation, 10h group work preparation)*
Assessment procedures	› *Written exam (2 hours)* › *Scientific paper group presentation* *Rules for failure: an overall grade of 10/20 is necessary to pass the exam.*
Prerequisites	› *Students must have 1st year Master knowledge of Biological Science or equivalent, Plant Biology/Physiology, Plant Biotechnology* › *Language prerequisites: a good level of scientific English*
Other information	*A maximum number of 20 students is recommended for this course.*

Please note that the number of places available may be limited for certain classes.

Discipline	*Biology / Genetics*
Title of the course	*Quantitative and Population Genetics and Evolution*
Date start Date end	› *September* › *December*
Course coordinator Contact details	*Valérie Schurdi-Levraud* › *valerie.schurdi-levraud@u-bordeaux.fr*
Additional contact Secretary	*Pierre-François Bert* › *pierre-françois.bert@ u-bordeaux.fr* *Florence Lartigaut* › *florence.lartigaut@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: in-class, seminars, flipped classroom*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language	*English*
Description	*Students learn how to:* › *Calculate and explain genetic diversity estimates, alleles frequency* › *Integrate theoretical and practical knowledge in detecting loci involved in quantitative traits* › *Integrate advanced statistics, bioinformatics, high through-put phenotyping and genome data* *A project is conducted on a dataset integrating population diversity analysis and population structure, linkage disequilibrium estimation and association genetics to detect loci involved quantitative traits in crops.* *A focus is carried out on dataset work. This work is co-coordinated with statistics and R teaching.*
Content	› *Population genetics and genetic diversity* › *Haplotype structure* › *Domestication and genetic consequences* › *Linkage disequilibrium* › *Genetic variance, estimating variance components, heritability* › *Genetic correlations* › *Association genetics, genomic selection* › *Induced diversity TILLinG, natural diversity ecoTILLinG* › *Linking genetics, genomics and bioinformatics : from fine-mapping to gene cloning; genotyping by sequencing*

Methods	*Lectures, seminars, project containing data study* *52 h in-class:* › *Seminars, flipped classroom (24h)* › *Data and in silico study, work on dataset (22h)* › *Professional seminars (6h)* *Personal work including distance-based, personal project preparation (128h)*
Assessment procedures	*Assessment is carried out via:* › *Summative assessment* › *Essay and group presentation of personal project* › *Quality of the proposal, report and presentation* › *Data study and presentation*
Prerequisites	› *Students must have completed a Master / Year 1 in Biological science* › *Knowledge of basis statistics and R, basis genetics and genomics*

Please note that the number of places available may be limited for certain classes.

Neuroscience

Discipline	*Neuroscience*
Course title	*Cellular and Molecular Neurobiology*
Duration Date start Date end	*3 months* › *September* › *November*
Course coordinator Contact details	*Dr. Elena Avignone* › *elena.avignone@u-bordeaux.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching:* *The course covers a series of lectures and seminars by researchers' specialists within their own field. Students critically analyze research papers guided by teachers. Flipped class methods are used. Students analyze documents and answer questions about a research article before the class.* *During tutorials they work in small groups to compare findings and then share the information with fellow students and teachers.* *Students participate in a micro-internship in a research lab where they focus on a specific technique used in cellular and molecular neuroscience.*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*Upon completion of this course, students are able to:* › *Analyze and understand the neuronal and brain functions at the cellular and subcellular levels;* › *Describe the use, limits and interest of anatomic, genetic, physiologic, pharmacologic, and biochemical approaches in the study of neuronal and glial functions and the analysis of elementary mechanisms.*

Neuroscience

Content	› *Neuronal morphology* › *Synaptogenesis, maturation and synaptic plasticity* › *Electrophysiology of synaptic transmission* › *Sub cellar fractionation of brain tissue* › *GABAA receptors: from molecular analysis to behavior* › *P2X ATP receptors: molecular regulation and function* › *Presynaptic organization and vesicular cycle* › *Structural plasticity* › *Astrocytes, glio-transmission and regulation of synapse function* › *Astrocytes, pathology and metabolism* › *Microglia*
Methods	*Face-to-face teaching: 52 hours (lectures: 18 hours; tutorials: 26 hours; practical work: 8 hours)* *Personal student work: 120 hours* *Final assessment: 3 hours* *lectures: 24 hours;* *tutorials: 20 hours;* *practicals: 8 hours*
Assessment procedures	*Grading is based on the following examinations:* › *Presentation on a chosen article (10%)* › *Written or oral report on the work carried out during the micro-internship (20%)* › *Participation in critical discussions (10%)* › *Final exam: critical analysis of a research paper (60%)* *Final assessment takes place in early December* *One re-sit is allowed*
Prerequisites	*Students should possess a Bachelor degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* *A proven interest and solid basic knowledge in the field of neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* *Language prerequisites: fluency in English*
Other information	› *Maximum number of students: 20* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

Neuroscience

Discipline	*Neuroscience*
Course title	*Cognitive Neuroscience*
Duration Date start Date end	*3 months* › *September* › *November*
Course coordinator Contact details	*Prof. Jacques Micheau* › *jacques.micheau@u-bordeaux.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, tutorials and seminars, practical work*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language of instruction	*English*
Description	*This high level course in cognitive neurosciences encompasses important topics such as learning and memory; structural modelling and brain function; motivation, action planning, anticipation and decision making; virtual reality and cognition in aging; neuroimaging and brain dysfunctions.*
Content	*The learning outcomes of this course are:* › *Master the foundations of Cognitive Neuroscience* › *Apply the basic technical approaches of Cognitive Neuroscience* › *Have a general, precise and critical overview of Cognitive Neuroscience, from normal functioning to brain diseases* › *Name the technical approaches of Cognitive Neuroscience, explain their theoretical groundings and know when to use them*

Neuroscience

Methods	*This unit is organized around lectures dealing with important topics in distinct domains of cognitive neuroscience. To cover most of these domains each lecture is given by a different speaker.* › *Face-to-face teaching: 56 hours* › *Lectures: 28 hours* › *Tutorials: 20 hours (task oriented work, round tables with paper presentations during which 3-4 neuroscientists are invited to share their knowledge with the students)* › *Practical work: 8 hours (basic memory tests; event-related potentials):* › *Personal student work: 94 hours* › *Final assessment: 2 hours*
Assessment procedures	› *Grading is based on the examination at the end of the term. In addition, a practical report and oral paper presentation contributes to the overall assessment.* *Final written assessment corresponds to a two-hour essay and takes place in early December.* *One re-sit is allowed*
Prerequisites	*Students should possess a Bachelor degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* *A proven interest and solid basic knowledge in the field of Neuroscience (neuroanatomy, neurophysiology, neuropharmacology, behaviour, molecular and cellular mechanisms) must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* *Language prerequisites: fluency in English*
Other information	› *Maximum number of students: 20* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

Neuroscience

Discipline	*Neuroscience*
Course title	*Functional Neuroanatomy*
Duration Date start Date end	*2 months* › *September* › *October*
Course coordinator Contact details	*Prof. Daniel Voisin* › *daniel.voisin@inserm.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching:* › *Lectures: general overview of neuroanatomy and basic definitions / check-points / methods* › *Flipped class room and team work (tutorials): students prepare oral presentations with the help of the teacher;* › *Games and case study (tutorials): Neuroanatomy trivial pursuit, puzzles and conundrums; Movies and 3D constructions; Use it to know it: Neuroanatomy through clinical cases.* › *Practical work: prepared via individual distance work.* › *Lab visits and demonstrations (prepared by individual distance work).*
Level	*Master course / semester 1*
ECTS credit points	*5 ECTS*
Language of instruction	*English*
Description	*The general objectives of this course are to:* › *Discover how Neuroanatomy is a living, dynamic field that needs to be grasped in order to build an understanding of brain functions and how they relate to structures;* › *Be able to relate Neuroanatomy to clinical cases.*

Neuroscience

Content	*During the course, students will learn to:* › *Know the structures and nomenclature* › *Understand complex spatial relationships* › *Train spatial cognition in relation to brain structures and functions* › *Integrate knowledge of different functional systems through clinical cases* › *Understand the principles and interest of classical and modern neuroanatomical methods* *The learning outcomes of this course are:* › *Master the foundations of modern Neuroanatomy* › *Apply the basic technical approaches of Neuroanatomy* › *Have a general, precise and critical overview of Neuroanatomy, from normal functioning to brain diseases* › *Name the technical approaches of Neuroanatomy, explain their theoretical groundings and know when to use them*
Methods	*Face-to-face teaching: 47 hours (lectures: 8 hours; tutorials: 27 hours; practical work: 8 hours; lab visits: 4 hours)* *Personal student work: 78 hours* *Final assessment: 2 hours*
Assessment procedures	› *Student talks (2 per student): 20%* › *Final paper (2 hours): MCQ, clinical cases: 80%* *The final assessment takes place in early November* *One re-sit is allowed*
Prerequisites	*Students should possess a Bachelor degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* *A proven interest and solid basic knowledge in the field of Neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* *Language prerequisite: fluency in English*
Other information	› *Maximum number of students: 20.* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

Discipline	*Neuroscience*
Title of the course	*Neural Networks*
Duration Date start Date end	*3 months* › *September* › *November*
Course coordinator Contact details	*Prof. Denis Combes* › *denis.combes@u-bordeaux.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching: in class, lectures, seminars, tutorials (computer-based experiments on neural networks)*
Level	*Master course / semester 3*
ECTS credit points	*6 ECTS*
Language	*English*
Description	*Upon completion of this course, students are able to analyze and understand how vertebrate and invertebrate neuronal networks work in terms of: cellular and synaptic mechanisms; normal, developmental and pathological plasticity; ontogenesis.*
Content	*During the course, students will learn to:* › *Master the cellular and synaptic mechanisms that allow a neural network to produce a physiologically relevant activity* › *Understand the mechanisms underlying the functional flexibility (plasticity) of neural networks* › *Apply electrophysiological and pharmacological approaches to decipher the functioning of neural networks* › *Develop and apply relevant electrophysiological and pharmacological experiments and computer-based simulations to decipher the cellular and synaptic mechanisms underlying the functioning of a neural network* › *Design appropriate protocols in electrophysiology and pharmacology* › *Use neurosimulation software to analyse the functioning of the central nervous system* › *Write a scientific report from their own experimental results* › *Provide an oral presentation of their own experimental results*

	The program will cover: › *Principles of organization of neuronal networks; central pattern generators* › *Methods of study* › *Cases study: locomotor networks & others* › *Plasticity* › *Development* › *Interactions between networks* › *From neural networks to robots*
Methods	› *Teaching: 54 hours (lectures: 36 hours; seminars and tutorials: 18 hours)* › *Personal student work: 96 hours* › *Final assessment: 3 hours*
Assessment procedures	*Grading is based on the following examinations:* › *Oral assignment from experiments done during the tutorials* › *Written assignment from experiments done during the tutorials* › *Paper (3 hours) at the end of term* *Final assessment takes place in early December* *One re-sit is allowed*
Prerequisites	› *Solid basis in Neuroscience (neurons, synapses...)* › *Students should possess a Bachelor's degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* › *A proven interest and solid basic knowledge in the field of Neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics,* › *computer science).* › *Language prerequisites: fluency in English*
Other information	› *Maximum number of students: 20* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Discipline	*Neuroscience*
Course title	*Neuropharmacology*
Duration Date start Date end	*3 months* › *September* › *December*
Course coordinator Contact details	*Prof. Philippe de Deurwaerdere* › *deurwaer@u-bordeaux.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, directed work following homework (exercises), supervised work: publication analysis and technical round tables*
Level	*Master course / semester 1*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*The objective of this course is to provide sufficient knowledge and scientific background to understand the orientations or the pharmaceutical options for the treatment of the various pathologies of the central nervous system.*
Content	*During the course, students will learn about:* › *Basis of pharmacodynamics and pharmacokinetics.* › *Pharmacological basis of important class of drugs* › *Physiology and pathophysiology of the main neurotransmitter systems.* › *Molecular and integrative views of the mechanisms of action of drugs* *This program is also supported by students' personal work. Students lecture fellow students on topics such as various neurotransmitter systems and receptors, enzymes and/or transporters:* › *To develop the skill to look fast on pertinent data in order to find out the right references* › *To produce informative text and/or oral presentations in the field of neuropharmacology.* *Learning outcomes:* › *Master the foundations of modern Neuropharmacology* › *Apply the basic technical approaches of Neuropharmacology* › *Have a general, precise and critical overview of Neuropharmacology, from normal functioning to brain diseases* › *Name the technical approaches of Neuropharmacology, explain their theoretical groundings and know when to use them* *At the end of the course, students should be able to follow a conference dealing with neuropharmacological principles.*

Methods	*Face-to-face teaching: 32 hours (lectures/seminars/tutorials)* › *Lectures: 14 hours (7 lectures given by teaching staff)* › *Seminars: 4 hours (corresponding to the lectures given by students regarding neurotransmitter systems and specific pharmacological targets)* › *Tutored projects to supervise the students to prepare their seminar: 6 hours* › *A round table (4 hours) is organized at the end of the semester to discuss the production of the students regarding enzymes/transporters/receptors or pharmacological agents.* › *4 hours of exercise of neuropharmacology* *Personal student work: 80 hours* *Final assessment: 3 hours*
Assessment procedures	› *Papers prepared at home and oral presentations will be graded and included as half of the final score to obtain 4 ECTS.* › *The final exam (3 hrs) addresses scientific cases in which the students must propose a mechanism of action for an unknown drug based on graphs and tables. Students are trained for this exam. Documents are authorized.* *Final assessment takes place in early January and may be organized at distance.* *One re-sit is allowed.*
Prerequisites	› *Students should possess a Bachelor degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* › *A proven interest and solid basic knowledge in the field of Neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* › *Language prerequisite: fluency in English*
Other information	› *Maximum number of students: 20.* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

Neuroscience

Discipline	*Neuroscience*
Course title	*Neurophysiology*
Duration Date start Date end	*3 months* › *September* › *December*
Course coordinator and contact details	*Dr. Elena Avignone* › *elena.avignone@u-bordeaux.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching:* › *The course implies a series of lectures, tutorials where electrophysiological and imaging techniques will be presented. During some tutorials, specific software will be used to simulate the main phenomena of neurophysiology.* › *Flipped class methods will be used, providing reading material, video and exercises before the class.* › *Students work in pairs to prepare a small lecture on a specific topic and present it to the class.* › *Students participate in a micro-internship in a research lab where they will focus on a specific technique used in Neurophysiology and applied to a Neuroscience problem.*
Level	*Master course / semester 1*
ECTS credit points	*4 ECTS*
Language of instruction	*English*
Description	*This course provides students with an essential theoretical framework for neurophysiology, so that they understand how the nervous system communicates and processes information, from basic electrical properties to synaptic plasticity.* *The course also gives an overview of the techniques used to monitor cellular activity, including specific hands on methods applied in modern Neuroscience labs using cutting edge techniques in the field.*
Content	*Learning outcomes:* › *Master the foundations of modern Neurophysiology* › *Apply the basic technical approaches of Neurophysiology* › *Have a general, precise and critical overview of Neurophysiology, from normal functioning to brain diseases* › *Name the technical approaches of Neurophysiology, explain their theoretical groundings and know when to use them*

Neuroscience

Methods	*Face-to-face teaching: 32 hours (lectures: 12 hours; tutorials: 16 hours; practical work: 4 hours)* *Personal student work: 68 hours* *Final assessment: 2 hours*
Assessment procedures	› *15 minute presentation on a chosen topic (15%)* › *Written report of work completed during the micro-internship (10%).* › *Intermediate exam (2 hours) questions on theoretical lectures and tutorial contents, exercise solutions (20%).* › *Participation in critical discussions and homework assignments (5%)* › *Final exam (2 hours): 1-2 questions which integrate several aspects of the course (50%)* *Final assessment takes place in early January and may be organized at distance* *One re-sit is allowed*
Prerequisites	*Students should possess a Bachelor degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* *A proven interest and solid basic knowledge in the field of Neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* *Language prerequisites: fluency in English*
Other information	› *Maximum number of students: 20* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

Discipline	*Neuroscience*
Title of the course	*Scientific Communication (English for Neuroscience)*
Duration Date start Date end	*2 weeks* › *Early September* › *Mid-September* *In addition, four lectures in September-October*
Course coordinators Contact details	*Ms. Joanne Pagèze* › *joanne.pageze@u-bordeaux.fr* *Prof. Daniel Voisin* › *daniel.voisin@inserm.fr* *Dr Aline Desmedt* › *aline.desmedt@inserm.fr*
Additional contact	*Mr. Cyril Lançon* › *master-b.biologie@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching, in-class:* *This course is taught intensively over two weeks. The objective is to develop communication skills in English, to gain an understanding of the specific genres and linguistic features of scientific English and to develop a capacity to read and analyze scientific publications in the field of Neuroscience.* *Insights in the epistemology of scientific research are also provided as additional lectures.*
Level	*Master course / semester 1*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Upon completion of this course, students have:* › *Gained a good grounding in scientific English;* › *Understood the basic philosophy for the communication of Neuroscience research work.* *Students are thus able to prepare and present effective oral communications in Neuroscience.*
Content	*1. Oral & written comprehension & expression.* *Students actively interact in English in all classes. Classes are organized according to Neuroscience themes with a focus on particular features of scientific English.* › *Memory: do you remember when? Description, comparison, narrative* › *Messing with our minds: hypothesis, conditionals* › *Writing project: register and genre* › *Pain: what is it? How does it work? Narrative, the experimental story, analysis and hypothesis*

	› *Brain disorders: collecting, organising, synthesis of information* › *Inside the animal mind: space and movement* › *Getting ready to present: phonology, and intonation, chunking* *2. Preparing and presenting a Neuroscience paper:* › *Understanding the paper* › *Extracting and summarizing the main points* › *Preparing the slide show* › *Getting ready to present* › *Anticipating and answering questions*
Methods	› *Tutorial class (case studies, simulation, task oriented work, practice, gaming…): 47 hours.* › *Lectures (epistemology): 8 hours.* › *Personal student work: 28 hours* › *Final assessment: 30 minutes*
Assessment procedures	› *At the end of the initial two-week intensive session the students give an oral presentation of an experimental paper in Neuroscience* (80%). › *Grading is also based on the oral and written assignments that take place during the course (20 %).* *One re-sit is allowed*
Prerequisites	› *Students should possess a Bachelor's degree (180 ECTS) or equivalent diploma in biology, biochemistry, biomedical sciences, medical studies, pharmacy, cognitive sciences or psychology.* › *A proven interest and solid basic knowledge in the field of neuroscience must be provided by students with a Bachelor degree in another subject (chemistry, physics, mathematics, computer science).* › *Language prerequisites: B1 level in English (Common European Framework of Reference for Languages), independent user, intermediate level*
Other information	› *Maximum number of students: 20* › *Selection procedure: send application file with CV, all previous transcripts and cover letter to the course coordinator* › *Selection criteria: excellent grades and/or other study results, high motivation, adequate prerequisites*

Please note that the number of places available may be limited for certain classes.

> Human Sciences

Discipline	*International Track*
Course title	*Intercultural communication and diversity studies (International track 1)*
Code	*Optional course*
Date start Date end	› *September* › *December*
Course coordinators Contact details	› *Laüra Hoskins: laura.hoskins@u-bordeaux.fr* › *Thibault Marthouret: thibault.marthouret@u-bordeaux.fr*
Additional contact	*Chrystel Lartigau (secretary): chrystel.lartigau@u-bordeaux.fr*
Mode of delivery	*Blended learning: face-to-face teaching with distance learning*
Level	*Bachelor / semester 3 or 5*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Disciplinary learning objectives:* › *Exploring the theme of "diversity" using human science methodology* › *Designing an interview questionnaire* › *Leading an interview* › *Exploring storytelling and personal narrative* *Language learning objectives:* › *Leading an interview* › *Interacting in an international environment* › *Reflecting on one's practice and giving feedback to peers* › *Oral presentation skills: designing and presenting visual aids, using strategies that enhance oral communication (hedging, signposting, storytelling, reformulating, recapping, defining…)* *Cross-disciplinary learning objectives* › *Collaborating within a interpersonal framework on a group project* › *Developing intercultural awareness and literacy*

Content	*Intercultural communication and diversity studies* › *Diversity in schools* › *Social diversity* › *Narratives of diversity* › *Diversity in the workplace* › *Diversity and institutions* › *Diversity policies*
Methods	› *Classes, seminars (9x 2hour sessions, 1x 3hour session – teaching is delivered on Thursday afternoons)* › *14 hours of English class work* › *4 hours of human science seminars* › *One 3-hour symposium* › *54 hours of self-study (classwork preparation, group work preparation and project-based work)*
Assessment procedures	*Continuous assessment of active learning (50%),* *Final oral presentation (50%)* *Re-sit: oral presentation*
Prerequisites	*B1 level of competence in English* *Basic computer literacy is required*
Other information	*Maximum number of students admitted: 25* *Students selected according to their level in English (language test) and international mobility profile (personal statement)*

Please note that the number of places available may be limited for certain classes.

Discipline	*International Track*
Course title	***Independent project in intercultural and comparative studies (international track 2)***
Code	*Optional course*
Date start Date end	› *January* › *May*
Course coordinators Contact details	› *Claire Schiff, sociology : claire.schiff@u-bordeaux.fr* › *Jacques Pouyaud, psychology : jacques.pouyaud@u-bordeaux.fr*
Additional contact	*Chrystel Lartigau (secretary): chrystel.lartigau@u-bordeaux.fr*
Mode of delivery	*Blended learning: face-to-face teaching, small group work, distance learning*
Level	*Bachelor / semester 4 or 6*
ECTS credit points	*3 ECTS*
Language of instruction	*English*
Description	*Disciplinary learning objectives:* › *Exploring the theme of "diversity" using human science methodology* › *Selecting and analysing interview content* › *Developing an international comparative framework for analysis and presentation of material based on interviews, observation and visual supports* › *Exploiting scientific articles in English to develop analytical framework* *Language learning objectives:* › *Selecting and organizing significant excerpts from Interviews and written material* › *Interacting in an international environment* › *Reflecting on one's practice and giving feedback to peers* › *Oral presentation skills: designing and presenting visual aids, using strategies that enhance oral communication (hedging, signposting, storytelling, reformulating, recapping, defining…)* *Cross-disciplinary learning objectives* › *collaborating within a interpersonal framework on a group project* › *developing intercultural awareness and literacy*

Content	*Intercultural communication and diversity studies* › *Diversity in schools* › *Social diversity* › *Narratives of diversity* › *Diversity in the workplace* › *Diversity and institutions* › *Diversity policies* › *Comparative analysis of international contexts/issues*
Methods	› *Seminars, tutorial, group work (5 hours of full group sessions / 6 hours of half group sessions / 2 hour tutorial on documentary / one half-day of final presentation. Teaching is delivered on Thursday afternoons)* › *6 hours of English language support* › *14 hours of human science tutorial and seminars* › *One half-day symposium on final projects* › *54 hours of self-study (classwork preparation, group work preparation and project-based work)*
Assessment procedures	*Continuous assessment of active learning (50%)* *Final oral presentation (50%)* *Re-sit: oral presentation*
Prerequisites	*B1 level of competence in English* *Basic computer literacy is required*
Other information	*Maximum number of students admitted: 25* *Students selected according to their level in English (language test) and international mobility profile (personal statement)*

Please note that the number of places available may be limited for certain classes.

Anthropology

Discipline	*Anthropology*
Course title	*Construction and Deconstruction of Racial Identity in the US*
Code	*Module CT2 / UE 13: Identity, Memory and Postcolonial Societies*
Duration Date start Date end	*Spring semester* › *January* › *May*
Course coordinator Contact details	*Christine Larrazet* › *christine.larrazet@u-bordeaux.fr*
Additional contact	*Dorothée Ben Raal (secretary)* › *secretariat.ethno@u-bordeaux.fr*
Mode of delivery	*Face-to-face teaching*
Level	*Master course / semester 4*
ECTS credit points	*1.5 ECTS*
Language of instruction	*English*
Description	*This lecture course is one of two modules within the course "Identity, Memory and Postcolonial Societies" that covers critical aspects of identity and memory in the United States and the Caribbean from an anthropological perspective. It is aimed at students studying for the MA in Culture, Politics, and Society.*
Content	*The 12-hour module covers both the history of the United States and of anthropology as a discipline in order to provide an overview of key stages of the construction and deconstruction of the "race" concept and racial identity. It also explores how African American narratives have contributed to rewriting their identity, and the collective memory of slavery. English language support will also be provided in this course.*
Methods	› *Lectures* › *Self-study (classwork preparation)*
Assessment procedures	*Continuous assessment*
Prerequisites	*Students must have completed Year 1 of a Master's degree in Human Sciences or Humanities.*

Please note that the number of places available may be limited for certain classes.