

# Syllabus - Specialty in Biological Engineering and Health systems (GBS) English version





# Syllabus Specialty in Biological Engineering and Health systems

(GBS) S5 (3<sup>rd</sup> year)

Version May 2020

Responsible: Marie Bonnin

€J <sub>A</sub>	English	POLYTECH' ANGERS
	3A / Semester 5	UE 5-1
GBS	28h TD	General Skill

Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Level B2 / CEFR

# **Objectives**:

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction to achieve proficiency in everyday and professional situations.
- Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels groups based on TOEIC practice scores from the TOEIC. A base TOEIC score is required in the final year to graduate as an Engineer.

#### **Programme:**

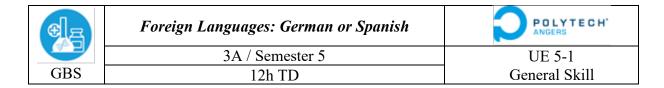
Oral and written communication skills

Looking for a mandatory training experience abroad, writing a cover letter, a CV Communication skills in companies (letters, memos, emails, phone conversations, interviews, etc.)

Current political, economic and social and professional issues Speech and presentation techniques.

Regular pronunciation and accent work.

# **Bibliography:**



Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Basic oral and written communication skills

#### **Objectives:**

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels whenever it is possible. The target for the advanced group is CEFR B2 or C1; A2 or B1 for the intermediate group, A certification in German/Spanish is recommended for advanced students in final year.

#### **Programme:**

Looking for a training experience abroad, writing a cover letter, a CV, an abstract Oral and written communication skills

Communication skills in Companies

Political, economic and social news

#### **Learning outcomes:**

Intermediate groups

- The student can write a CV in German/Spanish
- The student can speak for a few minutes on a topical issue or a topic of personal interest.
- The student can take part in a conversation on simple topics that can be related to his/her personal interests.

#### Advanced groups

- The student can write a cover letter in German/Spanish
- The student can read an article or listen to a program in a standard language and comment on it

#### **Bibliography:**

€J <sub>E</sub>	Company knowledge	POLYTECH' ANGERS
	3A / Semester 5	UE 5-1
GBS	16h TD	General Skill

**Keywords**: corporate functions, legal status, group, social economy, collaborative economy, CSR, business and corporate strategies

Prerequisites: None

# **Objectives**:

#### Discover:

- the main functions in companies
- the diversity of companies
- business and corporate strategies
- corporate social responsibility

# **Programme:**

- I. The main functions in companies
- II. All forms of companies: size, legal status, social economy, collaborative economy
- III. CSR
- IV. Business and corporate Strategies

#### **Bibliography:**

€] <sub>E</sub>	Economics	POLYTECH' ANGERS
	3A / Semester 5	UE 5-1
GBS	12h TD	General Skill

Keywords: market, economic growth, political economics, sharing economy

Prerequisites: none, except interest and curiosity

#### **Objectives**:

- o Understanding the issues of current economic debates
- o Knowing about vocabulary and economic indicators
- o Enrich general knowledge

## **Programme:**

- o Economics challenge (in teams)
- o The basics of economy
- o Economic news and analysis (students' work: report of an article in the economic press)
- o New economic forms

# **Bibliography:**

⊕] <sub>\(\beta\)</sub>	Integration challenge	POLYTECH' ANGERS
	3A / Semester 5	UE 5-1
GBS	26h TD	General Skill

Keywords: Integration, school, collaboration

Prerequisites: None, except interest and curiosity

#### **Objectives:**

1-Sensitize the students to the missions of an engineer

- Engineering approach (problem, solution, context)
- Multi-skills techniques
- Project management (requirements, organization, teamwork ...)
- Creativity & information retrieval
- Highlighting the work done (report & defence)
- 2-Understanding ISTIA training in project mode
  - Playful introduction to lessons in project mode
  - Importance of the multidisciplinarity of Polytech training
- 3-Integrate students and create a dynamic of work
  - Teach students to know quickly
  - Boost the beginning of the year with a unifying event

#### **Programme:**

The students are divided into groups of 5 (coming from all places and enrolled in all specialties: mixed teams). A specification is given to them on Monday morning: a project must be made and functional for Friday (challenge, competition on Friday). Other events come punctuate the week:

- Presentation of the team of their team
- Product promotion poster
- Cooking Tournament
- Integration quizzes

#### **Bibliography:**

€J <sub>E</sub>	Sport or scholastic sponsorship	POLYTECH' ANGERS
	3A / Semester 5	UE 5-1
GBS	12h TD	General Skill

**Keywords:** Teamwork, self-confidence, stress management

Prerequisites: None

#### **Objectives:**

Physical and sports education courses help train future engineers, promote their physical and mental balance, facilitate their integration, strengthen the team spirit and the dynamics of the school. Being able to work as a team, communicate, build relationships of trust, be healthy and resist stress are qualities that are required of future engineers.

The proposed sports activities involve new motor acquisitions, individual and collective strategies, and an adaptation to the effort. These elements contribute to development and are additional assets for their training.

Our missions are to participate in the training of future engineers, to promote the physical and psychic balance of the students, to facilitate the integration of the students of the school, to strengthen the team spirit.

Instead of sport, students who wish to do so can invest in scientific mediation or digital creation programmes in partnership with other schools or universities.

# **Programme:**

These objectives will be developed by practice of collective and individual sports

#### **Bibliography:**

€J <sub>E</sub>	Quality approach	POLYTECH' ANGERS
	3A / Semester 5	UE 5-2
GBS	9h20 CM – 10h40 TD – 5h20 TP	Basic Engineer Training

Keywords: Quality, Standards, Research and document monitoring

Prerequisites: none

#### **Objectives:**

- To introduce the field of quality to the students, to lay the foundations of the understanding of the standards in the various possible fields of application, to transmit the basic methodologies
- To enable students to highlight the role of information in understanding external events and making decisions, to characterize information and to appreciate its quality, and to conduct effective and relevant documentary research

#### **Programme:**

# • Basics of quality

- ✓ Evolution of quality: history and different approaches (quality control, quality assurance, total quality, etc.)
- ✓ Quality Spirit: principles, concepts and definitions, authors
- ✓ Continuous improvement of quality

# • Introduction to the main quality methodologies

Learning of specific vocabulary

# • Introduction to the Process Approach

Introduction to labels and product quality standards (NF, CE etc.) as well as the quality assurance approach (standards, standards and certification).

#### • Research and document monitoring

- ✓ Nature and type of searched information: identification of the need for information with the technical, financial and temporal objectives and constraints
- ✓ Characteristics of the sources of information and their access: documents and files internal to the organization, libraries, documentation centres, data banks, websites
- ✓ Criteria for selecting a document source: relevance, reliability, cost; delay in obtaining information
- ✓ Documentary search tools: indexing engines, thematic directories, meta-engines, logical expression, logical operators

#### Bibliography:

DOUCET Christian La qualité, que sais-je n°2779, Collection que sais-je?, PUF, 2013

COESTIER Bénédicte, MARETTE Stephan, *Economie de la qualité*, Collection Repères, La Découverte, 2004

LEVEQUE, L, La gestion documentaire selon l'ISO 9001, AFNOR, 1ère édition, 2003

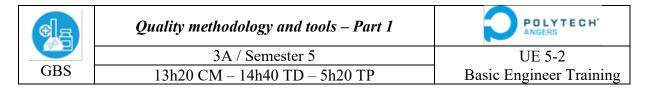
NAOUS Benoît, Construire le système documentaire, AFNOR, 1ère édition, 2004

GILLET GOINARD Florence, SENO Bernard, Réussir une démarche qualité, Paris, Eyrolles, 2009

JUSE, Comment lancer les cercles de qualité, AFNOR GESTION, 1ère édition, 1989

VANDEVILLE Pierre, Gestion et contrôle de la qualité, AFNOR, 2009

ALLAIS Marie-Charlotte, La qualité dans l'entreprise, collection Plein Pot FOUCHER



**Keywords:** Tools of the quality manager, performance checking, continuous improvement

Prerequisites: Quality approach

#### Goals:

To know the fundamental tools regarding quality management

> To treat and master these tools

#### **Programme:**

#### 1) Basic tools of the quality management

- Procedures, recordings, indicators, action plan
- PDCA, Problems solving

# 2) Tools of piloting and animation of the quality

- Identify and analyse situations (SORA, tree of causes 5M, 5P, brainstorming / creativity, QQOQCP, mind maps, functional analysis)
- Plan / pilot: action plan, 8D, PERT, flowchart, communication, visual management
- Decision-making support: PARETO, SWOT vote balanced, matrix of decision,
- Follow / pilot: maps of controls, visual management, action plan, GANT, TRS
- Warn / anticipate: HACCP, AMDEC (seen in the part 2 in the second half-year)
- Research for ideas and improvement: brainstorming, creativity, etc.

## 3) Control of the quality - Quality control

- Model of process (CROSBY), theory and applications
- Measure and steering tools: indicators (of results and process), followed by performance, evaluation, inspection, check, test, auto control ... (Objective 0 defect)
- Control of the skills: training, staking, authorization ... Piloting quality: action/reaction (finishing), communication quality (written, visual ...)

#### 4) Insurance of the quality

- Notions of system of Quality assurance: defined systematic rules
- Documentary Management, reference documents (quality handbook, procedures, index, forms of instructions) and recordings (sheets of statements, reports)
- Plans quality, simulation quality and reliability,

#### Bibliography:

CHAUVEL A-M, Méthodes et outils pour résoudre un problème, 30 outils pour améliorer la qualité dans votre organisation, Dunod, Paris, 1996

GILLET GOINARD Florence, SENO Bernard, *La boîte à outils du responsable qualité*, Dunod, Paris, 2012

ISHIKAWA K, *La gestion de la qualité : outils et applications pratiques*, Dunod, Paris, 2007 CHAPEAUCOU Robert Techniques d'amélioration continu en production, Dunod Parsi 2003

€J <sub>E</sub>	Computer tools	POLYTECH' ANGERS
	3A / Semester 5	UE 5-2
GBS	6h40 CM – 4h TD – 20h TP	Basic Engineer Training

**Keywords:** Office, telephony, oral, written and / or visual communication, expression and information, IT, Information System, MERISE, DBMS, ACCESS, entity association model, MCD, MLD, SAT

**Prerequisites:** The computer bases acquired during the preparatory cycle

#### **Objectives:**

- A presentation of the various communication tools, articulated around the advantages, disadvantages and context of use for each of the tools presented, should enable each student to:
  - o Know how to use the main means of communication
  - Know how to manage the relationship with the different parties, depending on the type of medium and the level of information to be transmitted.
  - o Know how to structure your message in conditions
  - Know how to design & implement an Access Information System using the MERISE method on a concrete example

#### **Programme:**

- Word in situation (mail, CV, cover letter, reports, ...)
  Basic functions of the word processing software
  Formatting of texts and editorial and layout techniques
- Excel (Spreadsheets, databases, ...)

  Getting Familiar with Excel Basic Features Using macros (initiation) Sheet protection Using PivotTables etc.
- Power point
  Basic features and design rules for a slideshow Formatting and animations
- Access
  Familiarization with a Relational Database Management System under a Windows environment (ACCESS) by applying the MERISE method (MCD, MCT, MOT, MOD, MLD, MLT, MPD, MPT) Requests, forms

# **Bibliography:**

Le guide de l'influence. Communication, Média, Internet, Opinion, par V. DUCREY, Ed Eyrolles, 2010

Introduction à Perl : Schwartz R., Phoenix T. et Foy B., Ed O'Relly, 4ème édition, mars 2006 Introduction pratique aux bases de données relationnelles : A. Meier, 2006, Springer 2ème édition Comprendre Merise : Outils conceptuels et organisationnels de Jean-Patrick Matheron Exercices et cas pour comprendre MERISE de Jean-Patrick Matheron

œ g	Control	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	12h CM – 1h20 TD – 9h20 TP	Hygiene and biological risks

Keywords: Control of health products, rheology, mass spectrometry.

Prerequisites: Chemical engineering, mechanics.

**Objectives**: This training should allow the acquisition of basic knowledge in the field of rheological controls as well as providing an indispensable complement in the field of mass spectrometry. Its objective is to train future managers in the control of health, food and cosmetic products.

#### **Programme:**

Mass spectrometry:

- ionization methods,
- ion separation methods,
- detection methods,
- determination of raw formulas,
- coupled techniques.

#### Rheology:

- generalities on the basics of rheology (laminar shear motion, shear stress, strain and shear rate, equation of state and rheograms, viscosities, laminar regime limit and Reynolds number);
- introduction to linear viscoelasticity (elementary models);
- flow behaviour (Newtonian and non-Newtonian liquids, permanent flow deformations in solids, influence of time);
- description of the main rheometers (steady state and transient).

#### Bibliography:

Initiation à la rhéologie : Bases théoriques et applications expérimentales. G. COUARRAZE, J.L. GROSSIORD, N. HUANG, Edition Lavoisier, 2

œ g	Immunological detection	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	12h CM – 2h40 TD – 2h40 TP	Hygiene and biological risks

**Keywords:** Antigens, Epitopes, Immunoglobulines, Antibody, Paratopes, cross reactivity, immunoassay.

**Prerequisites:** Knowledge about immune response (primary and secondary) and Immunoglobulins structure.

**Objectives:** know the main immunological techniques for the detection of antigens and microorganisms, and for the antibody detection particularly in the context of infectious diseases. At the end of the course, student must be able to validate and analyze results from immunological test, taking into account physical-chemistry parameters concerning antigen-antibody interaction.

#### **Programme:**

#### Course and exercise course

Antigen-antibody reaction

Force, affinity-avidity, immunogenicity-antigenicity, valence, linear and conformational antigens.

Monoclonal and polyclonal antibodies.

Obtention, clonality, specificity and purity (immune sera, immunoglobulin fraction, antibody fraction), cross reaction and antigenic community, specificity et selectivity.

Main immunological techniques for the detection and quantification of antigens and antibodies: techniques, use and limitation.

Gel immunodiffusion, agglutination, lateral flow cell, Immunofluorescence, Enzyme-Linked Immunosorbent-Assay (ELISA), Immunoblot, counterimmunoelectrophoresis. Direct and indirect techniques (signal amplification), sandwich, competition or inhibition. Metabolite antigens, somatic antigens, particular antigens, repetitive or non-repetitive antigen, matrix and artefacts. Natural antibodies, recent and longtime immunity, passive immunity.

False positive, false negative (masking, steric effect, zone effect, competition, non-specific interaction), sensitivity, cut-off.

#### Practical course

Do and analyse lateral flow cell, agglutination test and ELISA.

#### **Bibliography:**

Hématologie et Immunologie, Afonso A, Crdp d'Aquitaine, 2006

Principes des méthodes d'analyse biochimique, Audigie C, Dupont G and Zonszain F, Doin, 1992

Immunologie, Kindt TJ, Goldsby R et Osborne B, Sciences sup, Dunod, 2008

CEZARD D, Biotechnologies, Dosages immunologiques: modélisation et interference statistique, Huet S, Ed Immunologie : aide-mémoire illustré, Male D, DE Boeck supérieur, 2005 Immunologie, Male D, Roitt Y, Brostoff J and Roth DB, (7ème edition), Elsevier, 2007

el e	Cleaning and disinfection	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	5h20 CM - 5h20 TD - 9h20 TP	Hygiene and biological risks

**Keywords:** cleaning, disinfection, surface active agents, detergents, antiseptics and disinfectants

Prerequisites: Organic chemistry, fat biochemistry

**Objectives:** Cleaning aims to eliminate macroscopic or microscopic soils from a surface. This is done by using adequate detergents chosen in function of the soil and substrate. It must help the general hygiene of a sanitary establishment, to control the level of microbiological contamination of the environment, materials in a sustainable way.

# **Programme:**

Cleaning and disinfection plan: surfactants, soaps, and detergents Solubilisation, hydrophilic, lipophilic, amphiphilic

Cleaning solvents

Principle of detergent activity

Evidence of superficial tension and the effect of detergents on this physical parameter

Notion of tensioactivity

Application of surface active agents

Evidence of emulsifying and wetting effects

Water hardness and its influence on surface active agent effects

pH and salinity effects on surface active agent effects

Antiseptics, disinfectants
Action mode
Bacteria and resistance
Choices for efficient disinfectants

Main classes of disinfectants and their applications

Bibliography:

Les antiseptiques et les désinfectants : A.Dauphin, C.H Mazin, Edition Arnette, Paris, 1994

Antisepsie et désinfection : J.Fleurette, J.Freney, M.E Reverdy Editions ESKA 1995

œ g	Applied Microbiology	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	13h20 CM – 9h20 TP	Hygiene and biological risks

**Keywords:** food microbiology, hospital hygiene, Microbiology of cosmetics and pharmaceutical products

Prerequisites: General Microbiology, systematic microbiology

#### **Objectives:**

This program is based on three main items. The first one concerns food microbiology, microbial contamination of foods, food poisoning and laboratory tests used in food microbiology. The second part of the program is linked to hospital infections and methods used to prevent transmission in healthcare centres.

The contamination of cosmetics or pharmaceutical products and techniques used in routine to guarantee their safety are the third target of the program.

#### **Programme:**

- Food microbiology, food poisoning, Microbiological analysis of foods.
- Hospital infections: infections linked to healthcare activities and their prevention.
- Microbiology of cosmetics and pharmaceutical products: challenge test; detection of endotoxins,...

#### Bibliography:

Microbiologie alimentaire par C.M. Bourgeois et coll. Ed Lavoisier/ Tec et DOC 1996 Microbiologie alimentaire par Joseph Pierre Guiraud – Ed DUNOD 2012 Hygiène hospitalière : Nicole Maty et coll. 2010

œ g	Risks and infectious agents	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	9h20 CM – 9h20 TP	Hygiene and biological risks

**Keywords:** systematic bacteriology, Gram positive and negative cocci, Enterobacteriaceae, Campylobacter, Pseudomonas, Listeria, Spore forming gram positive bacilli

Prerequisites: knowledges in General Microbiology

**Objectives:** This teaching is focused on the study of bacteriological properties and the physiopathology of some microorganisms found in healthcare centres, in agri-food, cosmetic or in pharmaceuticals industries.

Practical laboratory techniques will complete the program by training the students on how to take samples, choose the best analytic methods for the identification of bacteria

## **Programme:**

Systematic bacteriology Identification of bacteria Methods in microbiological analysis: from sampling to identification

## **Bibliography:**

Microbiologie générale et appliquée par jean FIGARELLA et coll. Edition LT Jacques Lanore Bactériologie médicale : Techniques usuelles par François Denis, Ed : ELSEVIER/Masson 2016

Microbiologie Luciano Paolozzi et coll. Ed DUNOD 2015

œ g	DNA Technology	POLYTECH' ANGERS
	3A / Semester 5	UE 5-3
GBS	12h CM – 10h40 TD – 12h TP	Hygiene and biological risks

Keywords: DNA, cloning, Restriction enzymes, hybridization

Prerequisites: Knowledge of the structure and function of the nucleic acids

**Objectives:** To acquire a theoretical knowledge and practical basic tools allowing to manipulate and to analyse nucleic acids

## **Programme:**

#### • Lectures:

Restriction enzymes

Modification enzymes

Cloning vectors and molecular cloning methods

cDNA and genomic libraries

Hybridization technologies (Southern blot, northern blot)

#### • Practical:

Cloning of a DNA fragment, analysis of recombinant plasmids by restriction and/or PCR

# **Bibliography:**

Molecular Biology of the Cell (4th edition) de B. Alberts, A. Johnson, J. Lewis, M. Raff, K.Roberts et P. Walter. Garland Science, 2002

Molecular Cell Biology (4th edition) de H. Lodish, A. Berk, S L. Zipursky, P. Matsudaira, D.Baltimore, and J. Darnell. Editons W. H. Freeman, 2000

€] <sub>E</sub>	Applied studies	POLYTECH' ANGERS
	3A / Semester 5	UE 5-4
GBS	32 h TD	Project

Keywords: Quality management, project management, teamwork

Prerequisites: Project management methodology, quality approach and quality tools

#### **Objectives:**

Have students work in small groups (3-5 people) on case studies with a practical, mostly professional, scope.

Implement a quality approach

Using project management tools

This project allows the student, over a period of several months:

- To get involved in group work
- To discover the world of the company (contact, visit of companies, etc.)
- To use his knowledge and skills in a transversal way
- To implement methodologies adapted to the problem of the project
- To use his analytical and synthesis capacities, in particular in the writing of the report and during oral defence
- To deepen a topic or better know a sector of activity
- To meet specific objectives to each year during the curriculum

Each specific objective is in addition to the objectives of previous years.

# **Programme:**

The project runs throughout the year (S5 and S6)

In the first year of the engineering cycle, the applied study project deals specifically with an issue related to quality, hygiene, safety or the environment.

During this project, the group should use the tools of quality management and project management in order to carry out its study. It is invited to implement a quality approach.

These projects lead students to propose ways of improvement, most of them organizational, in order to optimize the functioning of a service or the effectiveness of an action in one of the aforementioned fields.

Each group is accompanied by a university tutor and possibly by a professional tutor.

Topics are given by teachers.

The project leads to the writing of a report as well as an oral defence

#### **Bibliography:**

Specific to each topic

el <sub>e</sub>	Project knowledge and management	POLYTECH' ANGERS
	3A / Semester 5	UE 5-4
GBS	10h40 CM – 21h20 TP	Project

**Keywords:** Project management, team management, expense plan, deadlines, needs expression, survey, sampling, counting

**Prerequisites:** Methods of documentary research

#### **Objectives:**

Accompany students to carry out their applied study project.

To present the means of acquisition of the primary information taking into account the nature of the sought information and the context in which the information is search.

At the end of the training, the student must be able to:

- ✓ master the methods and tools of project management
- ✓ take into account the organizational and human aspects of the project/production or project/company relationship
- ✓ recognize the different techniques of data collection and know how to use them wisely
- ✓ carry out a questionnaire survey: he must know the different forms of interviews and their rules of implementation

#### **Programme:**

- Organization and representation of a project: method of Work Breakdown Structure
- Processing and scheduling of a project: PERT method; Planning and management of time and delays: GANTT chart; Planning and Resource Management
- Managing the Resource / Delay Relationship
- Project / business relationship
- Computer tools associated with previous methods: project management software
- Management of budgets associated with projects
- Team management group dynamics
- Typology of surveys and techniques for collecting primary data (questionnaire, interviews)
- Sampling methods
- Development and administration of a questionnaire or interview guide
- Use of data collected during the survey (Counting using a survey analysis software (SPHINX) Analysis Reporting)
- Use of survey processing software (SPHINX)

#### Bibliography:

GIARD Vincent *Gestion de projet*, Economica, 2004 MOINE Jean-Yves, *Manuel de gestion de projet*, AFNOR, 2008



# Syllabus Specialty in Biological Engineering and Health systems

(GBS) S6 (3<sup>rd</sup> year)

Version May 2020

Responsible: Marie Bonnin

el <sub>A</sub>	English	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	20h TD	General Skill

Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Level B2 / CEFR

#### **Objectives:**

• Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction to achieve proficiency in everyday and professional situations.

• Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels groups based on Toeic practice scores from the TOEIC. A base TOEIC score is required in the final year to graduate as an Engineer.

#### **Programme:**

Oral and written communication skills

Looking for a mandatory training experience abroad, writing a cover letter, a CV Communication skills in companies (letters, memos, emails, phone conversations, interviews, etc.)

Current political, economic and social and professional issues

Speech and technical presentation.

Regular pronunciation and accent work.

#### **Bibliography:**

el <sub>A</sub>	Foreign Languages: German or Spanish	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	16h TD	General Skill

Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Basic oral and written communication skills

#### **Objectives:**

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels whenever it is possible.

The target for the advanced group is CEFR B2 or C1; A2 or B1 for the intermediate group, A certification in German/Spanish is recommended for advanced students in final year.

#### **Programme:**

Looking for a training experience abroad, writing a cover letter, a CV, an abstract Oral and written communication skills

Communication skills in Companies

Political, economic and social news

#### **Learning outcomes:**

Intermediate groups

- The student can write a CV in German/Spanish
- The student can speak for a few minutes on a topical issue or a topic of personal interest.
- The student can take part in a conversation on simple topics that can be related to his/her personal interests.

# Advanced groups

- The student can write a cover letter in German/Spanish
- The student can read an article or listen to a program in a standard language and comment on it.

#### **Bibliography:**

€J <sub>E</sub>	Communication	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	5h20 CM – 17h20 TD – 1h20 TP	General Skill

Keywords: Presentation, internship report, poster, intercultural, Professional Student Project

Prerequisites: Note

#### **Objectives:**

- Present a synthetic work experience
- Write an internship report
- Create a poster
- Stakes of the intercultural
- Adapt to the communication profile of the contact person
- Engage in an active approach of choice of orientation
- Discover the sectors of activity and socio-economic realities
- Develop a critical attitude towards the information gathered

#### **Programme:**

# **Professional Student Project**

Discovery of the sectors of activity and functions concerned

- Conducting business documentary research
- Learn to contact professionals
- Meet with professionals
- Analysing collected information
- Evolving career choices

#### **Communication strategy**

- 1 / Definition of communication objectives
- 2 / Identify targets
- 3 / Position yourself in your environment
- 4 / Formulating the message
- 5 / Analyse the human and financial resources of your company
- 6 / Define appropriate means of communication.
- 7 / Establish communication plan

#### Bibliography:

- L. Bellenger, Etre constructif dans les négociations et les discussions, Entreprise Moderne d'Edition, 1984.
- A. Da-Silva, Savoir se présenter efficacement, Kindle, 2012.
- M.I. Laborde, *Ecrire un rapport de stage*, Mémo 122, Seuil, 2012.
- B. Lebelle, L'art des présentations power point, Broché, 2012.
- P. Morin, Organisation et motivations, les éditions d'organisation, 1989.
- P. Oléron, L'argumentation, Presses universitaires de France, 1987.
- W. Ury, Négocier avec des gens difficiles, Paris, Le Seuil, 1990.
- BRESSY Gilles, KONKUYT Christian, Management et Economie des entreprises, 10ème édition, Collection Aide Mémoire, SIREY, 2011

€J <sub>E</sub>	Entrepreneurship	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	12h TD	General Skill

**Keywords:** Entrepreneurship, intellectual property, intrapreneurship.

Prerequisites: None

## **Objectives:**

- ✓ Discern the entrepreneurial spirit, the passion of entrepreneurs, their need to create and innovate and their orientation towards action
- ✓ Propose entrepreneurial projects
- ✓ Implementing creativity and monitoring methods
- ✓ Building a CANVAS business model

## **Programme:**

This introductory entrepreneurship course aims to develop the student's sense of initiative and entrepreneurial spirit, so that he or she can discover and exploit his or her full entrepreneurial potential.

The program takes the student through the entrepreneurial process. Students are led to discover the process of creating a business: from the creation of the idea to commercialization. This course integrates the concepts of industrial property: trademarks, designs and patents.

The notions are approached through the construction of a virtual company that the students will build based on the methods of creativity, the construction of a CANVAS business model and the creation of the identity and values of the company to be built.

#### **Learning outcomes:**

The student is expected to identify the stages of an activity creation and to be able to organize a process from the idea to the realization of his entrepreneurial project.

The student must understand the issues involved in intellectual protection and know the broad outlines of the rules of law that govern any activity in society.

#### **Bibliography:**

BODELL, Richard W., Garry RABBIOR et Larry W. SMITH, Entrepreneuriat - L'esprit d'aventure, Montréal, Les Éditions de la Chenelière, 1994, 35 p. \*

BODELL, Richard W., Garry GASSE, Yvon, et al., PME - Posséder mon entreprise, Vanier, Centre franco-ontarien de ressources pédagogiques, 1998, 281 p.\* GASSE, Yvon, et al., PME - Posséder mon entreprise, (Guide de l'étudiant et guide pour réaliser le plan d'affaires),

JOHNSON, M. W. CHRISTENSEN C.M., KAGERMANN H. Reinventing Your Business Model. Harvard Business Review, Dec 2008

LE LOARNE, S. BLANCO, S. et al., Management de l'Innovation, Ed. Pearson, 2e édition, 2012

RIES E., Lean startup, ed Pearson, 2015, 319p.

el <sub>e</sub>	Management and Accounting	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	24h TD	General Skill

**Keywords**: Balance sheet, assets, liabilities, income statement, expenses, incomes, organizational behaviour, social influence, corporate structures, corporate culture

Prerequisites: None

**Objectives**: To be able to understand the financial information of a business, to understand the human behaviour in the organizations and to meet the requirements to act more effectively in a professional situation

#### **Programme:**

#### Introduction to Organizational Behaviour

- I. Individual characteristics and behaviour
- a. The diversity of individuals in organizations
- b. Individual determinants of organizational behaviour
- II. Groups
  - a. Group pressure or conformism
  - b. Standards in a group
  - c. Group decision-making
- III. The impact of the organizational context on behaviour
  - a. Corporate structure and behaviours
  - b. Corporate culture

#### Accounting

- I. Objectives and means of accounting
  - a. The aims of accounting
  - b. Means of general accounting
- II. The balance sheet and the impact of management options
  - a. Liabilities items
  - b. Assets items
  - c. Major financial balances
- III. The income statement and interim management sales
  - a. Incomes analysis and expenses

#### **Bibliography:**

Alexandre-Bailly F. (coll.): « Comportements humains et management » Ed. Pearson Education, 2006

Crozier M. et Friedberg E: « L'acteur et le système » Ed. Seuil, 1977

Doise W., Deschamps J-C., Mugny G. : « Psychologie sociale expérimentale » Ed. Colin, 1991 Robbins S. et Judge T. : « Comportements organisationnels. »: Ed Pearson, 2011

Schermerhorn JR. Et al. (collectif): « Comportements humains et organisation » Ed ERPI, 2010 Colasse B., Comptabilité générale, Economica, 2000

⊕] <sub>\(\beta\)</sub>	Theatre or scholastic sponsorship	POLYTECH' ANGERS
	3A / Semester 6	UE 6-1
GBS	1h20 CM – 10h40 TP	General Skill

Keywords: Visual and oral communication, expression and behaviour

Prerequisites: None

#### **Objectives:**

Manage the relationship to space, to the other, to the body, to speaking and to listening. Understanding the basics and issues of effective communication

Take a step back from your personal attitude

Adapt to the communication profile of his interlocutor

# **Programme:**

- ✓ Self-confidence, feeling comfortable in oral exercises, mastery of theatrical practices
- ✓ Know how to improvise, react to various situations
- ✓ Be able to master his speech (breathing, articulation, flow, strength of the voice, etc.) and his gesture (holding the body, look, etc.)
- ✓ Know how to communicate, convince and persuade the audience
- ✓ Affirm his personality while knowing how to create in group

#### Means:

- progressive exercises (individual or collective)
- improvisations
- restitution / show in front of the group

Instead of sport, students who wish to do so can invest in scientific mediation or digital creation programmes in partnership with other schools or universities.

#### **Bibliography:**

⊕[ <sub>E</sub>	Evolution of health system and socio-medical cares	POLYTECH' ANGERS
	3A / Semester 6	UE 6-2
GBS	16h CM – 4h TD	Engineer Training

Keywords: Social security system, Heath economics, Functioning of Heath system

Prerequisites: none

#### **Objectives:**

Give general marks to students concerning Heath system in France.

Give general marks to students concerning Europeans Health system.

Understand the management of Heath establishments

Allow and optimized participation during internships and taking office in health institutions

#### **Programme:**

Introduction of the notion of social security and health system

Knowledge of the social security:

- History and evolution
- → Finances and reforms of the Social Security

Introduction to the economy of the health

- → Economic Specificities of the sanitary domain
- Growth and regulation of healthcare costs
- Needs for cares and consumption of medical cares
- → Public Production of cares: economic representation of the hospital sector

Evolution and history of the hospitable system

- → The legal and statutory framework
- ◆ The national strategy of health
- → Administrative and financial functioning of hospitals

#### **Bibliography:**

BARBIER J.C., Le nouveau système français de protection sociale, La Découverte, Paris. 2006 FARGEON V., Introduction à l'économie de la santé, Presses Universitaires de Grenoble, 2009 MAJNONI d'INTIGNANO B., Santé et Économie en Europe, Que sais-je ? n°3620, 5ème édition, Collection Que sais-je ? PUF, 2009

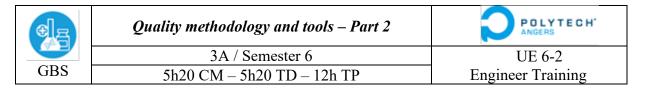
PALIER B., Gouverner la sécurité sociale, Collection Quadrige, PUF 2005

PALIER B., La réforme des systèmes de santé, Que sais-je ? n°3710, 5ème édition, Collection Que sais-je ?, PUF, 2010

PALIER B., La réforme des retraites, Que sais-je ? n°3667, 4ème édition, Collection Que sais-je ?, PUF, 2012

POURCEL P., la Protection sociale, Bréal, Paris, 2006

ROCHAIX L, LE PEN C, GRIGNON M, OR Z, PERRONNIN M, PARIS V, LANCRY P-J et al. *Traité d'économie et de gestion de la santé*. Éditions de Santé ; Sciences Po Les Presses, Paris, 2009



**Keywords:** Tools of the quality manager, performance checking, continuous improvement, HACCP, DMAIC

Prerequisites: Quality approach, Quality methodology and tools – Part 1

# **Objectives:**

- To know the fundamental tools regarding quality management
- > To treat and master these tools
- ➤ Be able to choose the best quality tools in different contexts

# **Programme:**

Discovery and implementation of new tools: HACCP, DMAIC.

Using Excel as part of Quality: Pivot Tables

#### Bibliography:

CHAUVEL A-M, Méthodes et outils pour résoudre un problème, 30 outils pour améliorer la qualité dans votre organisation, Dunod, Paris, 1996

GILLET GOINARD Florence, SENO Bernard, *La boîte à outils du responsable qualité*, Dunod, Paris, 2012

ISHIKAWA K, *La gestion de la qualité : outils et applications pratiques*, Dunod, Paris, 2007 CHAPEAUCOU Robert Techniques d'amélioration continu en production, Dunod Parsi 2003

œl ș	Experimental design	POLYTECH' ANGERS
	3A / Semester 6	UE 6-2
GBS	13h20 CM – 13h20 TD – 4h TP	Engineer Training

**Keywords**: optimisation, industrial studies, research-development, manufacturing process, quality implementation

Prerequisites: statistical knowledge, statistical process control, quality courses, process approach

#### **Objectives:**

- To solve problems of process improvement using experimental and Taguchi design
- To choose an experimental design adapted to a problem

# **Programme:**

Introduction to process improvement Completely randomized design Taguchi design

#### Bibliography:

GOUPY Jacques, *Plans d'expériences*, Techniques de l'ingénieur Traité. Analyse et Caractérisation, 1997

GOUPY Jacques, CREIGHTON Lee, *Introduction aux plans d'expériences*, Dunod, 2006 SADO Gilles, SADO Marie-Christine *Les plans d'expériences : de l'expérimentation à l'assurance qualité*, AFNOR 1991

PILLET Maurice Les plans d'expérience par la méthode Taguchi, Les Editions d'Organisation, 2001

el <sub>e</sub>	Health and environment	POLYTECH' ANGERS
	3A / Semester 6	UE 6-2
GBS	14h40 CM – 6h40 TD – 5h20 TP	Engineer Training

Keywords: Hazard/risk, waste, pollution/pollutants, discharges, toxicology/toxicity

Prerequisites: basics in physic, chemical, biology

**Objectives:** Analyse, understand and provide solutions to the impact of a company's business on the environment.

# **Programme:**

- ✓ Basics of toxicology, assessment of toxicity
- ✓ Hazards and Risk
- ✓ Environment/Health Links
- ✓ Main indoor air pollutants
- ✓ Atmospheric Pollution
- ✓ Risk assessment and rehabilitation of polluted sites
- ✓ Wastes
- ✓ Environmental diagnosis
- ✓ ISO 14001 and OHSAS 18001 certifications
- ✓ ICPE Regulations

# Bibliography:

Communicated by each teacher

el <sub>a</sub>	Bioinformatics	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	8h CM – 9h20 TP	Bio-product technologies

**Keywords:** Molecular biology, computer tools

**Prerequisites:** Knowledge of tools used in molecular biology (DNA technology module)

**Objectives:** This training is intended to give a concrete overview of the computer tool in the field of biology.

- Manage the most used software in bioinformatics
- Compare sequences
- Understand phylogenetic analyses

#### **Programme:**

#### Lectures:

- Presentation of sequences analysis tools
- Presentation of the main sequence comparison and molecular phylogeny programs
- The process of recording a sequence on a database

#### Practical:

- Manipulations of simple programs (restriction maps, pattern search, etc.)
- Comparison between two sequences, between a sequence and a database
- Manipulation of alignment programs (global or local), and multi-alignment
- Manipulation of phylogeny software.

#### **Bibliography:**

el <sub>a</sub>	Biomarkers	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	12h CM – 4h TD	Bio-product technologies

**Keywords:** cell signalling, oncogene, tumour suppressor genes, biomarkers.

**Prerequisites:** cell structure, cell organization and gene expression mechanisms must be known prior to enrolment in the subsequent course to ensure adequate preparation.

**Objectives:** Analyse and understand the scientific process. Understand the molecular and physiological mechanisms of the cell in pathological context. Analyse scientific and clinical studies to understand the new concepts of the modern biology.

#### **Programme:**

There are different kinds of measurable biological characteristics, such as genetic, proteomic, metabolomic, physiologic, in blood or in biopsies. All of them can play a role of indicator of the current statute during biological processes (normal, pathogenic or in response to therapeutic treatment). Since a quarter of century, the progresses in molecular biology encourage scientists to dissect mechanisms initiating disease development. This work allows identifying the emerging of new biomarkers of diagnosis, of toxicity, of monitoring and of anti-cancer treatment efficiency. Therefore, the combination of these markets may determine a target population which responses to a specific therapy and may optimize the treatment evolution until the personal cancer therapy.

The course provides a broad overview of:

- What is the cancer?
- The different mechanisms of carcinogenesis
- What are the conventional treatments against cancer?
- The development of new therapies/biomarkers
- Personal cancer treatments

#### **Bibliography:**

el <sub>a</sub>	Conservation	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	17h20 CM – 9h20 TD	Bio-product technologies

Keywords: Conservation, Stabilization, Degradation, Hygiene, Alimentary security

**Prerequisites:** Conservation part I; Food engineering; Hygiene and microbiological risks, Chemical engineering

## **Objectives:**

- ✓ To comprehend the thermal treatment processes for conservation and stabilization of bioproducts
- ✓ To apply the chemical and food engineering knowledge
- ✓ To master techniques allowing to evaluate the antioxidative properties
- ✓ To comprehend the quantification techniques of preservatives in a bioproduct

#### **Programme:**

Strategies and techniques of conservation of bioproducts:

- Reduction of water availability
- Heat exchanger technologies: theoretical and technological approaches
- Heat treatment
- Cold treatment
- Effect of cold treatment on the conservation of bioproduct

#### **Bibliography:**

€] <sub>E</sub>	Molecular detection	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	10h40 CM - 10h40 TD - 9h20 TP	Bio-product technologies

Keywords: PCR, qPCR, sequencing, pyrosequencing

**Prerequisites:** Knowledge of transcription, genome structure, micro-organisms, DNA technology (UE5.3)

**Objectives:** At the end of the training, the student should have a perfect knowledge of the various techniques of molecular identification of microorganisms and to be able to set a PCR experiment by himself.

#### **Programme:**

#### • Lectures:

PCR: history et principle Classical PCR and Real-Time Quantitative PCR Various sequencing methods (Sanger, Edman) and their applications DNA fingerprinting

#### • Practical:

PCR detection of food contamination, frauds, human DNA fingerprinting

#### Bibliography:

Molecular Cell Biology (4th edition) de H. Lodish, A. Berk, S L. Zipursky, P. Matsudaira, D.Baltimore, and J. Darnell. Editons W. H. Freeman, 2000.

An Introduction to Genetic Analysis (7th edition) de A. JF Griffiths, J. H Miller, D.T Suzuki, R. C Lewontin, and W. M Gelbart. Editions W. H. Freeman, 2000. http://pedagogie.ac-aix-marseille.fr/geniebio/biomol/docs/pcr.html http://frodo.wi.mit.edu/

el <sub>e</sub>	Extraction and purification	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	18h40 CM – 4h TD – 10h40 TP	Bio-product technologies

Keywords: Frontal filtration, Tangential filtration, Distillation

Prerequisites: Process engineering, Chemical engineering

#### **Objectives**:

- Acquire the fundamental and practical basics on separation techniques by filtration and change of state,
- Acquire the practical basics of extraction and dosage of biomolecules by chromatography.

#### **Programme:**

# Separation techniques:

- by change of state: Distillation, Steam drive
- > by filtration: frontal and tangential
- ➤ Chromatographic methods for the determination of biomolecules

#### Applications, presentation of dies:

> The aromatic and medicinal plant sector

#### Extraction Technologies:

- > pressure extraction
- > solvent-based extraction

#### Practical work:

Obtaining different extracts and assaying biomolecules of interest from a complex matrix.

#### Bibliography:

el <sub>e</sub>	Immunotechnologies	POLYTECH' ANGERS
	3A / Semester 6	UE 6-3
GBS	16h CM – 10h40 TD	Bio-product technologies

**Keywords:** Monoclonal antibodies, polyclonal antibodies, coupling/labelling, immunoassay conception

Prerequisites: antigen-antibody interactions, immunoassay tests.

**Objectives:** Know monoclonal and polyclonal antibodies production methods, (glyco)protein coupling/labelling and particle coupling/labelling.

Expanding Knowledge from UE5.3 concerning immunoassay and complementary techniques. At the end of the course, student must be able to design immunoassay to detect antigen or antibody, taking into account each model specificity.

#### **Programme:**

Animal experimentation/testing

Immunisation (T dependent and T-independent, hapten and carrier, synthetic peptid, adjuvants, immunization control)

Monoclonal and polyclonal antibodies (production, screening, amplification, purification, preservation)

Coupling/labelling antigens and antibodies (radioisotopes, biotine, enzymes and fluorochromes, particle/gold/latex/red blood cells-coupling/labelling)

Proteins analysis (electrophoresis), blotting (Western, dot, slot) counterimmunoelectrophoresis, immunoprecipitation

Enzyme Linked Immunosorbent Assay (competitive and non-competitive, homogeneous and heterogeneous phases)

Agglutination active, passive, indirect

Epitope mapping

Immunoassay design: ELISA, agglutination, lateral flow cell

#### **Bibliography:**

Making and Using Antibodies: A Practical Handbook. Howard Matthews GC, Kaser R. CRC Press, 2007

The protein protocols handbook, 2<sup>nd</sup> edition, Walker JM., Humana Press, 2002

The immunoassay handbook, 3rd edition, Wild D., Elsevier 2005.

Monoclonal Antibody Production. National Research Council (US) Committee on Methods of Producing Monoclonal Antibodies. Washington (DC): National Academies Press (US); 1999.

Antibodies, a laboratory manual, Barlow Ed and Lane D (ed), Cold Spring Harbor Laboratory Press, NY, 1988

Guide for the Care and Use of Laboratory Animals. 8th edition. National Research Council (US) Committee for the Update of the Guide for the Care and Use of Laboratory Animals. Washington (DC): National Academies Press (US); 2011.

Immunological techniques made easy, Cochet O, Teillaud JL, Sautès C (Eds), Johna Wiley and Sons Ltd, 1998, Chichester, England

œl ș	Applied studies	POLYTECH' ANGERS
	3A / Semester 6	UE 6-4
GBS	32h Project	Project

Keywords: Quality management, project management, teamwork

Prerequisites: Project management methodology, quality approach and quality tools

### **Objectives:**

Have students work in small groups (3-5 people) on case studies with a practical, mostly professional, scope.

Implement a quality approach

Using project management tools

This project allows the student, over a period of several months:

- To get involved in group work
- To discover the world of the company (contact, visit of companies, etc.)
- To use his knowledge and skills in a transversal way
- To implement methodologies adapted to the problem of the project
- To use his analytical and synthesis capacities, in particular in the writing of the report and during oral defence
- To deepen a topic or better know a sector of activity
- To meet specific objectives to each year during the curriculum

Each specific objective is in addition to the objectives of previous years.

# **Programme:**

The project runs throughout the year (S5 and S6)

In the first year of the engineering cycle, the applied study project deals specifically with an issue related to quality, hygiene, safety or the environment.

During this project, the group should use the tools of quality management and project management in order to carry out its study. It is invited to implement a quality approach.

These projects lead students to propose ways of improvement, most of them organizational, in order to optimize the functioning of a service or the effectiveness of an action in one of the aforementioned fields.

Each group is accompanied by a university tutor and possibly by a professional tutor.

Topics are given by teachers.

The project leads to the writing of a report as well as an oral defence

### **Bibliography:**

Specific to each topic

⊕] <sub>\(\beta\)</sub>	Internship abroad	POLYTECH' ANGERS
	3A / Semester 6	UE 6-5
GBS	Abroad internship – 13 weeks minimum	Internship

Keywords: internship, business situation, operational position

Prerequisites: Analysis of the PPPE and preparation for the internship

# **Objectives:**

The objective of the worker's internship is to allow the student:

- to understand the global functioning of a company or an organization and its environment (social, structural, historical, hierarchical ...),
- to understand the concept of sector and career path,
- to discover the world of work, with real participation in the work of the company or the host organization.

It is important for a future engineer to live on the ground with operators in order to better understand their life in the company, the problems they encounter and how they solve them.

### **Programme:**

- Observation of business life in all its aspects: operational and participating situation
- Pay particular attention to health and safety issues at the workplace as well as environmental aspects where appropriate.

# **Bibliography:**

Specific to each topic



# Syllabus Specialty in Biological Engineering and Health systems

(GBS) S7 (4<sup>th</sup> year)

Version May 2020

Responsible: Sandrine Giraud

el <sub>a</sub>	English	POLYTECH' ANGERS
	4A / Semester 7	UE 7-1
GBS	28h TD	General skills

Keywords: Communication skills, Cross-cultural skills, Professional Environment

**Prerequisites:** Level B2 from the CEFR

# **Objectives:**

- Validating TOEIC minimum score to graduate as an Engineer.
- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

A practice TOEIC test is organized at the beginning of term 7 to set up language proficiency groups for TOEIC Preparation.

### **Programme:**

- Understanding the TOEIC test format and requirements.
- Practising oral and written communication skills.
- Reviewing and Strengthening English grammar skills.
- Regular practise of pronunciation and word stress.
- In company communication situations.
- Current political, economic and social issues.
- Oral proficiency practice.

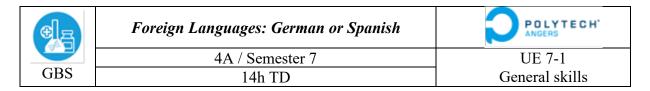
### **Evaluation:**

Continuous assessment (100%)

### **Learning outcomes:**

- The student can speak about a technical issue related to his/her field of expertise.
- The student can infer and understand gist, purpose and details in a spoken document related to a general or technical topic.
- The student can infer and understand gist, purpose and details in a written document related to a general or technical topic.

The student can speak and write in a clear and fairly complex language



Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Basic oral and written communication skills

# **Objectives:**

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels whenever it is possible. The target for the advanced group is CEFR B2 or C1; A2 or B1 for the intermediate group. A certification in German/Spanish is recommended for advanced students in final year.

# **Programme:**

- Oral and written communication skills
- Communication skills in Companies
- Political, economic and social news

### **Evaluation**

100% Continuous assessment

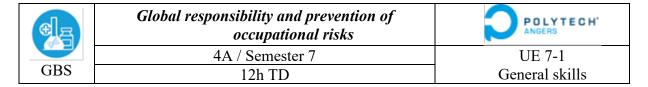
### **Learning outcomes:**

Intermediate groups

- The student can speak for a few minutes on a topical issue or a topic of personal interest.
- The student can take part in a conversation on simple topics that can be related to his/her personal interests.

### Advanced groups

- The student can read an article or listen to a programme in a standard language and comment on it.
- The student can write an abstract and a report in German/Spanish
- The student can make an oral presentation on professional topics
- The student can argue and justify his/her point of view fluently



**Keywords:** occupational health and safety, occupational risks, ergonomic, occupational psychology, musculo skeltal disorder, psychosocial risks, single document

Prerequisites: Business organization, rules and regulation

# **Objectives:**

This module is constructed on the base of the referential BES&ST «Bases Essentielles en Santé et Sécurité au Travail» formalised in 2005 (Inrs). It is intended to give to any future engineer essential skills in order to integrate occupational hygiene within all of his/her professional activities.

# **Programme**: Tutorials

- Practice and study on concrete cases based on videos, photos and if possible roleplaying, evaluation of working situations (human and technical)
- Calculation, analyses and interpretationion of occupational hygiene indicators
- Analysis of the different dimensions of an occupational accident : causal tree method
- Identification and risks assessment : « unique document » construction and action plan

### **Evaluation:**

100% Continuous assessment

Learning outcomes: Integration of occupational hygiene in its professional activity

• Identify in any working organization the human, social, economic and legal issues of occupational hygiene

Regulatory and normative context, responsibilities

Internal and external actors of occupational hygiene

Occupational hygiene indicators and sources of information

• Integrate occupational hygiene in the management of its activities and projects

Vocabulary and definitions - Identify hazardous situations

Take into account the human factor at work including physical, physiological, cognitive and psychological dimensions, and the working reality

Identify et assess risks: a priori and a posteriori

Ergonomics, tools and methods

« Unique document » for risks assessment: methods and issue

Risks prevention – Prevention principles

• Contribute to occupational hygiene management

Occupational hygiene management and integrated management system, management commitment

Safety culture - Reflection on Lean Management: which issue for health at work?

### Bibliography:

Sources d'information en santé et sécurité au travail, L. Laborde, B. Berlioz, M. Ferreira, *Techniques de l'ingénieur, collection Sante et sécurité au poste de travail, article se3950*, octobre 2008.

- <u>Le guide de la sécurité au travail Les outils du responsable</u>, B. Péribère, *Ed. AFNOR*, 218 p., 2013.
- www.inrs.fr; www.anact.fr; www.travail-et-securite.fr

ela A	Communication	POLYTECH' ANGERS
	4A / Semester 7	UE 7-1
GBS	20h TP	General skills

**Keywords:** Professional project, curriculum vitae, cover letter, meeting animation

Prerequisites: French language written and spoken

# **Objectives:**

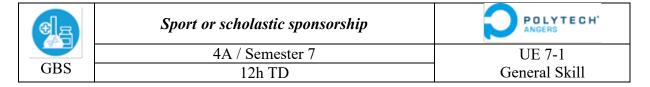
- Preparing for job search
- Meeting and group animation

### **Evaluation**:

100% Continuous assessment (50% oral checks and 50% written tests)

# **Bibliography:**

- L. Bellenger, *Etre constructif dans les négociations et les discussions*, Entreprise Moderne d'Edition, 1984.
- V. Billaudeau, Le recrutement : quelles pratiques actuelles ?, Julhiet Editions, 2012.
- M.J Chalvin, *Prévenir conflit et violence*, Paris, Nathan, 1996.
- S. Milgram, Soumission à l'autorité, Calman Lévy, 1974.
- R. Mucchielli, *La conduite des réunions: Les fondamentaux du travail en groupe*, ESF éditeur, réédité, janvier 2016.
- P. Morin, Organisation et motivations, les éditions d'organisation, 1989.
- P. Oléron, L'argumentation, Presses universitaires de France, 1987.
- C.Papetti, B. Dogor Di Nuzzo, Un CV réussi!, Ellipses, 2016.
- D. Pérez, Le guide du CV et de la lettre de motivation, Solar, 2014.
- W. Ury, Négocier avec des gens difficiles, Paris, Le Seuil, 1990.



# **Keywords:**

Teamwork, self-confidence, stress management

# **Prerequisites:**

None

# **Objectives:**

Physical and sports education courses help train future engineers, promote their physical and mental balance, facilitate their integration, strengthen the team spirit and the dynamics of the school. Being able to work as a team, communicate, build relationships of trust, be healthy and resist stress are qualities that are required of future engineers.

The proposed sports activities involve new motor acquisitions, individual and collective strategies, and an adaptation to the effort. These elements contribute to development and are additional assets for their training.

Our missions are to participate in the training of future engineers, to promote the physical and psychic balance of the students, to facilitate the integration of the students of the school, to strengthen the team spirit.

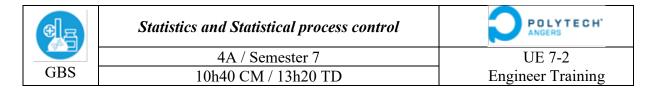
Instead of sport, students who wish to do so can invest in scientific mediation or digital creation programmes in partnership with other schools or universities.

# **Programme:**

These objectives will be developed by practice of collective and individual sports

# **Bibliography:**

Communicated by teachers



Keyword: Statistics, Quality diagnosis, continuous improvement, SPC tools, control charts

**Prerequisites:** Statistical tools

### **Objectives**:

- To know statistical tools dedicated to biology
- To know SPC basics and tools and measure technical and human aspects
- To use SPC as a tool to monitor the performance of a process and improve quality

### **Programme:**

- Statistics dedicated to biologu
- SCP

### Introduction

# **Organisation**

Methods, Process selection, product, variable data

Measure the performance of a process: Supply chain capabilities

# Monitoring and management of industrial process

Control charts

Self-control approach

### **Evaluation**:

100% Continuous assessment

### Bibliography:

PILLET Maurice, Appliquer la maîtrise statistique des processus MSP/SPC, Editions d'Organisation 2005

€ A	Conditionning and packaging	POLYTECH' ANGERS
	4A / Semester 7	UE 7-2
GBS	10h40 CM / 9h20 TD	Engineer training

**Keywords**: conditionning, packaging, regulation, sustainable development, packaging conception

**Prerequisites:** Basic notions on chemistry and biology, on conservation and conditioning, basic notions on design, innovation and creativity techniques

# **Objectives:**

- To be able to define all the functions expected for a product packaging
- To be able to purpose solutions to improve packaging

# **Programme:**

# • Packaging: functions and design

Functions of packaging and consumer expectations regarding the parckaging Specifications of a packaging

# • Packaging / product compatibility

The different types of exchanges and the associated risks. Regulatory aspects Tests and measurements

# • Technological aspects of packaging

The different packaging solutions and materials (plastics, paper, cardboard, glass, metals, other)

Presentation of the various packaging processes

# • Packaging and environment

Clean packaging: how? Regulatory aspects

### **Evaluation**:

100% Continuous assessment

### Bibliography:

POTHET Jean-Paul, *Emballage et conditionnement. Marketing. Techniques. Mise en œuvre. Qualité. Réglementation*, Paris, Dunod, collection Les Référentiels, 2004 Publications du Conseil National de l'Emballage <u>www.conseil-emballage.org</u>

<b>E</b> EE	R&D, production	POLYTECH' ANGERS
	4A / Semester 7	UE 7-2
GBS	20h CM / 12h TD / 18h40 TP	Engineer training

**Keywords:** Bioproduction, Bioreactor, industrial transposition, production

Prerequisites: None

# **Objectives:**

- To know the various production systems (algae, plants, insect and mammalian cells)
- To be able to conduct fertilizer bioprocesses
- To be able to understand the problems inherent in scale changes and industrial transposition

# **Programme:**

Production in bioreactors

Management of fermentation parameters

Types of bioreactors

Sterility

Biomass production

Production of recombinant proteins in different production systems (algae, plants, insect cells and mammalian cells)

Practical course:

Production of recombinant proteins in prokaryotes and eukaryotes cells and analysis of these productions by immunotechnologies

### **Evaluation:**

100% Continuous assessment

### **Bibliography:**

BioTechnologies, BioProduction, BioMédicaments : Eric Levacher, Instutut des Métiers et des Tecnologies, 2011

€I <sub>E</sub>	Processing - Formulation	POLYTECH' ANGERS
	4A / Semester 7	UE 7-2
GBS	13h20 CM / 13h20 TD / 4h TP	Engineer training

**Keywords:** Galenic formulation, cosmetic formulation, food technology, flow chart analysis

**Prerequisites:** Preservation and stabilisation, Extraction-separation, Controls

### **Objectives:**

- Basic skills on physicochemical in order to understand general rules of formulation
- Understanding the different galenic forms such as liquids, solids, semi-solids and new formulations, which can be developed in different applications
- Be able to define a strategy of formulation, based on the ingredient physicochemical properties and the aim in term of product development
- Integrated approach of the different health product sectors: be able to combine different skills related to product quality control.
- Visit several industrial plants and meet engineers and professionals in different fields of health products

# **Programme:**

### Lectures:

Galenic formulation and methods of control of health products (Anne-Marie Leray Richomme et Frank Boury)

### Tutorials and practical works:

Visit of food, cosmetic and pharmaceutical plants

- Preliminary work for information search on products and process
- Active visits of plants with professionals concerning various aspects
- Analysis within the group to prepare a report and an oral presentation in order to emphasise some key points.

### **Evaluation:**

100% Continuous assessment

# Bibliography:

€J <sub>A</sub>	Conception and Innovation	POLYTECH' ANGERS
	4A / Semester 7	UE 7-2
GBS	10h40 CM / 6h40 TD / 2h40 TP	Engineer training

**Keywords**: Conception, innovation processus, Creativity tools, business, eco-conception et suitable development

Prerequisites: None

# **Objectives**:

- To know and understand creativity process and design of innovative products and services.
- To know the main approaches and the implementation of the engineering tools (analysis of the value, functional analysis, method TRIZ).
- To know the basics of eco-design and sustainable development

# **Programme:**

Design an innovative product or service: main stages

Principles and techniques of creativity, positioning of creativity in design / innovation

Creativity tools: Brainstorming, crushing ...

Group animation in creativity

Scenario using case studies, role-playing

The problem of innovation in design

Innovation Methodology TRIZ

Ecodesign and sustainble development

### **Evaluation:**

100% Continuous assessment

# **Bibliography**:

el <sub>A</sub>	Flow management	POLYTECH' ANGERS
	4A / Semester 7	UE 7-2
GBS	10h40 CM / 10h40 TP	Engineer training

**Keywords**: logistic, production flow, invetory management, value chain, production management

**Prerequisites:** Knowledge of the company (organization, main functions), main notions of production management, project management (project scheduling, control of costs and deadlines, etc.)

# **Objectives**:

Awareness and basic notions on management of logistical flow

- To have notions on the fundamental concepts of management of industrial logistics flows
- To imagine these concepts in different contexts, industrial and sanitary

# **Programme:**

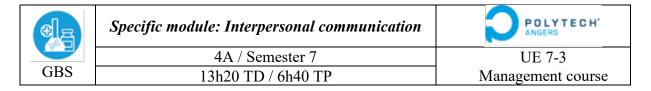
Basic notions and issues that lead companies to manage their flows Organization of logistical flows, financials issues. Knowledge and application on inventory management The flow management in various sectors and processes

### **Evaluation**:

100% Continuous assessment

# Bibliography:

Supplied by the teacher



**Keywords:** Interpersonal communication, group communication, written and visual communication, oral communication, expression and behavior

Prerequisites: Communication tools, communication methodologies

# **Objectives:**

- To Manage the relationship to the Other, to the body, speaking out and listening. To understand basics and issues of an effective communication
- Take a step back regarding his personal attitude
- To adapt to his interlocutor and his communication profile

### **Programme:**

# • Interpersonal communication

Basics of interpersonal communication

Sense-making through communication means and standards (registers of language, verbal and non-verbal signs, standards and rituals)

Sense-making through the actors identity, contexts, influences

Behavior and place in communication: applications and training

### • Group communication

Role of facilitator: Objectives, methods, group management

### **Evaluation:**

None

### Bibliography:

Méthodes de communication écrite et orale – DUNOD, 4ème édition 2013- Michelle

# Fayet, Jean- Denis Commeignes

Theories et pratques de la communication\_ L'HARAMATAN- 2011- Patrice Mbianda, Pierre Mouandjo Lewis

€J <sub>A</sub>	Human resources management	POLYTECH' ANGERS
	4A / Semester 7	UE 7-3
GBS	5h20 CM / 9h20 TD	Management course

**Keywords**: Mobilization of human resources, qualification, jobs, skills, post, GPEC, social assessment, training

Prerequisites: Knowledge of company, organizational management

### **Objectifs**

Awareness on the issues and missions of HR function in companies.

- To know the main issues associated with the mobilization of human resources
- To understand the evolution of the analysis of human resources in a company
- To evaluate the human resources needs

# **Programme:**

# The human resources function

Emergence and development of the HR function Objectives, challenges and missions of HRM Organization of the HR function

# **Mission Overview**

Acquisition of HR

Managing jobs and skills Recruitment and integration

HR Stimulation

Salary

Safety, health and well-being at work

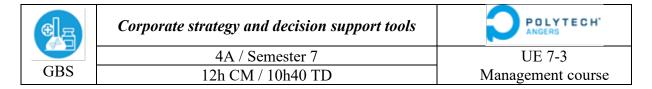
HR Development

Promotion and Career Management Training and skills development Information and communication, social dialogue

### **Evaluation:**

100% Continuous assessment

### Bibliography:



**Keywords**: strategic business management, environment, competitive advantage, strategic marketing

**Prerequisites:** knowledge of company, organizational management, economic and financial management

# **Objectives**:

- To understand the basics of strategy implementation and control
- To learn how to create an innovative company
- To identify strategic areas of activity (DAS) and strategic segmentation criteria
- To perform external and internal analyses for companies (PESTEL, competitive forces analysis, SWOT, barriers to entry, MacKinsey, ADL, BCG matrices) and to evaluate the dynamic competition

### **Programme:**

# Strategic business management

Basics and main concepts of strategic business management

### External and internal analyses

### Strategic tools

PESTEL, Dynamic competition (PORTER), SWOT matrix, BCG matrix, MacKinsey matrix, Value chain (PORTER), CANVAS des projets

### **Evaluation**:

100% Continuous assessment

# Bibliography:

CHANAL Valérie (dir.), Business Models dans l'innovation, pratiques et méthodes, Presses Universitaires de Grenoble, 2011

GARRETTE Bernard, DUSSAUGE Pierre et alii. Strategor, 6ème édition, Dunod, 2013

JOHNSON Gerry, SCHOLES Kevan et alii. *Stratégique*, 9<sup>ème</sup> édition, Pearson Education, 2011

KIM W. Chan, MAUBORGNE Renée, *Stratégie océan bleu : Comment créer de nouveaux espaces stratégiques*, 2<sup>ème</sup> édition Pearson Education, 2010

KOTLER Philip, KELLER Kevin, MANCEAU Delphine, *Marketing Management*, 15<sup>ème</sup> édition, Pearson Education, 2015

LENDREVIE Jacques, LEVY Julien, Mercator, 11ème édition, Dunod, 2014

OSTERWALDER Alexander, PIGNEUR Yves, Business Model nouvelle génération : Un guide pour visionnaires, révolutionnaires et challengers, Pearson, 2011

PORTER Michaël, « How Competitive Forces Shape Strategy », *Harvard Business Review*, mars-avril 1979

PORTER Michaël, « The Five Competitive Forces That Shape Strategy », *Harvard Business Review*, janvier 2008, p. 78-93

el <sub>A</sub>	Risks assessment	POLYTECH' ANGERS
	4A / Semester 7	UE 7-3
GBS	22h40 CM / 9h20 TD	Management course

Keywords: Risks assessment, Health information system

Prerequisites: None

# **Objectives:**

• To know the health information systems and be aware of the associated

• To be able to identify biological and chemical hazards

# **Programme:**

# Risk assessment in health

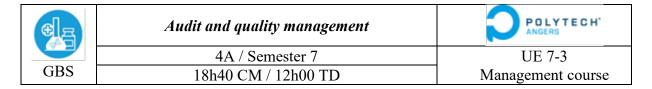
A priori tools, a posteriori tools, risks mapping Prevention programmemes in health care **Biological and chemical hazards Health Information System** Presentation

Associated risks

### **Evaluation**:

100% Continuous assessment

# Bibliography:



Keywords: Audit, standard, non-compliance

Prerequisites: Quality courses (EI3)

# **Objectives**:

• To interpret standard to prepare an internal audit

• To conduct quality audits

# **Programme:**

### Audit and its fundamentals

Definition and related concepts (action plan, non-compliance, indicators...)

Role of the auditor

Preparation of an audit

Audit visite (opening meeting, collect informations, ...)

Report (rédaction d'un compte-rendu,....)

### **Audit in various sectors**

Audit and IFS/BRC standards, audit in industrie cosmetic companies, audit and certification audit in clinical research,

Practical lessons

### **Evaluation**:

100% Continuous assessment

# **Bibliography:**

ela A	Applied studies	POLYTECH' ANGERS
	4A / Semester 7	UE 7-4
GBS	40h Project	Projects

Keywords: Team working, Project management, Project

Prerequisites: Project management, quality courses

# **Objectives**:

- To be able to analyse a problem and to propose innovative concepts ans solutions related to business practices.
- To use project managment tools on an actual project

# **Programme:**

# **Evaluation**:

Continuous assessment

# **Bibliography**:

Related to each project

€J <sub>A</sub>	Professional and Personal Student Project (PPSP)	POLYTECH' ANGERS
	4A / Semester 7	UE 7-4
GBS	6h40h TP	Projects

**Keywords:** Professional and Personal Student Project

Prerequisites: PPSP EI3- professional experience

# **Objectives:**

- To confirm their choice (choice in semester 7 of a training module that will reinforce the students in their choice of career)
- To take stock of his background, his skills, his knowledge and personal characteristics, his professional project and life project
- To validate and confront his choices with the socio-economic reality

# **Programme:**

Identification of his skills Precision his profesional project Anticipating his professional integration

### **Evaluation:**

100% Continuous assessment



# Syllabus Specialty in Biological Engineering and Health systems

(GBS) S8 (4<sup>th</sup> year)

Version May 2020

Responsible: Sandrine Giraud

GBS	English	POLYTECH' ANGERS
	4A / Semester 8	UE 8-1
	24h TD	General skills

**Keywords:** Communication skills, Cross-cultural skills, Professional Environment

**Prerequisites:** Level B2 from the CEFR

# **Objectives:**

- Validating TOEIC minimum score to graduate as an Engineer.

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

Language proficiency level groups are reorganized according to the TOEIC test scores.

# **Programme:**

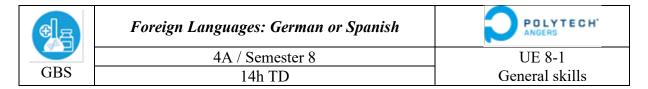
- Practising oral and written communication skills.
- Strengthening grammar skills.
- Regular practise of pronunciation and word stress.
- Communication skills in companies.
- Political, economic and social news
- Presenting industrial projects.

### **Evaluation**:

Continuous assessment (100%)

# **Learning outcomes:**

- The student can speak about a technical issue related to his/her field of expertise.
- The student can infer and understand gist, purpose and details in a spoken document related to a general or technical topic.
- The student can infer and understand gist, purpose and details in a written document related to a general or technical topic.
- The student can speak and write in a clear and fairly complex language.



Keywords: Communication skills, Cross-cultural skills, Professional Environment

Prerequisites: Basic oral and written communication skills

# **Objectives:**

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment

Organization of Language proficiency levels whenever it is possible.

The target for the advanced group is CEFR B2 or C1; A2 or B1 for the intermediate group.

A certification in German/Spanish is recommended for advanced students in final year.

### **Programme:**

Oral and written communication skills Communication skills in Companies Political, economic and social news

### **Evaluation:**

100% Continuous assessment

### **Learning outcomes:**

Intermediate groups

- The student can speak for a few minutes on a topical issue or a topic of personal interest.
- The student can take part in a conversation on simple topics that can be related to his/her personal interests.

# Advanced groups

- The student can read an article or listen to a programme in a standard language and comment on it.
- The student car write an abstract and a report in German/Spanish
- The student can make an oral presentation on professional topics
- The student can argue and justify his/her point of view fluently

€ A	Business Games	POLYTECH' ANGERS
	4A / Semester 8	UE 8-1
GBS	24h TD	General skills

**Keywords:** Challenges, Financial balance, Treasury, profitability, Teams, multidisciplinary

**Prerequisites:** Fundamentals in management, marketing, human resources, R&D, business strategy, inventory management, project management and corporate finance.

# **Objectives:**

In the continuity of the financial analysis course, develop an understanding of the operational and financial management of an international group in a competitive environment that is constantly evolving through the practice of a serious game.

### **Evaluation:**

100% Continuous assessment

Continuous monitoring via enterprise game challenges

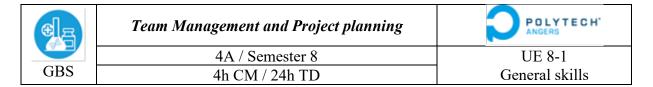
The performance of participants is measured and compared by both operational and financial indicators, including net income, market shares, return on capital, earnings per share, capacity utilization rates and employee productivity.

The overall performance of the teams is measured by the return to shareholders, which consolidates all the key success factors into a synthetic indicator that can be used to compare the teams.

Oral presentation

### **Sources**

Cesim Global Challenges



**Keywords:** Team management, Leadership, Project management, needs analysis, planning, project management and management, project closure and evaluation

Prerequisites: Knowledge of a company

### **Objectives:**

### Team management

- Understand the challenges of «team management».
- Acquire the relational fundamentals within a team.
- Know and develop leadership skills.

# **Project planning**

The objective of this part is to make students aware of the concepts and tools of project management through scenarios, ongoing exchanges with the teacher from the definition and framing of a project, its planning and management until the project is completed and evaluated.

At the end of this course, students will have a better knowledge for:

- Meet project deadlines
- Manage time, quality and resources effectively
- Achieve the objectives set
- Manager the human factor and the different categories of actors involved
- Facilitate teamwork through appropriate communication and common repositories
- Identify and take into account constraints and risks
- Measure the success of the project

# **Programme:**

# Team management

- Leadership Role of the manager Mission- Objectives Values.
- Human and managerial skills of the manager Styles and types of authority
- Motivation Assertiveness.
- Conflict management.

### **Project planning**

### • Needs analysis and project launch

Tools: QQOQCCP, Brainstorming, Ishikawa diagram, SWOT, project mapping, SMART objectives...

### Build and Plan

Tools: WBS, OBS, RACI, planning, decision matrix, backplanning, Gantt, Pert, Eisenhower matrix, risk matrix

# • Driving and Piloting

Tools: dashboards, decision matrix, mind mapping, PDCA

### • Close and evaluate

Tools: closing report (post mortem), Deming wheel

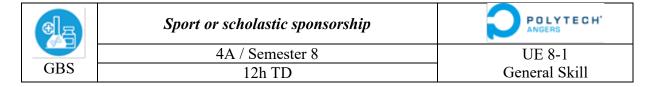
### **Examination:**

100% Continuous assessment situational assessments

# Bibliography:

« Le guide du manager d'équipe » - Jean Louis VIARGUES - Ed. d'Organisation - 2001

- « Encadrer et motiver une équipe » Arthur PELL Ed. les Echos 2000
- « Autodiagnostic des styles de management » Dominique CHALVIN Ed. ESF-EME -1990
- « Management situationnel » Dominique TISSIER Ed. INSEP 2011
- « Motiver ses collaborateurs » Anne BRUCE, James S.PEPITONE Ed. Maxima 2002
- « La dynamique des équipes » Olivier DEVILLARD Ed. d'Organisation 2000
- « Les responsables porteurs de sens » Vincent LEENHARDT Ed. INSEP 1992
- « Le kit du manager opérationnel » Pierre THEPAUT Ed. d'Organisation 1998
- « Le manager est un psy » Eric ALBERT, Jean Luc EMERY Ed. d'Organisation 1998
- « Comment manager son équipe » Denis RIBIERRE Ed. Masson 2002
- « Etre leader » François LAVOIE Ed. SKF -2004
- L'essentiel de la gestion de projet Aim, Roger (Gualino 2016



# **Keywords:**

Teamwork, self-confidence, stress management

# **Prerequisites:**

None

# **Objectives:**

Physical and sports education courses help train future engineers, promote their physical and mental balance, facilitate their integration, strengthen the team spirit and the dynamics of the school. Being able to work as a team, communicate, build relationships of trust, be healthy and resist stress are qualities that are required of future engineers.

The proposed sports activities involve new motor acquisitions, individual and collective strategies, and an adaptation to the effort. These elements contribute to development and are additional assets for their training.

Our missions are to participate in the training of future engineers, to promote the physical and psychic balance of the students, to facilitate the integration of the students of the school, to strengthen the team spirit.

Instead of sport, students who wish to do so can invest in scientific mediation or digital creation programmes in partnership with other schools or universities.

# **Programme:**

These objectives will be developed by practice of collective and individual sports

# **Bibliography:**

Communicated by teachers

€ A	Specific module: Contract Law	POLYTECH' ANGERS
	4A / Semester 8	UE 8-2
GBS	10h40 CM / 6h40 TD	Engineer training

Keywords: work contracts, evidence, effects, European law

Prerequisites: None

# **Objectives**:

- To introduce the main principles of contract law with a comparative perspective between French and European law.
- Highlight the issues associated with the European framework and the implications in terms of French contract law

### **Programme:**

Work Contract : Definition, Classification

Perform a work contract Evidence of the contract Contractual clauses

Effects of a work contract

Effets généraux, Responsabilité contractuelle, Particularisme du contrat synallagmatique European contract law

### **Evaluation**:

100% Continuous assessment

### **Bibliography:**

CABRILLAC Rémy, Droit européen comparé des contrats, Lextenso, 2012

COLLECTIF, Droit de l'entreprise, (remis à jour chaque année) Lamy,

HAUSER Jean, Les contrats, Que sais-je?n°1677, Collection Que sais-je?, PUF, 1992 (1ère édition)

HESS-FALLON B, SIMON A-M, *Droit Civil*, 23<sup>ème</sup> édition, Aide Mémoire Sirey, 2013 PRIETO Catherine (dir.) *Regards croisés sur les principes du droit européen du contrat et sur le droit français*, Presses Universitaires d'Aix-Marseille, 2003

ROUHETTE Georges (dir. Pour la version française) Principes du droit européen des contrats, Société de législation comparée, 2003

VAREILLES-SOMMIERES P (dir.), Le droit privé européen, 2<sup>ème</sup> édition, Economica, 2013 WICKER Guillaume, (dir.) Droit européen du contrat et droits du contrat en Europe – Quelles perspectives pour quel équilibre?, Lexis-Nexis, Collection Colloques et débats, 2008

€J <sub>E</sub>	Marketing	POLYTECH' ANGERS
	4A / Semester 8	UE 8-2
GBS	14h40 CM / 1h20 TD / 9h20 TP	Engineer training

**Keywords**: strategic development, strategic marketing, operational marketing, mix marketing, commercial policy, segmentation, target, positioning, plan of marketing, customer relationship, market survey

Prerequisites: None

### **Objectives:**

The course aims to sensitize students to the « marketing » spirit and its contemporary stakes, and to familiarize them with the approach of marketing including the study of marketing, both strategic and operational.

The course proposed will allow students:

- To understand the basic concepts of marketing,
- To understand the importance of the marketing for companies and consumers,
- To know how to integrate the marketing orientation of a company with its strategic, objectives and its organizational structure
- To be capable of developing a marketing plan.

### **Programme:**

# Discovery of the marketing and knowledge of the market

Definitions, history, marketing approach

Introduction to the concepts of marketing

The market (Levels of analysis of the market, couple market-product, the market and the consumers, the measure of the market, market survey)

# The strategic marketing

External diagnosis

Internal diagnosis

Segmentation, product positioning and targeting

Marketing strategies

### The operational marketing (mix marketing)

The product policy

The price policy

The communication policy

The distributive policy

### **Evaluation:**

100% Continuous assessment

### Bibliography:

DUBOIS Pierre-Louis, JOLIBERT Alain, Le marketing, fondements et pratique, 4<sup>ème</sup> édition, Economica, 2005

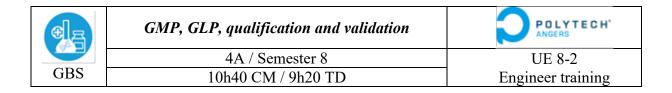
GARRETTE Bernard, DUSSAUGE Pierre et alii. Strategor, 6ème édition, Dunod, 2013

JOHNSON Gerry, SCHOLES Kevan et alii. *Stratégique*, 9<sup>ème</sup> édition, Pearson Education, 2011

KIM W. Chan, MAUBORGNE Renée, *Stratégie océan bleu : Comment créer de nouveaux espaces stratégiques*, 2<sup>ème</sup> édition Pearson Education, 2010

KOTLER Philip, KELLER Kevin, MANCEAU Delphine, *Marketing Management*, 14<sup>ème</sup> édition, Pearson Education, 2012

LENDREVIE Jacques, LEVY Julien, Mercator, 11ème édition, Dunod 2014



**Keywords**: Good practices, Manufacturing process, regulatory requirements, compliance, qualification and validation

Prerequisites: Quality courses (EI3)

# **Objectives**

- To understand GMP and GLP-regulation requirements in Europe and in USA
- To understand the different levels of involvement in the organization of Good Practices: the role of the Study Director, the Management system, the Quality Assurance department...
- To be able to implement a quality system in compliance with the Good practices applied in the industries of the health products.
- To master the qualification and validation rules in the various sectors related to bioproducts (pharmaceutical industries, cosmetics, medical devices ...)

### **Programme:**

# **GMP** (Good manufacturing practices)

GMP in manufacturing and quality assurance Design, conception, qualification, validation, maintenance Specific risks related to manufacturing activities 5M, traceability

Deviation, change, documentation

# **GLP (Good Laboratories practices)**

GLP principles: definition, vocabulary

GLP and quality assurance

Role and responsabilities

GLP studies: « short term », « multi-site », « in vitro »

Inspection / inspection report

documentation

### Qualification and validation

Qualification and validation: process qualifications, systems and equipment qualifications, personal qualification, industrial validation, process validation, IT validation...

Regulatory requirements

Validation Master Plan

Performance of validation and validation protocol

Risk Analysis

DQ, IQ, OQ, PQ and traceability

Change Management

### **Evaluation:**

100% Continuous assessment

### Bibliography:

GLP, Edition OCDE 2006.

**GMP** 

el <sub>A</sub>	Automated systems	POLYTECH' ANGERS
	4A / Semester 8	UE 8-2
GBS	4h CM / 2h40 TD / 7h TP	Engineer training

Keywords: Production tools, Automatism, Quality managment

Prerequisites: None

# **Objectives**:

- To perform and apply technical notions (mechanics, automatism, electricity)
- To be able to perform a functional analysis of an automated production system
- To know how to carry out a quality diagnosis on a production chain
- To be able to discuss with operators and propose feasible technical solutions

### Programme:

# **Technological bases:**

Electricity, Mecanic, Automatism

# Practical courses (Performed at Lycée Chevrollier):

- Packaging workshop:
- Maintenance workshop

### **Evaluation:**

100% Continuous assessment

# Bibliography:

ela A	Water and Environment	POLYTECH' ANGERS
	4A / Semester 8	UE 8-2
GBS	12h CM / 12h TD	Engineer training

**Keywords**: Energy, industrial water, purification, pollutions

Prerequisites: basics in physics, chemistry and biology

# **Objectives**:

To understand the modes of energy supply and the problems of water management in a company. Ecological approach to pollution

# **Programme:**

**Energy supply for companies Industrial Hydrology** 

Affluent

Uses: industrial hot water, cooling water, etc. Industrial effluents and their treatments

Recycling

**Pollution of water** 

Cycles of nitrogen, phosphorus, carbon

Pure water: methods of obtaining, monitoring

### **Evaluation**:

100% Continuous assessment

# Bibliography:



# Health environments and associated risks



4A / Semester 8 20h CM / 29h20 TD UE 8-3.1 PPSP training courses

Keywords: hygiene, safety, risk management, Health information systems

Prerequisites: Risks management (EI4-S7)

# **Objectives:**

- To analyse problems overall related to occupational and environmental risks, hygiene and safety, in particular in the health and social medical sectors
- To understand specificities of health information systems and identify associated risks

### **Programme:**

# Health risk management

Main risks and Risk prevention in hospitals
Hospital hygiene
Sterilization
Legionella risk management
Health information system and associated risks
Managing health information system
Security management of health information system
Security techniques and cybercrime

### **Evaluation:**

100% Continuous assessment

# Bibliography:



### Built environments and associated risks



4A / Semester 8 25h20 CM / 6h40 TD / 8h TP UE 8-3.1 PPSP training courses

Keywords: Bulding, construction

Prerequisites: None

# **Objectives:**

- To know and identify the actors, the context and the issues of the construction sector
- To know regulations for a construction project (accessibility, thermal of the building, airtightness ...)
- To be able to identify various risks in built environments

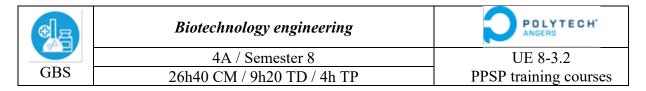
# **Programme:**

Buiding and Health
Lead and emerging risks
Noise
Indoor air
Radon
Abestos: risks and client responsability
High Environmental Quality
Accessibility and security of persons
Legionellosis
Technological risks

### **Evaluation:**

100% Continuous assessment

# Bibliography:



**Keywords**: transcriptomic, proteomic, metabolomic, Mass spectrometry, Chip (DNA or protein), biomarkers

Prerequisites: Bases of mass spectrometry, Biochemistry (Nucleic acid and protein structure)

# **Objectives**:

The aim is to provide a global view of complex problems by addressing large-scale techniques from the "omic" era: from transcriptomics to metabolomics

### **Programme:**

- Large-scale or "omic" analyses and their inter-relationship.
- Data processing and data analysis
- study of the variation of gene expression: transcriptomics and DNA chips
- Mass spectrometry and proteomics
- Protein chips: Principle, development and applications
- Metabolomics

### Practical courses:

Platform visit: Protein chips and Surface plasmon resonance

Use of data analysis software for proteomics

### **Evaluation:**

100% Continuous assessment

### Bibliography:

Interplay of transcriptomics and proteomics, de P. S. Hegde, I. R. White et X. Debouck, Curr. Opin. Biotech, 2003, 14(1): 647-651.

Operomics: molecular analysis of tissue from DNA to RNA to protein, de S. M. Hanash, Clin Chem Lab Med., 2000, 38(3): 805-813.

Transcriptomics, proteomics and interactomics: unique approach to track the insights of bioremediation, de O. V. Singh et N. S. Nagaraj, Brief Funct Genomic, Proteomic, 2006, 4(4): 355-362.

DNA microarrays, de F. F. Bier, M. von Nickisch-Rosenegk, E. Ehrentreich-Förster, E. <u>Reiss</u>, J. Henkel, R. Strhlow et D. Andersen., Mass spectrometry-based proteomics: basic principles and emerging technologies and directions, de S. K. Van Riper, E. P. de Jong, J. V. Carlis et T. J. Griffin, Adv Exp Med Biol, 2013

ela A	Process engineering	POLYTECH' ANGERS
	4A / Semester 8	UE 8-3.2
GBS	18h40 CM / 18h40 TD / 16h TP	PPSP training courses

**Keywords**: Biochemistry and Food Sciences, Process engineering, Formulation of health products

**Prerequisites:** Processing-formulation, Preservation, Controles, Automated systems

### **Objectives**:

- To understand the role of ingredients and additives in food formulation.
- To understand beneficial or detrimental interactions or chemical reactions occurring in food products.
- To understand interactions and benefical or harmful chemical reactions which are involved in food
- To establish relationships between physico-chemical properties of constituents and their main sensory, technological and nutritional propoerties.
- To aquire some expertise on physico-chemical structure and stability of food products
- To put formulation process engineering process knowledge into practice

### **Programme:**

### <u>Lectures and tutorials</u>

- The food constituents
- Food ultrastructure
- Flavours and flagrances and coloring (
- Food formulation case studies and practice
- Process engineering

### Practical work:

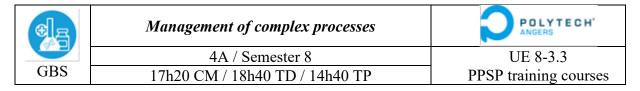
- Formulation of Hygiene and cosmetics products
- Food formulation
- Process engineering

### **Evaluation:**

100% Continuous assessment

### Bibliography:

Supplied by teachers



**Keywords**: Flow management, Supply chain and logistic, clinical research, data management, monitoring

Prerequisites: Flow management (S7 EI4)

### **Objectives:**

- To be able to organize and support the logistics function
- To know how to optimize production and / or distribution logistics
- To be able to identify the actors of the clinical research and implement the monitoring
- To master the clinical research tools (TMF, BI, BP, data management)

### **Programme:**

### Flow management tools

Industrial and business plan, production plan Cold chain, la marche en avant Complexity of the supply chain and logistic

### Management of clinical studies

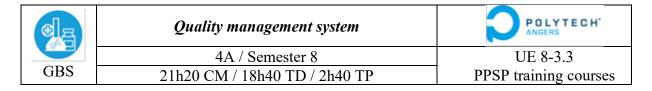
Actors of the clinical reseach, role of a project manager Informed consent MEP visite, monitoring Data management

### **Evaluation:**

100% Continuous assessment

### Bibliography:

Supplied by the teachers.



Keywords: Quality management, continuous improvement, regulations in clinical research

Prerequisites: None

### **Objectives:**

- To implement a process of continuous improvement
- To understand regulatory requirement for clinical trials
- To understand the specificities of private health institutions and to understand health cooperation

### **Programme:**

### Quality management in industry

Direction and quality management

Le lean management and RCA

### Regulatory environment for clinical trials

regulations

Protection of persons Committee (PPC)

Risks management in clinical trials

### Quality management in healthcar facilities

Health care system organization

Management of Hospitalization at home (HAH), health cooperation

User rights

Manage the restoration function and HACCP

### **Evaluation:**

100% Continuous assessment

### Bibliography:

Supplied by teachers.

ela A	Applied studies	POLYTECH' ANGERS
	4A / Semester 8	UE 8-4
GBS	40h project	Project

Keywords: Team working, Project management, Project

Prerequisites: Project management, quality courses

### **Objectives**:

• To be able to analyse a problem and to propose innovative concepts ans solutions related to business practices.

• To use project managment tools on an actual project

### Prsogramme:

### **Evaluation:**

100% Continuous assessment

### Bibliography:

Related to each project

el <sub>a</sub>	Training period	POLYTECH' ANGERS
	4A / Semester 8	UE 8-5
GBS	3-4 months	Training courses

Keywords: professional experience, training period

### **Prerequisites:**

**Objectives**: First experience as engineer in the speciality domain

### **Evaluation:**

100% Continuous assessment



# Syllabus Specialty in Biological Engineering and Health systems

(GBS) S9 (5<sup>th</sup> year)

Version May 2020

Responsible: Jean-Michel Oger

el <sub>A</sub>	English	POLYTECH' ANGERS
	5A / Semester 9	UE 9-1
GBS	16h TD	General Skill

Communication skills, Cross-cultural skills, Professional Environment

### Required:

**TOEIC** validation

### **Objectives**:

- Meeting the requirements of the CEFR (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of international environment
- Good command of oral techniques

### **Programme:**

- Team work skills
- Presenting techniques for the final industrial project presentation (focusing on pronunciation, fluency, idiomatic expressions, etc...)
- Job/internship interview training
- Abstract writing

### **Evaluation:**

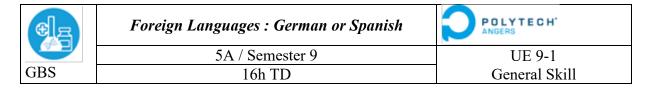
100% continuous assessment (Written and spoken)

### **Learning outcomes:**

The student can carry out a job/internship interview.

The student can make a professional oral presentation on a long-term project (5<sup>th</sup> year industrial project)

The student can write a professional report, an abstract, a professional e-mail and a personal profile.



Communication skills, Cross-cultural skills, Professional Environment, Certification

### **Prerequisites:**

B1-B2 level on listening and comprehension skills

### **Objectives:**

- Meeting the requirements of the CEFRL (Common European Framework of Reference for Languages): oral and written comprehension, oral and written expression, interaction
- Cross-cultural skills: knowledge of German-speaking countries
- Preparation to an external certification

### •

### Programme:

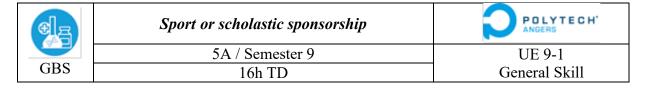
Training placement tests Professional writing (abstract, report, e-mail) Advanced grammar review

### **Evaluation:**

100% continuous assessment Self assessment with placement tests

### **Learning outcomes:**

Running meetings Advanced grammar skills



Teamwork, self-confidence, stress management

### **Prerequisites:**

None

### **Objectives:**

Physical and sports education courses help train future engineers, promote their physical and mental balance, facilitate their integration, strengthen the team spirit and the dynamics of the school. Being able to work as a team, communicate, build relationships of trust, be healthy and resist stress are qualities that are required of future engineers.

The proposed sports activities involve new motor acquisitions, individual and collective strategies, and an adaptation to the effort. These elements contribute to development and are additional assets for their training.

Our missions are to participate in the training of future engineers, to promote the physical and psychic balance of the students, to facilitate the integration of the students of the school, to strengthen the team spirit.

Instead of sport, students who wish to do so can invest in scientific mediation or digital creation programmes in partnership with other schools or universities.

### **Programme:**

These objectives will be developed by practice of collective and individual sports

### **Bibliography:**

Communicated by teachers

<b>(A)</b>	Employability	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-1
GBS	16h TD	General Skills

Job, employability, hiring, integration, professional watch

### **Prerequisites:**

None

### **Objectives:**

- Provide keys to facilitate the professional integration of students upon graduation
- Define your use profile
- Knowing how to value yourself

### Program:

- 1.Prospective method
- . positioning of Polytech Angers students in terms of evolving trends
- . projections
- 2. The keys to integration into a team:
- . know yourself and have clear objectives to communicate
- . exchange of experiences on the fundamentals (codes, social life...)
- 3. Focus on skills
- . Evaluation of the individual skills of his speciality based on the expectations of the CTI
- . Convince in 3 minutes for an integration (professional or project)
- 4. Digital identity
- . Digital capsule to know everything
- . Audit of your online presence to be ranked at the top of the search list

### **Examination**:

100% continuous assessment

- <u>Stéphanie Assante</u>, Les 16 grands types de personnalité Le MBTI, Dangle Editions, 17 octobre 2012.
- <u>Christophe BLAZQUEZ</u>, <u>Samir ZAMOUM</u>, <u>Développez votre identité numérique</u>, <u>GERESO ÉDITION</u>, 2019.
- Axelle Larroumet, « Quels talents! », Ed. Diagonart, 2012.
- Isabelle Rouhan en collaboration avec Clara-Doïna Schmelck, Les métiers du futur, First éditions. 2019.

el <sub>A</sub>	Employment law	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-1
GBS	8h CM, 8h TD	General Skills

Labour code, employment contract, Collective Agreements, justice

### **Prerequisites:**

None

### **Objectives:**

- Knowing labour law is essential; either you are worker or employer. Nobody can ignore it.
- Labour legislation is in constant discussion. It is therefore important to understand the legal, economic and social issues

### **Programme:**

- Introduction to labor law
- Justice in labor law
- Labor Inspections
- Job offer and maintenance
- The employment contract (from the signature to the termination of the employment contract)
- The rights and duties of the parties (employee / employers)
- Union representatives
- Payroll and exam preparation
- The 2020 novelties

### **Evaluation:**

100% continuous assessment

Table examination with practical case

### **Learning outcomes:**

The student has understood the meaning of law and is able to read and understand a court decision

- Code du travail, ed.Dalloz
- RAY Jean-Emmanuel, « Droit du travail, Droit vivant 2017 », Ed Liaisons,  $25^{\rm \grave{e}me}$  édition 2016

œ E	Project costs mastering	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-1
GBS	4h CM, 12h TD	General Skills

**Keywords**: Market, investment, budget, cost

### **Prerequisites:**

Financial analysis

### **Objectives:**

Be able to calculate the financial profitability of an industrial project and to monitor and control the costs of this project.

### Program:

- Part 1 : Analysis and diagnosis
  - external environment : the PESTLE model
  - industry : the PORTER strenghts
  - market: the SWOT and the success factors analysis
  - firm: the SBU and the BCG matrix
- Part 2 : Investment
  - fundamentals
  - actualization
    - NPV
    - IRR
- Part 3 : Budget and financing plan
  - budget
    - definition and utility
    - building
    - operations vs cash flow
  - financing plan
    - operational cash flows
    - funding
- Part 4 : Costs and profitability
  - full costs
  - partial costs
    - variable costs
    - fixed costs
  - break even

**Examination :** Continuous assessment (100%)

- Stratégique Gerry JOHNSON, Kevan SCHOLES, Frédéric FRERY Ed. PEARSON (10ème édition) 2017
- Contrôle de gestion DCG 11 Manuel & applications Ed. Dunod 2017
- Décision d'investissement (incertitude et information) P. PIGET Ed. Economica 2019
- Construire et défendre son budget C. SELMER Ed. Dunod 2014

<b>E</b>	Ethics	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-1
GBS	16h TD	General Skills

Societal responsibility, environment, societal issues, company, professions, skills, ethics, quandary, values, training, engineer

### **Prerequisites:**

None

### **Objectives:**

- Integrating the impacts of corporate social responsibility internally and externally
- How to position yourself
- Knowing how to value yourself

### Program:

- 1. Corporate Social Responsibility CSR = an imperative
- . CSR as a management tool in companies
- . tools to involve employees and stakeholders in a CSR approach : CSR to make work more meaningful and innovative.
- 2. The IESF engineer's ethical charter

SPIE. the engineer in society

- . the engineer and his skills
- . the engineer and his job
- . the engineer and his missions
- . comparison with the ethical charter for engineers in Belgium https://www.fabi.be/l-ingenieur-charte
- + an ethics workshop: placing groups of students in a dilemma (per spe + animation)
- 3. Ethics in everyday life

Launching of the actions of your choice: (Specifications + validation of the leads to be carried out)

Follow-up of the actions: (provide a mini specification for each action)

Report on actions: (organize a daily ethics forum where the teams present their work in the appropriate format according to the action and achievements)

- A- . The citizen-engineer's commitment to society: carrying out an "honest engineer" project (organizing a blood donation, promoting artistic skills among children in difficulty, organizing an artistic and cultural week on the theme of "art and science", meeting sick children, running to collect doses of vaccine, etc.).
- B- Being a creative scientist with an open mind and knowing how to question oneself: through the history of technology, the sociology of work and geopolitics, the student is led to weave links between his future profession as an engineer and the associated activities, considered in their historical, sociological and geopolitical context.
- C- . To be a relevant, honest, tolerant and fair professional: zetetic workshop (art of rational doubt). The student is led to confront critical analysis in a concrete way, seeking to distinguish scientific content from pseudo-scientific content, to detect lies with commercial or

propaganda aims, or to prevent the intrusion into the scientific method of ideologies such as racism or creationism.

D- . Being an efficient, vigilant, far-sighted, rigorous and responsive leader: a driving force behind proposals for school and/or training

https://www.innovation-pedagogique.fr/article245.html

### **Examination**:

100% continuous assessment

### Bibliography:

NF ISO 26000 Novembre 2010, AFNOR.



### Management and performance evaluation



5A / Semestre 9 13h20 CM, 17h40 TD UE 9-2 Engineer training

### **Keywords:**

Cost, performance, lean, piloting, evaluation.

### **Prerequisites:**

Project costs mastering module (UE9-1)

### **Objectives:**

The objective of this module is to provide the principles, tools and methods for monitoring and evaluating performance in health sectors and health product industries.

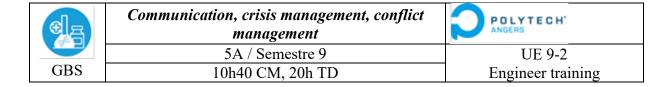
### Program:

Cost of production and management, Improved performance, The tools of monitoring, Lean and visual management Driving health facility performance Medico-economic evaluation in health

### **Examination:**

Continuous assessment (100%)

### **Bibliography:**



Communication, crisis, interpersonal conflict

**Prerequisites :** Lessons from previous years related to management, communication, interpersonal relations...

### **Objectives:**

- Acquire all the organizational methods, techniques and means that enable an organization to prepare itself and to face the occurrence of a crisis and then to learn the lessons of the event in order to improve the procedures and Structures in a forward-looking perspective.
- Knowing how to deal with interpersonal conflicts in a professional situation

### Program:

Conflict management

- Conflicts in groups: definition, types of conflicts, sources, attitudes
- Conflict resolution
- Conflict prevention

Prevention and management of health crisis - study of various emergency plans

- Health crisis management
- RNBC Risk
- White Plan, Blue Plan
- Management of industrial crises

Internal and external communication during a crisis

- Internal communication
- External communication plans and strategies
- Relations with stakeholders

### **Examination:**

100% Continuous assessment

### **Bibliography:**

ela	Change management	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-2
GBS	4h CM, 4h TD, 4h TP	Engineer training

Management and change management, planning, accompaniment, resistance

### **Prerequisites:**

Lessons from previous years related to management, communication, interpersonal relations...

### **Objectives:**

- Acquire all organizational methods, techniques and means that allow an organization to prepare for and cope with change
- Know how to pilot all the dimensions of this change, as manager or project manager
- Understand the stakes and importance of stakeholder involvement in the success of change

### Program:

- Definition, qualification and importance of change in organizations
- Steps for Change
- Human and organizational aspects of change management
- Resistance to change
- Analysis and Case Studies

### **Examination:**

100% Continuous assessment

### **Bibliography:**

ela	Change management	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-2
GBS	8h CM, 1h20 TD, 2h40 TP	Engineer training

Connected objects, health, habitat.

### **Prerequisites:**

### **Objectives:**

Acquire basic knowledge about connected objects and their applications in the areas of health and / or habitat.

### Program:

- Market and use of connected objects,
- Function and technical components of the connected objects (sensors, networks, data processing ...)
- Industrial protection of connected objects
- Application of connected objects in health / habitat

### **Examination:**

100% Continuous assessment

### **Bibliography:**



### Legal and regulatory specificities in health



5A / Semestre 9 26h40 CM, 20h TD, 4h TP UE 9-2 Engineer training

### **Keywords:**

Regulations, healthcare, medical devices, health / building, budget, purchase

### **Prerequisites:**

Lessons from previous years

### **Objectives:**

Acquiring legal and regulatory specificities related to: the management of a health sector establishment or service; the production and distribution of medical devices; the health in the built environment

### Program:

- Legal and Institutional Framework for Health
- Responsibility of health institutions and professionals
- Purchasing regulations in healthcare institutions
- Health Ethics
- Regulation of medical devices
- Medical device risk management
- Regulation in Health / Building
- Development of a drug
- Regulation of pharmaceutical products
- Analysis and case studies

### **Examination:**

100% Continuous assessment

### **Bibliography:**



# Module I: Health Products Quality Management and Regulatory Approach

5A / Semestre 9

9h20 CM, 22h TD



UE 9-3.1 (IIPS option)
Deepening training

### **Keywords:**

Regulations standards, regulations, product development

### **Prerequisites:**

Quality approach & methodology, quality tools Legal and regulatory specifications in the health sector

### **Objectives:**

Lead projects for developing new products abiding by the specific requirements set out in the health sector

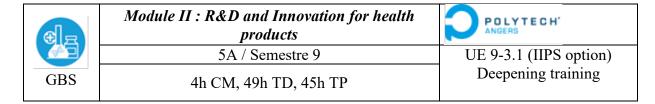
### Program:

- ✓ To analyse health-related reference documents that ensure the management of risks for consumers.
- ✓ To acquire knowledge of the tools used for quality management tools and risk analysis in terms of health products design.
- ✓ To have knowledge of specifics regulations for different health sectors
- food products
- beauty produtes
- dietary supplements
- novel foods
- herbs decree
- ✓ To know labelling rules (to understand and calculate products' nutritional values)

### **Examination:**

Continuous assessment (100%)

### **Bibliography:**



Innovation, Formulation, Physico-chemical caracterization, Sensory analysis

### **Prerequisites:**

Processing-Formulation, Process engineering, Control

### **Objectives:**

- ✓ To understand the innovative formulation technologies and the rules of formulation applied to development of health products
- ✓ To understand the methodologies and techniques for sensory analysis, analytical and physico-chemical characterization
- ✓ To put the formulation technologies into practice

### Program:

### Lectures and tutorials:

- Formulation of solid dosage forms
- Microencapsulation
- Supercritical fluids technologies
- Microfluidic technologies and apllications
- Characterization methods of dispersed systems: Scanning probe microscopy, Granulometric and surface potential analyses, stability and spectroscopy
- Interfacial tensiometry and rheology
- Statistical data processing techniques applied to R&D
- Buisness innovation

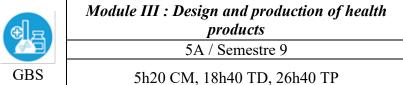
### Practical work:

- Microencapsulation
- Spray Drying and Gelation
- Microemulsion
- Foam formulation

### **Examination:**

Continuous assessment (100%)

### Bibliography:





UE 9-3.1 (IIPS option)
Deepening training

### **Keywords:**

Nutrition, Biochemistry, Food-Health, Dietary supplement, Immunology, Molecular biology, *In vitro* diagnostic

### **Prerequisites:**

Bioproducts technologies, Hygiene and biological hazards, R&D production, Biotchnology engineering, Process engineering, Processing-Formulation, Health Products Quality Management and Regulatory Approach

### **Objectives:**

From the scientific and technological knowledge previously acquired, to be able to mobilize them in order to manage an innovation project and the development of health product in accordance with applicable regulations

### Program:

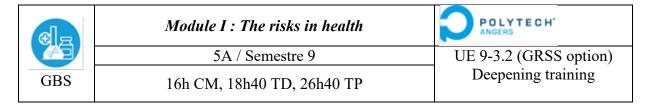
From a concrete problematic, students must:

- To analyze the objectives and the complexity of development project
- To identify scientific and technological barriers, and the associated regulations in the design phase of a product
- To propose plans for developments, improvements and innovation
- To design and manage an action plan
- To put the action plan into practice in order to check the technical feasibility
- To reflect upon the limits of the development project

### **Examination:**

Continuous assessment (100%)

### **Bibliography:**



Sanitary risk, building, health product, chemical risk

### **Prerequisites:**

Module8-3.1 4A GBS: environments of health, built environments and associated risks.

### **Objectives:**

The student has to acquire the necessary knowledge regarding sanitary risks in buildings, in accommodation, in the establishment of health, and the risks connected to the products of health. He has to master the diverse categories of risks, the associated regulations and the state of the art of every tackled issue.

### Program:

- Sanitary Risks in the building:
  - o Lead, asbestos, radon, air inside, noise, molds, wood,
  - o Sanitary Characteristics of building materials,
  - o Management of the unexplained collective syndromes,
  - o Soil remediations ...
- Risks bound(connected) to products / establishments of health:
  - Management of chemical risks
  - o Risks in radiotherapy,
  - o Risks of pandemic,
  - o Management of radioactive waste

**Examination:** 100% Continuous assessment

### **Bibliography:**

- -Coeudevez, C. and Déoux, S. (2011). Bâtiments, santé, le tour des labels. 1st ed. Andorra: Medieco.
- -Collignan, B. (2008). Le radon dans les bâtiments. 1st ed. Centre Scientifique et Technique du Bâtiment.
- -Construire Sain Guide à l'usage des maîtres d'ouvrage et maîtres d'oeuvre pour la construction la construction et la rénovation. (2013). 2nd ed. Ministère de l'Ecologie, du Développement Durable, de l'Energie.
- -Déoux, S. (2010). Bâtir pour la santé des enfants. 1st ed. Andorra: Medieco.
- -Déoux, S. and Déoux, P. (n.d.). Le guide de l'habitat sain. 1st ed. Andorra la Vella: Medieco.
- -Gestion de la qualité de l'air intérieur Établissements recevant du public. (2010). 1st ed. InVS, Ministère de la Santé.
- -KERMAREC, F., HEYMAN, C. and DOR, F. (2017). Diagnostic et prise en charge des syndromes collectifs inexpliqués. 1st ed. InVS.
- -MARCHAND, C. and CARRILHO, H. (2015). Accompagnement de la surveillance obligatoire de la qualité de l'air intérieur dans les établissements d'enseignement, d'accueil de la petite enfance et d'accueil de loisirs. 1st ed. INERIS.
- -Moisissures dans votre logement ?. (2015). 1st ed. CSTB.
- -Prévention du risque amiante dans la gestion du bâtiment. (2012). 1st ed. Ministère de l'Economie, des Finances et de l'Industrie.

Schriver-Mazzuoli, L. (2017). La pollution de l'air intérieur. 1st ed. Dunod.



### Module II: Statutory aspects and audits



UE 9-3.2 (GRSS option)
Deepening training

5A / Semestre 9 12h CM, 32h TD, 8h TP

### **Keywords:**

Audit, regulations, reference table, ISO, methodology

### **Prerequisites:**

Quality approach, tools quality, common-core syllabus on the audit.

### **Objectives:**

At the end of the module II, the student must have understood the diverse stages and the necessary methodology to lead an audit. He must be capable of realizing an audit by himself: determination of the subject, the construction of the railing of audit, animation of the diverse meetings, the document retrieval, the search for proof, analysis of the results, the construction of the audit report, the writing of the conclusions.

### Program:

- Statutory Aspects, requirements of reference tables SSI health.
- Methodology of analysis of the risks in IS security.
- Normalize ISO, risk management.
- Audit: principles, objectives, action plan. Concrete examples with applied cases.
- Analysis of practices

### **Examination:**

100% Continuous assessment

### Bibliography:



### Module III: Integrated risk management



5A / Semestre 9

20h CM, 40h TD, 6h40 TP

UE 9-3.2 (GRSS option)
Deepening training

### **Keywords:**

Risk management, project management, management system, safety, pharmaceutical industry, products of health, human factor

### **Prerequisites:**

Common-core syllabus  $4A / 5A \ GBS$  on the risk management and the quality / quality management.

### **Objectives:**

The student has to understand the stakes and the methods of the risk management in the diverse approached sectors: information system, establishments of health, industry of the products of health. He has to master the concepts and be capable of applying the current proposed tools. He has to be up to date statutory evolutions and recent currents of thought in the domain.

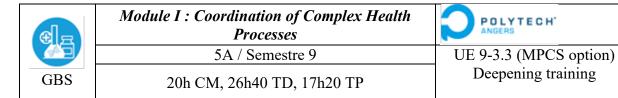
### Program:

- Project management of health information system and risk management, information security,
- Management of the risks in establishment of health,
- Methodology of risk management a priori, a posteriori
- Human factors,
- Crisis management,
- Sanitary Risks and management, indicators,
- Risks in pharmaceutical industry, in food-processing industry.

### **Examination:**

100% Continuous assessment

- Manuel of certification of the establishments of health V2010, in June, 2009, Direction(Management) of the accreditation Orders National of Accreditation and Evaluation in Health, High Authority of Health.
- Manuel of certification of the establishments of health V2010, in January, 2014, Direction(Management) of the accreditation Orders National of Accreditation and Evaluation in Health, High Authority of Health.
- David AUTISSIER Isabelle VANDAN GEON-DERUMEZ Alain VAS Change management: key concepts 50 years of practices stemming from works of the founding authors, published(edited) DUNOD, on 2014
- Martinez, Fabien. The general principles of the quality. ADSP, in June, 2011
- White, Didier. Health and social, the ISO 9001 in your reach(impact). Afnor Edition, 2008, 304p.
- Cattan, Michel. Guides of the processes, let us pass in the practice. Afnor Edition, on 2013
- Gillet Goinard, Florence. The big book of the quality controller. EYROLLES, on 2011, 486p.
- Duck, Fréderic. Quality management. LEXTENSO edition, on 2009, 304p. Roux-Dufort, Christophe. Manage and decide in crisis situation 2nd edition: tools of diagnosis, prevention and decision. 2nd éd. Paris: Dunod, on 2003.



Bio-products industry, clinical trials, health sectors Management, logistics and flow management, specificities of clinical trials

### **Prerequisites:**

Module 8-3.3 4A GBS: Management of complex processes and quality management system

### **Objectives:**

In the different sectors of application,

- coordinating and securing processes
- use the piloting tools wisely
- Managing and coordinating the actors involved

### Program:

Process control in industry and health sectors
Study of support processes (payroll, billing, outsourcing ...)
Transversal management
Tools (5S ...)
Clinical research tools
Project management in clinical research
Vigilances
Tools (imaging, organization of the URC ... ..)
Applications

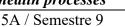
### **Examination:**

100% Continuous assessment

### Bibliography:



# Module II: Global management of complex health processes



UE 9-3.3 (MPCS option)
Deepening training

POLYTECH'

18h40 CM, 40h TD, 4h TP

### **Keywords:**

Bio-products industry, clinical trials, health sectors

Management of production, management and management of human resources, management of clinical research

### **Prerequisites:**

Module 8-3.3 4A GBS: Management of complex processes and quality management system

### **Objectives:**

In the different sectors of application:

- driving performance
- mastering production processes
- control the costs

### Program:

The management of continuous improvement in industry

Performance suppliers, after-sales service, production management tools (CMMS, Just in time, SMED, Kanban ...)...

Clinical research tools

Statistics, Epidata, data management

Pharmacovigilance

Regulatory aspects

Logistical and managerial aspects in clinical trials

**Applications** 

Steering health structures

Governance and strategic management

Financing arrangements

Management and Human Resources Management

### **Examination:**

100% Continuous assessment

### **Bibliography:**



# Module III: Design, evaluation and optimization of complex health processes



5A / Semestre 9

17h20 CM, 36h TD, 4h TP

UE 9-3.3 (MPCS option)
Deepening training

### **Keywords:**

Bio-products industry, clinical trials, health sectors Lean, performance, management, management tools, clinical research tools

### **Prerequisites:**

Module 8-3.3 4A GBS: Management of complex processes and quality management system

### **Objectives:**

In the different sectors of application:

- design and master the tools to make them efficient
- analyse and improve professional practices

### Program:

Lean and Performance
Visual Management
Healthy Lean
Measuring Performance
Practical cases (6 sigma, TRS calculations ...)
Tools and skills of the manager
Reporting, dashboards
Leadership, Values, and Responsibilities
Analysis of practices
Environmental adaptations and continuous improvement
Clinical research tools
Pharmacodynamics, pharmacokinetics, pharmacogenetics
Over cost grids
Medical devices
Applications

### **Examination:**

100% Continuous assessment

### **Bibliography:**

ela	Project	POLYTECH' ANGERS
	5A / Semestre 9	UE 9-4
GBS	100h	Project

Team working, Project management, Project

### Required:

Project management, quality courses

### **Objectives**:

Have students work in small groups (3 to 6 people) on case studies proposed by professionals in connection with the chosen course of study.

### **Programme:**

The project runs over the entire semester 9 and is a kind of thread in the last year of engineering school.

This project is thus an opportunity for the student to deepen knowledge of the sector, the sector or the field related to the subject.

The project must be innovative. The goal is to go through all the stages of conception and realization of a product or a service, from the idea to the turnkey project.

The subjects most often concern the development of a new product or the creation, evaluation or improvement of an action, service or service structure. In both cases, students are encouraged to consider economic and regulatory constraints.

The project leads to the writing of a report as well as an oral defense

### **Evaluation:**

Project report and oral defense

### Bibliography:

Related to each project



# Syllabus Specialty in Biological Engineering and Health systems (GBS) (GBS) S10 (5<sup>th</sup> year)

Version May 2020

Responsible: Jean-Michel Oger

el <sub>a</sub>	Internship	POLYTECH' ANGERS
	5A / Semestre 10	UE 10-1
GBS	5-6 month	Intership

Occupational integration

### Prerequisite:

All lessons from semesters S5 to S9

### **Objectives:**

- Original production in relation to the expectations of the company and more broadly the expectations of the profession
- Occupational integration

### Program:

Internship in company, laboratory or nursery of 5 months minimum or 4 months for research internship

### **Evaluation:**

- Monthly reports, visits by a referent teacher
- Report, oral defense, evaluation of the training supervisor