

**FEDERAL INSTITUTE OF
EDUCATION, SCIENCE AND
TECHNOLOGY**
MATO GROSSO
Campus Cuiabá - Bela Vista

Bachelor's Degree

FOOD ENGINEERING

Classroom mode
EDUCATIONAL COURSE PLAN - ECP

Cuiabá – MT
November/2010

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Luiz Diego Marestoni
Daryne Lu Maldonado Gomes da Costa
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DATES	VERSIONS
16/09/2009	1 st
07/06/2010	2 nd
09/07/2010	3 rd
22/11/2010	4 th

1st Version - Presentation of ECP

Minute 004 Department of Education Collegiate– 16/09/2009

- Final version for submission to the Board (approved as registration of the resolution n. 005 of October 15, 2009).

2nd Version - Alteration of ECP

Minute 002 Department of Education Collegiate– 07/06/2010

- Curriculum change:
 - a) Subject "Applied Informatics" moved to the 1st Semester
 - b) Removal of Subject "Instrumental English" in 2nd Semester
 - c) Workload change of Subject "Instrumental Portuguese" to 34 hours

3rd Version - Alteration of PPC

Minute 003 Higher Education Collegiate – 09/07/2010

- Register of Core Faculty Members of Bachelor's Degree in Food Engineering (NED-EA); Teachers Edgar Nascimento, Carolina Garcia Santos Balbino, Luiz Diego Marestoni, Daryne Lu Maldonado Gomes da Costa and Marco Aurélio Bulhões Neiva;

4th Version - Alteration do PPC

Minute 004 Higher Education Collegiate – 22/11/2010

- Workload change of mandatory Curriculum Contents, and mandatory workloads, Final Project (TCC) and Internship; Adjustment of subject requirements, and referral to the Board of IFMT for evaluation and approval (approved on 20/12/2010).

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1. THE EDUCATIONAL INSTITUTION

1.1 INSTITUTION CHIEF OFFICER

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1.2 INSTITUTION IDENTIFICATION

Identification of the Institution					
Unit:	IFMT Campus Cuiabá Bela Vista				
CNPJ:	10.784.782/0001-50				
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1.3 INSTITUTION MANAGEMENT BODY

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1.4 INSTITUTIONAL PROFILE

The federal network of professional and technological education, whose origins date back in 1909, with the creation of the Apprentices and Craftsmen Schools, currently goes through an unique moment in its history. Aiming to offer free public professional and technological education with quality, the network completed 100 years last year, with the responsibility to contribute to the Brazilian scientific, technological and socio-cultural development, while keeping the its inclusiveness and sustainable character in sight.

Thus, the responsibility it takes for itself in the world of education in society when defining the human development as central target, is intrinsically linked to a work proposal rooted in reality. The federal network of technological education brings within its locus commitment with a diverse population, in different stages of training with more complex life challenges, and citizens feeding very promising life expectations. It is worth noting, however, that by its historical trajectory, these institutions have an identity with the lower classes and work towards emancipation.

The Federal Institute for Education, Science and Technology of Mato Grosso - IFMT - was created through the integration of the Federal Centre of Technological Education of Cuiabá, the Federal Centre of Technological Education of Mato Grosso, the Federal Agrotechnical School of Cáceres and their respective decentralized education units (Campo Novo de Parecis, Bela Vista and Pontes e Lacerda), transformed into campuses of the institute.

Besides the integration of these institutions, four other campuses were also deployed, namely the municipalities of Barra do Garças, Confresa, Juína and Rondonópolis. All campuses reach comprehensively the economic sectors of the agrarian, industrial and technology sectors. They offer courses in accordance with the cultural, social and productive arrangements across the state, focusing on the mechanisms of social inclusion and sustainable development, but also promoting a culture of entrepreneurship and partnerships, supporting educational processes that lead to the generation of employment and income. Next, we present the backgrounds of the campuses that comprise the IFMT since the beginning of its activities until the moment of its transformation to the Federal Institute of Mato Grosso.

The Decentralized Teaching Unit of Bela Vista (UNED - Bela Vista) was created through the governmental Act of Law No. 11.195, of 18th November 2005. Authorized to operate by the Ministerial Decree No.1,586, of 15th September 2006 and inaugurated on 13th September 2006, which is integrated into the Federal Centre of Technological Education of Mato Grosso - CEFET-MT. Today, institutionalized as one of the IFMT campuses, the Campus Cuiabá Bela Vista meets the Open University of Brazil (UAB) and the following courses of Technological Education: Technical Course in Integrated Environment to Secondary Education; Technical Course in Chemistry Integrated to High School; Subsequent Technical Course in Chemistry; Subsequent Technical Course in Food; Course of Technology in Environmental Management and a Bachelor Degree in Food Engineering.

1.5 MAIN ACTIVITIES OF THE INSTITUTION

It is the mission of IFMT to provide the scientific, technological and humanistic education in various levels and types of education, research and extension, in plural, inclusive and democratic way. Also, based on socioeconomic development, in local, regional and national levels, preparing the student for the profession and citizenship with environmental responsibility.

In its performance, IFMT observes the following guiding principles:

- I. Commitment to social justice, equity, citizenship, ethics, environmental preservation, transparency, publicity and democratic management;
- II. Verticalization of education and its integration with research and extension;
- III. Effectiveness in responses to professional training, dissemination of scientific and technological knowledge and support educational, local, social and cultural production;
- IV. Inclusion of people with disabilities and special educational needs;
- V. Regular education with a free and public nature, under the responsibility of the Federal Government.

The Federal Institute has the following characteristics and purposes:

- I. To offer professional and technological education at all levels and modalities, forming and qualifying citizens with views on professional practice in the various sectors of the economy;
- II. Emphasis on socio-economic development locally, regionally and nationally;
- III. To develop professional and technological education as an investigative process of generation and adaptation of technical and technological solutions to social demands and regional peculiarities;
- IV. To promote integration and verticalization of basic education to vocational and higher education, optimizing the physical infrastructure, the staff and resources management;
- V. To guide its educational offer for the benefit of the consolidation and strengthening of local and educational productive arrangements;
- VI. To strengthen social and cultural arrangements identified based on the mapping of potential socioeconomic and cultural development within the scope of the IFMT;
- VII. To constitute itself as a centre of excellence in the provision of general and applied science education. In particular, encouraging the development of critical thinking focused on empirical research;
- VIII. To become qualified as a centre of excellence to support the supply of science education in public educational institutions, providing technical capacity and pedagogical update to the teachers of public schools;
- IX. To develop outreach programs, as well as scientific and technological promotion;
- X. To conduct and stimulate applied research, cultural production, entrepreneurship, associations and scientific and technological development;

- XI. To promote scientific production, technological development and transfer of social technologies, particularly those related to environmental conservation.

IFMT has the following objectives:

- I. To provide professional and technical education at middle level, primarily in the form of integrated courses for the graduates of the primary school and for the public education of youth and adults;
- II. To provide courses of initial training at all levels and modalities, aiming at capacity building, improvement, specialization and professional updating in the fields of education, science and technology;
- III. To conduct applied research, stimulating the development of technical and technological solutions, extending its benefits to society;
- IV. To develop extension activities in accordance with the principles and purposes of professional and technological education, in conjunction with the work environment and social sectors. Also, with emphasis on production, development and dissemination of scientific and technological knowledge;
- V. To encourage and support educational processes that lead to the generation of employment and income, and the emancipation of the citizen from the perspective of local and regional socio-economic development;
- VI. To minister at higher education level:
 - a) Technology courses aimed at training professionals for the different sectors of the economy;
 - b) Degree courses as well as special programs for teacher training, aimed at training teachers for basic education, especially in science, and professional education;
 - c) Bachelor and engineering degrees, aimed at training professionals for different industries and areas of knowledge;
 - d) *Lato sensu* post-graduation courses of development and specialization, aimed for the training of specialists in different areas of knowledge;
 - e) *Stricto sensu* courses for post-graduate master's degree and doctorate studies, which contribute to promote the establishment of a solid foundation in education, science and technology, with a view to the process of the generation and innovation of educational, scientific and technological knowledge.

1.6 PERFORMING AREAS OF THE INSTITUTION

The strategic areas of action of the Federal Institute of Education, Science and Technology of Mato Grosso - IFMT, adopted by line with regional needs and the availability of teachers are Civil Construction, Geomatics, Management, Industry, Information Technology, Leisure and Social Development, Environmental Studies, Chemistry, Telecommunications and Tourism, Food and Hospitality.

1.7 INSTITUTIONALIZED PERMANENT MECHANISM OF RELATIONSHIP WITH PRODUCTIVE SEGMENTS TO WHICH COURSES ARE LINKED FOR THE DEFINITION OF COURSES OFFERINGS, VACANCIES AND FOR CURRICULUM UPDATE

The institute has a board of Business and Community Relations, which is responsible for developing relationships and partnerships with the community. The main strategies of articulation are: internships for students of professional courses, covenants for basic courses, and agreements for technology services and consulting. In the case of agreements for covenant services they are generally made through the support foundation or School Fund.

Regarding the opening, resizing of vacancies and reorientation of courses the school has the Professional Technical Council as the law commands. The Council relies on data from DREC (number of vacancies offered, opportunities and internship activities), on the information of Area Professional Committee, and in its own experience.

The Director of Corporate and Community Relations actualized 129 (one hundred and twenty-nine) agreements with companies and/or institutions of different areas in order to provide our students internships in various courses offered.

The IFMT forms partnerships with institutions, companies and educational foundations aimed at continuing education, extension "latu sensu", upgrading technology of industry professionals, commerce and agrobusiness. The development of these partnerships takes place through Education Management and/or Coordination of courses, approved by the board.

For implementation of the joint with the productive sectors, the institution celebrates covenants, terms of cooperation and partnerships, offering subsidies to the knowledge of the needs and potential of the labour market. Through practice held in public and private institutions, students and teachers develop a constant interaction and contribution, so that the institution is in tune with the ongoing production process, facilitating the definition of courses offered, vacancies and curriculum update.

2. PROJECT OF THE PROPOSED COURSE

2.1 GENERAL COURSE INFORMATION

2.1.1 DENOMINATION

Bachelor of Food Engineering

2.1.2 PRESIDENT OF THE PROJECT DEVELOPMENT COMMITTEE

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2.1.3 COURSE COORDINATOR

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2.1.4 REGISTRATION SCHEME

Enrolled for:	Frequency	Period value	Annuity value
Academic semester	Semiannual	—	—

2.1.5 TOTAL OF ANNUAL VACANCIES

Operating shifts	Vacancies per group	Number of groups/semester	Total annual places	Observations
Integral (Morning and Evening)	35	1	70	2 selective exams per/year

2.1.6 WORKLOAD

Total course workload	Workload completion time	
	minimum (months/semesters)	maximum (months/semesters)
4.020 hrs (including 90h TCC + 180 h Internship)	60 months / 10 semesters*	108 months / 18 semesters

* Art. 2, III, d do CNE/CES - MEC Resolution n.º 2. June 2007

2.2 ORGANIZATION AND CURRICULAR DEVELOPMENT

2.2.1 COURSE OFFER BACKGROUND

According to data obtained from the Department of Industry, Commerce, Mines and Energy of the State of Mato Grosso (SICME), 100,000 new companies have been opened in Mato Grosso state in the last 5 years. The sectors of agriculture, industry and service attest that Mato Grosso is in full development. While agriculture grew by less than 7% in Brazil and in the Midwest, Mato Grosso recorded growth rates of 14% between 2003 and 2007. In the industrial sector the state had the same trend in this period. In the first half of 2008 the Government of the State of Mato Grosso attracted 38 new companies through SICME, which together are investing R\$ 670,220 million in the state. Among the benefited segments are rice processing, ethanol plant, animal slaughterhouses and dairy products.

The high agroindustrial capacity of Mato Grosso attracts investment from large industries in the food sector, such as Petrópolis brewery, in Rondonópolis. Also the meatpacking industry group Alibem, which will invest approximately US\$ 400 million in the installation of a plant in Rondonópolis. Food industry group Sadia is also expanding their activities in the state and is investing US\$ 634 million in the installation of a new business unit in Campo Verde, according to SICME (2008).

Despite the economic crisis affecting the world economy since 2008, a survey conducted by FIEMT (Federation of Industries of the State of Mato Grosso) in April 2009 titled "Analysis of the Economic Crisis of Mato Grosso," reveals that the economy in Mato Grosso, which was predicted to grow at a rate of 7.2%, decreased to 4.2%. This means that the state economy is not experiencing a recession, but by an economic retraction.

With the growth of the food industry in the state, comes the demand for qualified professionals in the industry, to be in on the act as Food Engineers. Currently, the demand for professionals has been supplied by college graduates or other professionals who come from out of state, mainly from the South and Southeast of the country.

According to the Register of Institutions of Higher Education of the National Institute for Educational Research, and Ministry of Education, out of the 76 Food Engineering colleges in the country only 3 are in the state of Mato Grosso: the Federal University of Mato Grosso in Pontal do Araguaia, the State University of Mato Grosso in Barra do Bugres, and the University Centre in Várzea Grande. So far, none of the three institutions has formed a group of Food Engineering.

Based on the demand for professionals and the shortage of professionals who possess the technological bases for operations in the food industry in the state, the creation of a public, free Food Engineering course of quality in the capital Cuiabá is of great interest not only for IFMT, but also to the state, the industrial sector and the community.

The IFMT Bela Vista Campus in Cuiabá, which proposes to allocate the course, currently offers technical courses in Chemistry and Food, as well as the degree in Environmental Management, thus having the basic infrastructure and human resources necessary for opening the Food Engineering course.

2.2.2 AIMS AND OBJECTIVES OF THE COURSE

The Course of Food Engineering was recognized by the Federal Government through Decree Law 68644 of 21.5.1971 and its minimum curriculum was established in the new conception of Engineering teaching in Brazil in the resolutions of the Federal Council of Education 48/76 and 52 / 76 and Decree 1695/94 of the Ministry of Education and Sports.

The Law No. 5194, from December 1966 and CONFEA's resolution 218 from 29.06.1973, regulate the profession of Food Engineer. It offers professional activities, featuring professional practice as of social and human interest. To do so, it specifies which activities the engineer should matter in conducting projects such as: exploitation and utilization of the country's natural resources; agricultural and industrial development in Brazil.

The field for Food Engineer covers:

- a) Supervision, coordination and technical guidance.
- b) Study, planning, design and specifications.
- c) Study of technical and economic feasibility.
- d) Assistance, advice and consultancy.
- e) Work and service directions.
- f) Inspection, expertise, evaluation, arbitration, reports and technical advice.
- g) Performance of office and technical function.
- h) Teaching, research, analysis, experimentation, extension, testing and technical disclosure.
- i) Budgeting.
- j) Standardization, measurement and quality control.
- k) Execution of works and technical service.
- l) Supervision of work and technical service.
- m) Production and technical specification.
- n) Conduction and technical work.
- o) Conducting the installation team, installation, operation, repair and maintenance.
- p) Execution of installation, assembly and repair.
- q) Operation, equipment assembly, and installation.
- r) Execution of technical drawing.

The performance of these activities relates to the food industry, packaging, preservation, food transport and, and its related services.

Food Engineers are responsible for the entire food production chain, as well as the preparation and preservation of foods and drinks from animal and vegetable origin. For this, they study and research reserves of agriculture, livestock and fisheries. They accompany the industrial processing of basic raw materials such as milk, meat, cereals, vegetables and fruits. They supervise the handling, harvest, and define the best type of storage, packaging and conservation of goods before and after industrialization. They also analyze the various substances used in the process and evaluate the nutritional content of the final product, aiming to improve the feeding pattern of the population.

The Food Engineer may prepare studies and projects relating to industrial installations, process lines, equipment and technological processes for industrialization of raw food materials, as well as participate in the direction and supervision of the manufacturing facilities.

The professional is able to establish chemical, microbiological and sensorial quality control plans, and the direction of their implementation. They may also become university teachers.

The professional may act according to regional conditions, focusing on the technologies of major products obtained or obtainable in the region, preserving the agronomic and productive vocation and ecosystem, and develop small and medium food enterprises, using the potential of the region.

Overall, the course aims of Food Engineering is to make professionals able to make the most of agroindustrial production and its waste, transforming them through various processes in order to get a quality product with great stability, nutritional value and viable.

2.2.3 PROFESSIONAL PROFILE OF COMPLETION

In order to work in a complex and diverse market, the professional graduated in the course of Food Engineering should first present a solid and generalist training related to the fundamentals of engineering, technology and food science.

The foundations of engineering enable the professional to act in the development of projects and equipment, in process optimization, installation and maintenance of equipment. The fundamentals of technology comes to subsidies the professional to work in the development and industrial process control, in the raw materials quality, processes and products. The fundamentals of food science give the professionals greater scope of action, through the study of physical, chemical, microbiological, sensory and functional properties of raw materials and products.

Another essential requirement to professional Food Engineering is to possess entrepreneurial determination and pro-activity leading their decisions, totally meeting the customer needs through the ability of interdisciplinary work, implementing quality at all stages of the production process.

The professional must also possess scientific skill, which gives conditions to specialize within the area, with enough background to produce scientific innovation through the use of techniques, and thus encourage technological progress.

Besides the established technical profile, Food Engineers shall have as a complement to his professional training:

- Humanistic , critical and reflective approach;
- Ability of oral and written communication;
- Ability of permanent learning;
- Entrepreneurial and inquisitive spirit, critical thinking and leadership that enable rapid decision making required by the market;
- Ability to solve problems, manage conflicts and people.

Taking into account the expertise and skills acquired during the Course of Food Engineering, graduates can work in the following areas:

➤ **Production**

Due to their knowledge of technological processes and equipment involved in the industrialization of food, Food Engineer is the professional indicated to be responsible for the production area.

➤ **Quality Control**

The Food Engineer may act from receipt of raw materials to the finished product. These activities require a professional with a solid background in microbiology, chemistry, food technology, food analysis, and statistics. The professional training allows them to develop, plan and manage quality control laboratories.

➤ **Planning and Industrial Design**

The Food Engineer is essential in defining the processes, equipment and industrial facilities, as well as the study of the economic feasibility of the project.

➤ **Management and Administration**

The Food Engineer has the authority to act in solving administrative problems related to the agribusiness chain.

➤ **Marketing and Sales**

Due to basic knowledge in all areas comprising the Food Engineering (raw materials, processing, additives, packaging and equipment) this professional has been quite this professional required in this sector, both nationally and in foreign trade.

➤ **New Product Development**

Based on studies of the need for certain products in the market, the Food Engineer has acquired competence to develop new food products using the knowledge on raw materials, processes and equipment, providing the necessary support for the launch of a new product and proposing sales arguments and basis for cost calculations.

➤ **Equipment**

The participation of the Food Engineer on projects and equipment adaptations noteworthy. Their actions have provided a better performance of the equipment used in the food industry.

➤ **Supervision of Food and Beverage**

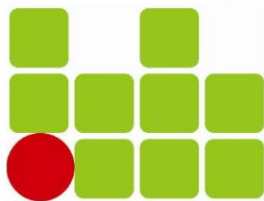
In this sector, their contribution have been relevant in setting quality and identity standards, and in monitoring the implementation of these standards.

➤ **Storage**

The Food Engineer may act in the storage area, developing their programming and using appropriate techniques to avoid losses and maintain the quality of the raw material to its industrialization or "in natura" consumption.

➤ **Consulting**

Because of their knowledge and experience acquired during the course, the Food Engineer may act providing technical advice to the food industry in order to propose solutions to the problems presented.



BACHELOR'S DEGREE IN FOOD ENGINEERING

COURSE FLOWCHART

2.2.4 COURSE FLOWCHART

1 st Semester	2 nd Semester	3 rd Semester	4 th Semester	5 th Semester	6 th Semester	7 th Semester	8 th Semester	9 th Semester	10 th Semester
1A Calculus I 60h	2A Calculus II 60h	3A Calculus III 60h	4A Numerical Calculus 60h	5A Food Chemistry 60h	6A Electrotechnical 60h	7A Instrumentation and Control 30h	8A Enzymatic and Microbiology Technology 60h	9A Technology of Water and Wastewater 60h	10A Final Project 30h
1B Physics I 60h	2B Physics II 60h	3B Physics III 60h	4B Introduction to Food Science 30h	5B Food Biochemistry 60h	6B Mechanics and Resistance of Materials 60h	7B Safety at Workplace 30h	8B Hygiene and Food Legislation 30h	9B Refrigeration 60h	10B Curricular Internship 180h
1C General and Inorganic Chemistry 60h	2C Qualitative Analytical Chemistry 60h	3C Quantitative Analytical Chemistry 60h	4C Fluid Mechanics 60h	5C Heat Transfer and Mass 60h	6C Basic Laboratory I 60h	7C Unit Operations II 60h	8C Technology of Meat, Fish, Eggs and Derivatives 60h	9C Technology of Oils and Fats 30h	
1D Introduction to Chemical Analysis 60h	2D Organic Chemistry 60h	3D Mechanisms of Organic Reactions 60h	4D Physical-Chemistry 60h	5D Sensory Analysis 60h	6D Food Analysis I 60h	7D Basic Laboratory II 60h	8D Technology of Fruit and Vegetables 60h	9D Technology of Beverages 60h	
1E Technical Design 60h	2E Experimental Physics I 60h	3E Biochemistry 60h	4E Microbiological Food Analysis 60h	5E Thermodynamics 60h	6E Management and Economy in the Food Industry 60h	7E Processes in the Food Industry 30h	8E Facilities, Cashflows and Packaging for the Food Industry 45h	9E Facility, Planning and Design of Food Industry 60h	
1F Introduction to Food Engineering 30h	2F Experimental Statistics 60h	3F Human Relations 30h	4F Instrumental Methods of Food Analysis 30h	5F Fundamentals of Nutrition 45h	6F Quality Control in the Food Industry 30h	7F Food Preservation Techniques 30h	8F Technology of Milk and Dairy Derivatives 60h	9F Modelling and Simulation Process 30h	
1G Research Metrology 30h	2G Instrumental Portuguese 30h	3G General Microbiology 60h	4G Quality Management 30h	5G Introduction to Environmental Microbiology 60h	6G Unit Operations I 60h	7G Food Analysis II 60h	8G Technology of Cereals, Roots and Tuber Vegetables 60h	9G Sugarcane Production 30h	
1H Analytical Geometry and Linear Algebra 60h	2H Cell Biology and Genetics 60h	3H Experimental Organic Chemistry 60h	4H Physics IV 60h			7H Raw Material of Animal Origin 45h		9H Development of Brand and Marketing 30h	
1I Applied Informatics 30h			4I Experimental Physics 60h			7I Raw Material of Plant Origin 45h		9I Food Toxicology 30h	
TOTAL 450h	TOTAL 450h	TOTAL 450h	TOTAL 450h	TOTAL 405h	TOTAL 390h	TOTAL 390h	TOTAL 375h	TOTAL 390h	TOTAL 270h

CARGA HORÁRIA TOTAL 3.750h + FINAL PROJECT (TCC) 90h + CURRICULAR INTERNSHIP 180h = 4.020h



2.2.5 CURRICULAR ORGANIZATION

Below is the matrix of the Food Engineering course (Table 1):

Table 1 - Curricular matrix of the degree of Bachelor in Food Engineering

Code	Subject	Prerequisites	Core	Workload	
				Weekly (classes)	Semestral (hours)
1st SEMESTER					
1A	Calculus I	None	Basic	4	60
1B	Physics I	None	Basic	4	60
1C	General and Inorganic Chemistry	None	Basic	4	60
1D	Introduction to Chemical Analysis	None	Basic	4	60
1E	Technical Design	None	Basic	4	60
1F	Introduction to Food Engineering	None	Specific	2	30
1G	Research Methodology	None	Basic	2	30
1H	Analytical Geometry and Linear Algebra	None	Basic	4	60
1I	Applied Informatics	None	Basic	2	30
Total				30	450
2nd SEMESTER					
2A	Calculus II	1A	Basic	4	60
2B	Physics II	1B	Basic	4	60
2C	Qualitative analytical Chemistry	1C	Vocational	4	60
2D	Organic Chemistry	1C	Vocational	4	60
2E	Physics Experimental I	1B	Basic	4	60
2F	Experimental Statistics	None	Basic	4	60
2G	Instrumental Portuguese	None	Basic	2	30
2H	Cell Biology and Genetics	None	Vocational	4	60
Total				30	450
3rd SEMESTER					
3A	Calculus III	2A	Basic	4	60
3B	Physics III	2B	Basic	4	60
3C	Quantitative Analytical Chemistry	2C	Vocational	4	60
3D	Mechanism of Organic Reactions	2D	Vocational	4	60
3E	Biochemistry	2D	Vocational	4	60
3F	Human Relations	None	Basic	2	30
3G	General Microbiology	2H	Vocational	4	60
3H	Experimental Organic Chemistry	2D	Vocational	4	60
Total				30	450
4th SEMESTER					
4A	Numerical Calculus	3A	Vocational	4	60
4B	Introduction to Food Science	None	Specific	2	30
4C	Fluid Mechanics	3A, 2B	Basic	4	60
4D	Physical-Chemistry	3A, 2B	Vocational	4	60
4E	Microbiological Food Analysis	3G	Vocational	4	60
4F	Instrumental Methods of Food Analysis	3C	Vocational	2	30
4G	Quality Management	None	Basic	2	30
4H	Physics IV	3B	Vocational	4	60
4I	Experimental Physics II	3B	Basic	4	60
Total				30	450
5th SEMESTER					
5A	Food Chemistry	3E	Specific	4	60
5B	Food Biochemistry	3E	Specific	4	60



5C	Heat Transfer and Mass	4C, 4D	Basic	4	60
5D	Sensory Analysis	2F, 4B	Specific	4	60
5E	Thermodynamics	4C, 4D	Vocational	4	60
5F	Fundamentals of Nutrition	3E	Specific	3	45
5G	Introduction to Environmental Management	None	Basic	4	60
Total				27	405
6th SEMESTER					
6A	Electrotechnical	4H	Basic	4	60
6B	Mechanics and Resistance of Materials	1B, 3A	Basic	4	60
6C	Basic Laboratory I	5C, 5E	Vocational	4	60
6D	Food Analysis I	4B, 5A	Specific	4	60
6E	Management and Economy in the Food Industry	None	Basic	4	60
6F	Quality Control in the Food Industry	4G	Vocational	2	30
6G	Unit Operations I	4C	Vocational	4	60
Total				26	390
7th SEMESTER					
7A	Instrumentation and Control	4C, 5C	Vocational	2	30
7B	Safety at Workplace	None	Vocational	2	30
7C	Unit Operations II	5C	Vocational	4	60
7D	Basic Laboratory II	6G	Vocational	4	60
7E	Processes in the Food Industry	6G	Vocational	2	30
7F	Food Preservation Techniques	4E	Specific	2	30
7G	Food Analysis II	6D	Specific	4	60
7H	Raw Material of Animal Origin	6D	Specific	3	45
7I	Raw Material of Plant Origin	6D	Specific	3	45
Total				26	390
8th SEMESTER					
8A	Enzymatic and Fermentation Technology	3E, 3G	Vocational	4	60
8B	Hygiene and Food Legislation	4E	Specific	2	30
8C	Technology of Meat, Fish, Eggs and Derivates	7H	Specific	4	60
8D	Technology of Fruit and Vegetables	7I	Specific	4	60
8E	Additives, Coadjutants And Packaging For The Food Industry	5A	Specific	3	45
8F	Technology Of Milk And Dairy Derivatives	7H	Specific	4	60
8G	Technology Of Cereals, Roots And Tuber Vegetables	7I	Specific	4	60
Total				25	375
9th SEMESTER					
9A	Technology Of Water And Wastewater	3C	Vocational	4	60
9B	Refrigeration	5E	Vocational	4	60
9C	Technology of Fats and Oils	7I	Specific	2	30
9D	Technology of Beverages	7I, 8A	Specific	4	60
9E	Facilities, Planning And Design Of Food Industry	1E	Basic	4	60
9F	Modelling and Simulation Process	4A	Vocational	2	30
9G	Sugarcane Production	7I, 8A	Specific	2	30
9H	Development of New Products and	None	Vocational	2	30

	Marketing				
9I	Food Toxicology	3G, 8E	Specific	2	30
Total				26	390
10th SEMESTER					
10A	Final Project (TCC)	Workload Compliance		6	90
10B	Curricular Internship	Workload Compliance		12	180
Total				18	270
Course Total Workload				268	4.020

2.2.5.1 CURRICULAR INTERNSHIP

According to the National Curriculum Guidelines for Undergraduate Engineering, contained in Resolution CNE/CES 11, of March 11th 2002, the curricular internship is a compulsory requirement for the formation of the engineer.

The resolution published in the Federal Official Gazette of April 9th 2002, Section 1, p.32, presents the following article:

"Art.7th Engineer training shall include, as a constituent step of graduation, mandatory internships under the direct supervision of the educational institution, through technical reports and individualized monitoring during the period of the activity. The minimum duration of the traineeship is expected to reach 160 (one hundred sixty) hours."

The curricular internship of the course has a minimum duration of 180 hours, which can start from the 6th (sixth) semester and must be completed by the second half of the curricular completion, and can be performed in companies or through project development of technological initiation at the institution or partner institutions.

The activities planned for the internship should correspond to the theoretical and practical knowledge acquired by the student. The internship is accompanied by an adviser teacher for each student, depending on the area of performance and on availability of teachers, according to their workload.

After completion of the internship, the student must submit a technical and scientific report for evaluation, and present it to a panel composed of the adviser teacher and two components, which may be an invited outside professional with recognized experience in the field. After corrections and proposals the report will be part of the Institution's bibliographic collection.

2.2.5.2 FINAL PROJECT (WORK FOR THE COMPLETION OF THE COURSE) - TCC

The Final Project (TCC) aims to bring students to gather their knowledge in a systematic way and show their ability to apply the scientific method to analyze results and write technical texts. Thus, the project should be developed on a topic of scientific-technical interest, preferably linked to the demands of the market.

Students may submit a work proposal (research project) that contemplates the execution of jobs matching their professional profile, based on the completion of at least 80% of the course workload. The project is individually developed and guided by a teacher of the course. If students wish an external orientation, they must apply for a permit and accreditation, and keep their co-orientation linked to the institute.

The work of completion will have a workload equivalent to 90 hours to be added to the course, and follow the regulations of the Didactic Organization of IFMT-MT.

Table 2 below shows a summary of the course's workloads, depending on the category of the subjects.

Table 2 - Summary of workload of the Degree of Bachelor of Food Engineering.

Course Curricular Matrix	Workload (hrs)	%
a) Mandatory Curriculum Contents (3750 hrs)		
Core Basic	1360	33,8
Core Vocational	1420	35,2
Core Specific	970	24,1
b) Mandatory Workload (270 hrs)		
Final Project	90	2,3
Curricular Internship	180	4,6
Total	4.020	100

2.2.6 SYLLABUS OF MANDATORY COMPONENTS OF CURRICULUM MATRIX

1st SEMESTER

Curriculum Contents CALCULUS I		Code: 1A	Period: 1 st Semester
Credits: 04 (4T+0P)	Type: Presential		Workload: 60 hrs
Prerequisites:	None		

SYLLABUS

Intervals, inequalities and absolute values. Functions of a real variable: basic functions and inverse functions. Limit and continuity. Fundamental limits. Derivatives: definition and geometric interpretation, kinematics, and rate of change. Derivation rules, derivative operations properties, and implicit differentiation. Applications. Theorems on differentiable functions: applications. Study of variation of functions and problems of maxima and minima. L'Hospital rule. Taylor polynomial and error. Antiderivative. Riemann sums and calculation of areas: fundamental theorem of calculus.

BASIC BIBLIOGRAPHY

LEITHOLD, L. **O cálculo com geometria analítica**. V. 1. São Paulo: Harbra, 2002.
ANTON, H. **Cálculo. Um Novo Horizonte**. V. 1. Porto Alegre: Bookman, 2000.
THOMAS, G.B.; FINNEY, R.L.; WEIR, M.; GIORDANO, F.R. **Cálculo**. V.1 e 2. 10th Edition; São Paulo: Pearson. 2009.

COMPLEMENTARY BIBLIOGRAPHY

BOYCE, W.E.; DIPRIMA, R.C. **Equações diferenciais**. Rio de Janeiro: LTC, 2005.
GUIDORIZZI, H.L. **Um curso de cálculo**. V.1. Rio de Janeiro: LTC, 2001.
MUNEM, M.; FOULIS, D.J. **Cálculo**. V.1. Rio de Janeiro: LTC, 2000
SIMMONS, G.F. **Cálculo com geometria analítica**. V.1. São Paulo: McGraw-Hill, 1999.
STEWART, J. **Cálculo**. V. 1 e 2. São Paulo: Pioneira, 2001.

Curriculum Contents PHYSICS I		Code: 1B	Period: 1 st Semester
Credits: 04 (4T+0P)	Type: Presential		Workload: 60 hrs
Prerequisites:	None		

SYLLABUS

Unit Systems. Dimensional analysis. Error theory. Kinematics. Particle dynamics. Momentum. Work and energy. Conservation. Particles system dynamics. Internal and external forces. Linear momentum conservation. Particle rotation. Angular momentum. Torque. Angular momentum conservation. Rigid body dynamics. Gravitation.

BASIC BIBLIOGRAPHY

HALLIDAY, D. RESNICK, R., WALKER, J. **Fundamentos da Física: Mecânica**. V. 1, 8th edition; Rio de Janeiro: LTC. 2009. 368p.
NUSSENZVEIG, H. M. **Curso de Física Básica: Mecânica**. V.1. 4th edition; São Paulo: Edgard Blucher. 2002. 328p.



TIPLER, P.A., MOSCA, G. **Física - Mecânica, Oscilações e Ondas, Termodinâmica.** V.1, 5th edition; Rio de Janeiro: LTC. 2006. 793p.

COMPLEMENTARY BIBLIOGRAPHY

CAMPOS, A.A.; ALVES, E.S.; SPEZIALI, N.L. **Física Experimental Básica na Universidade.** 2nd edition; Belo Horizonte: Publishing UFMG, 2008.

EMETERIO, D. **Práticas de Física para Engenharia.** São Paulo: Átomo, 2008.

SEARS, F. W.; ZEMANSKY, M. W. **Física.** V. I e II., Rio de Janeiro: LTC.

Curriculum Contents GENERAL AND INORGANIC CHEMISTRY	Code: 1C	Period: 1 st Semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs
Prerequisites:	None	

SYLLABUS

Atomic structure; Periodic table; Periodic properties; Chemical elements: Occurrence, properties, uses and main compounds; Inorganic functions: acids, bases, salts, oxides and hydrides - nomenclature and properties; Chemical Bonds; Solubility, Introduction to coordination chemistry; Chemical reactions; Chemical quantities and stoichiometric calculations; Oxidation-reduction reactions; Fundamentals of chemical kinetics; Concepts of chemical Equilibrium. Principles of Electrochemistry.

BASIC BIBLIOGRAPHY

MAHAN, B.H.; MYERS, R.J. **Química – um curso universitário.** 4th edition; São Paulo: Edgard Blücher: 1993.

RUSSEL, J. B. **Química Geral.** 2nd edition; São Paulo: Mc Graw Hill. 1994.

ATKINS, P.; JONES, L. **Princípios de química: questionando a vida moderna e o meio ambiente.** 3th edition; Porto Alegre: Bookman. 2006.

COMPLEMENTARY BIBLIOGRAPHY

BRADY, J.E.; HUMISTON, G.E. **Química Geral,** V. 1 e 2. 2th edition; Rio de Janeiro: LTC. 2003.

LEE, J. D. **Química Inorgânica Não tão Concisa.** 5th edition; São Paulo: Edgard Blücher. 2000.

FONSECA, M.R.M. **Interatividade Química: Cidadania, participação e transformação.** São Paulo: FTD. 2005.

BARROS, H. L. C. **Química Inorgânica, uma introdução.** Ouro Preto: UFOP. 1995.

BENVENUTTI, E. V. **Química Inorgânica: átomos, moléculas, líquidos e sólidos.** Porto Alegre: UFRGS. 2003.

Curriculum Contents INTRODUCTION TO CHEMICAL ANALYSIS	Code: 1D	Period: 1 st Semester
Credits: 4 (2T+2P)	Type: Presential	Workload: 60 hrs
Prerequisites:	None	

SYLLABUS

Theory: Safety standards and conduct in chemical laboratories; Substance separation techniques; Using the analytical scale; Recognition and techniques for the use of volumetric apparatus; Calibration of volumetric instruments; Sample and sampling; Quality in analytical results: significant digits; Error of a measure; Accuracy and precision; Deviations; solutions: concentration units; Solution preparation techniques; Dilution of solutions; Chemical equilibrium: pH and pOH; Solubility and solubility product; Buffer solutions. Practice: Recognition of glassware, equipment, and reagents; Use of basic laboratory equipment: oven, scale, centrifuge and heating appliances; Basic laboratory operations: measurements with volumetric apparatus; substance weighing; filtration, drying, liquid and solids

transfers; Washing and disinfection of glassware; Heating and cooling operations; Physical properties of substances: melting and boiling points, density, freezing point; Physical-chemical methods of separation: sedimentation, filtration, centrifugation, distillation; Techniques of preparation of solutions; Standardization of solutions; measures of pH.

BASIC BIBLIOGRAPHY

MORITA, T.; ASSUMPÇÃO, R. M. V. **Manual de soluções, reagentes & solventes : padronização - preparação - purificação**. 6. edition; São Paulo: Edgard Blücher. 1998.
CAMPBELL, J. M., CAMPBELL, J. B. **Matemática de Laboratório**. 3rd edition; São Paulo: Rocca. 1986.
NEVES, V. J. M. **Como preparar soluções químicas em laboratório**. São Paulo: Tecmed. 2005.

COMPLEMENTARY BIBLIOGRAPHY

RUSSEL, J. B. **Química Geral**. 2nd edition; São Paulo: Mc Graw Hill. 1994.

Curriculum Contents TECHNICAL DESIGN		Code: 1E	Period: 1 st Semester
Credits: 4 (1T+3P)	Type: Presential		Workload: 60 hrs
Prerequisites:	None		

SYLLABUS

Notions of descriptive geometry; Projection systems; Point, lines and plans; Plan intersection; Descriptive methods: Change of projection plans, rotation, and folding; Representation systems; Projection of geometric solids; Introduction to the fundamental techniques of the technical drawing; Letters and symbols; Orthogonal Projections; Perspective; Dimensioning; Building design; Plans; Cuts; Views; Situations; Drawing equipment; Layout drawing; Piping design, Electrical circuit design and flowcharts; Applied informatics; Computer graphics; CAD Systems; Applied ABNT (Brazilian Technical Standards).

BASIC BIBLIOGRAPHY

LEAKE J.; BORGERSON, J. **Manual de Desenho Técnico para Engenharia: Desenho, Modelagem e Visualização**. 1st edition; Rio de Janeiro: LTC. 2010. 328p.
BUENO, C. P.; PAPAOGLOU, R. S. **Desenho Técnico para engenharias**. 1st edition; São Paulo: Juruá, 2008. 196p.
VENDITTI, M. V. R. **Desenho Técnico sem Prancheta com AUTOCAD 2010**. 1st edition; São Paulo: Visual Books. 2010. 346p.

COMPLEMENTARY BIBLIOGRAPHY

MACHADO, A. **Geometria Descritiva**. Atual: São Paulo, 1991.
ESTEPHANIO, C. **Desenho Técnico Basic**. Livro Técnico S/A.
MONTENEGRO, G. A. **Inteligência Visual e 3D**. São Paulo: Edgard Blücher: 2005.
FRENCH, T. E., VIERCK, C. J. **Desenho Técnico e Tecnologia Gráfica**. Rio de Janeiro: Globo. 2002.
XAVIER, N. **Desenho Técnico Basic**. São Paulo: Ática, 2001.
ABNT. **NBR 8196 – Emprego de Escalas em Desenho Técnico**. Rio de Janeiro.
ABNT. **NBR 8402 – Execução de Caracteres para Escrita em Desenho Técnico**. Rio de Janeiro.
ABNT. **NBR 8403 – Aplicação de Linhas em Desenho Técnico - tipos/larguras de linhas**. Rio de Janeiro.
ABNT. **NBR 10067 – Princípios Gerais de Representação em Desenho Técnico – Vistas e Cortes**. Rio de Janeiro.
ABNT. **NBR 10068 – Folha de Desenho – Lay-out e dimensões**. Rio de Janeiro.
ABNT. **NBR 10126 – Cotagem em desenho Técnico**. Rio de Janeiro.
ABNT. **NBR 10582 – Conteúdo da folha para desenho Técnico**. Rio de Janeiro.
ABNT. **NBR 10647 – Desenho Técnico – Norma Geral**. Rio de Janeiro.

Curriculum Contents INTRODUCTION TO FOOD ENGINEERING		Code: 1F	Period: 1 st Semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites: None			

SYLLABUS

InterSubjectry food engineering; Problems in Engineering and in Food Engineering; Creation of Food Engineering courses in the Brazil; Concept of Engineering, Science and Food Technology; Basic Food Engineering science curriculum; Basic sciences in the curriculum of Food Engineering; Sciences of general education in the curriculum of Food Engineering; Specific vocational training: Food Microbiology, Food Biochemistry, Food Analysis, Sensory Analysis, Food Process Control; Food Engineering course curriculum in Campus IFMT-Bela Vista; The role of the food engineer in the industry and research institutions; Job market; Attributes of the food engineer: license, attitudes and professional behaviour; Social role; Professional field; Introduction to food engineering; Evolution of technological processes in food preservation; Types of food industries and technological processes involved in processing; Technical visits to the food industry.

BASIC BIBLIOGRAPHY

BAZZO, W.A.; PEREIRA, L.T.V. **Introdução à Engenharia**. 6th edition; Santa Catarina: UFSC, 2002. 274p.
BAZZO, W. A.; PEREIRA, L.T.V. **Introdução à Engenharia – Conceitos, ferramentas e comportamentos**. 1st edition; Santa Catarina: UFSC, 2006. 270p.
DYM, C.; LITTLE, P. **Introdução à Engenharia – Uma abordagem baseada em Projeto**. Ed Bookman, 2010.

COMPLEMENTARY BIBLIOGRAPHY

FISENGE - Federação de Sindicatos de Engenheiros. Sindicato de Engenheiros da Bahia. **Manual do Engenheiro**. 2006. 21p.

Curriculum Contents RESEARCH METHODOLOGY		Code: 1G	Period: 1 st Semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites: None			

SYLLABUS

The various forms of knowledge, from common sense to scientific knowledge, its origins and forms; Theoretical contribution, and the creation of a framework: theory and method; Research methodology, scientific methods, experimental method; the steps of the scientific process: observation, development of research projects and deployment, data collection (literature and experimental research); Technical-scientific writing: report, article, review, manual, thesis, dissertation; Oral presentation of academic work; Technical standards for the presentation of scientific work, following the Brazilian Technical Standards Association (ABNT) and IFMT bylaws.

BASIC BIBLIOGRAPHY

ISKANDAR, J. I. **Normas da ABNT - comentários para trabalhos científicos**. 3rd edition; Paraná: Juruá, 2009.
MEDEIROS, J. B. **Redação Científica: a prática de fichamento, resumos, resenhas**. São Paulo: Atlas, 2006.
FURASTÉ, P. A. **Normas técnicas para o trabalho científico**. 11th edition; Porto Alegre: s.n. 2002.

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BASTOS, C.; KELLER, V. **Aprendendo a aprender: Introdução à metodologia científica**. Rio de Janeiro: Vozes, 1991.
 GIL, A. C. **Como elaborar projetos de pesquisa**. 4th edition; São Paulo: Atlas, 2006.
 LAKATOS, E.M.; MARCONI, M.A. **Metodologia Científica**. São Paulo, Atlas, 1986.
 MATOS, H. C. J. **Aprender a Estudar: orientações metodológicas para o estudo**. Rio de Janeiro: Vozes, 1994.

Curriculum Contents ANALYTIC GEOMETRY AND LINEAR ALGEBRA		Code: 1H	Period: 1 st Semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: None

SYLLABUS

Coordinate Systems; Matrices; Systems of linear equations; Vectors; Vector products; Application of vectors to the analytical study of lines and planes. Vector spaces. Linear transformations. Eigenvalues and eigenvectors. Inner product space. Conics and quadrics.

BASIC BIBLIOGRAPHY

BARROSO, L.C.; BARROSO, M.A.; CAMPOS FILHO, F. F.; CARVALHO, M.L.B.; MAIA, L. **Cálculo numérico com aplicações**. 2nd edition; São Paulo: Harbra. 1987. 367p.
 BOLDRINI, J.L. et al. **Álgebra linear**. São Paulo: Harbra, 1986.
 BOULOS, P.; CAMARGO, I. **Introdução à geometria analítica no espaço**. São Paulo: Makron Books, 1997.

COMPLEMENTARY BIBLIOGRAPHY

CALLIOLI, C.A.; DOMINGUES, H.H.; COSTA, R.C.F. **Álgebra linear e aplicações**. São Paulo: Atual, 1990.
 LIPSCHULTZ, S. **Álgebra linear**. São Paulo: McGraw-Hill, 1971.

Curriculum Contents APPLIED INFORMATICS		Code: 1I	Period: 1 st Semester
Credits: 2 (1T+1P)	Type: Presential e Semi-Presential		Workload: 30 hrs

Prerequisites: None

SYLLABUS

History of computing; Overview of Microcomputers; Computers: functional structure, peripherals, basic organization of UP, types of instructions; Systems: system components, hardware and software most used; Study of the major systems and operating environments; Tools: Text editors, spreadsheets, graphing, obtaining equation curve from scatter plots. Database managers; Presentation programs; Development of algorithms for the construction of computer programs, implemented using high level programming language.

BASIC BIBLIOGRAPHY

TERADA, R. **Desenvolvimento de algoritmo e estruturas de dados**. 1st edition; Ed. Pearson Education
 MANZANO, J.A.N.G. **Broffice.org 3.2.1 - Guia Prático de Aplicação**. São Paulo: Erica. 2010.208p.
 MANZANO, A.L.N.G.; MANZANO, M. **Estudo Dirigido de Microsoft Office Word 2010**. São Paulo: Erica. 2010.160p.

COMPLEMENTARY BIBLIOGRAPHY

- ALVES, W.P. **Banco de dados - Teoria e desenvolvimento**. 1st edition; São Paulo: Erica. 2009.
- JOHNSON, J. A.; CAPRON, H. L. **Introdução a Informática**. 1st edition; Ed. Pearson Education. 2004.
- PAULA JR, M.F. **Ubuntu - Guia Prático para Iniciantes**. 1st edition; São Paulo: Ciência Moderna. 2007.
- NORTON, P. **Introdução à Informática**. Rio de Janeiro: Makron Books, 1997.
- SZWARCFITER, J. L.; MARKENZON, L. **Estruturas de dados e seus algoritmos**. Rio de Janeiro: LTC, 1994.
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2nd SEMESTER

Curriculum Contents CALCULUS II		Code: 2A	Period: 2 nd semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1A

SYLLABUS

Polar and integral coordinate systems; Improper integrals; Eulerian integrals; Topology topics of n-dimensional real space; Relations and functions in n-dimensional real space; Limit and continuity of functions of real n-variables; Partial derivatives; Derivatives of composite, implicit, and homogeneous functions. Differential functions of n-variables. Maxima and minima of real n-variable functions; Multiple integrals. Multiple integrals geometric applications.

BASIC BIBLIOGRAPHY

LEITHOLD, L. **O cálculo com geometria analítica**. V. 1. São Paulo: Harbra, 2002.
ANTON, H. **Cálculo. Um Novo Horizonte**. V. 1. Porto Alegre: Bookman, 2000.
THOMAS, G.B.; FINNEY, R.L.; WEIR, M.; GIORDANO, F.R. **Cálculo**. V.1 e 2. 10th edition; São Paulo: Pearson. 2009.

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ÁVILA, G. **Cálculo: funções de várias variáveis**. V.3. Rio de Janeiro: LTC, 1995.
AYRES, F. **Cálculo diferencial e integral**. Rio de Janeiro: McGraw-Hill do Brasil Ltda, 1980.
CUNHA, F. **Matemática aplicada**. São Paulo: Atlas, 1990.
LEWIS, D.; KAPLAN, W. **Cálculo e álgebra linear**. V. 1, 2, 3 e 4. Rio de Janeiro: LTC, 1982.
MUNEM, L. **Cálculo**. V. 1 e 2. Rio de Janeiro: Guanabara, 1990.

Curriculum Contents PHYSICS II		Code: 2B	Period: 2 nd semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1B

SYLLABUS

Introduction to wave motion; Oscillatory Movements: Mechanical and Electromagnetic Waves. Fluid Mechanics: Hydrostatic; Hydrodynamics; Temperature and heat. First and Second Law of Thermodynamics; Kinetic Theory of Gases; Maxwell-Boltzmann distribution; Concepts of Geometrical Optics, Physical Optics; Polarization; Interference; Diffraction of light and acoustics.

BASIC BIBLIOGRAPHY

HALLIDAY, D. RESNICK, R., WALKER, J. **Fundamentos da Física: Gravitação, Ondas e Termodinâmica**. V. 2. 8th edition; Rio de Janeiro: LTC. 2009. 310p.
NUSSENZVEIG, H. M. **Curso de Física Básica: Fluidos, Oscilações e Ondas, Calor**. V.2. 4th edition; São Paulo: Edgard Blucher. 2002. 314p.
TIPLER, P.A.; MOSCA, G. **Física - Eletricidade e Magnetismo, Ótica**. V.2. 5th edition; Rio de Janeiro: LTC. 2006. 596p.

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SEARS, F. W. & ZEMANSKY, M. W. **Física**. Vol. 1. Rio de Janeiro: LTC
SEARS, F. W. & ZEMANSKY, M. W. **Física**. Vol. 2. Rio de Janeiro: LTC
TIPLER, P.A.; MOSCA, G. **Física**. V. 1, Rio de Janeiro: LTC

Curriculum Contents QUALITATIVE ANALYTICAL CHEMISTRY		Code: 2C	Period: 2 nd semester
Credits: 4 (1T+3P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1C

SYLLABUS

Theory: Introduction to qualitative analysis; solubility products (K_{sp}) and their application in qualitative analysis; Reactions characteristics of cations and anions; Isolation, characterization and separation techniques and their identification by systematic analysis of cations and anions; Analyses of minerals in food - theoretical; Qualitative organic analysis.

Practice: General properties of cations; wet and dry analysis; Systematic analytical cations march; Anions identification; Identification of organic compounds; Analysis of minerals in foods - practice.

BASIC BIBLIOGRAPHY

VOGEL, A. **Química Analítica Qualitativa**, 5th edition; Editora Mestre Jou, São Paulo, 1981.
BACCAN, N., ALEIXO, L.M., STEIN, E. GODINHO, E.S. **Introdução à semimicroanálise Qualitativa**, 4th edition; Campinas: Unicamp, 1991.
VAITSMAN, D.S.; BITTENCOURT, O.A.; PINTO, A. **Análise Química Qualitativa**, 1981.

COMPLEMENTARY BIBLIOGRAPHY

SCOOG, D.A; WEST, D.M. **Química Analítica**. São Paulo. MacGraw-Hill, 2000.

Curriculum Contents ORGANIC CHEMISTRY		Code: 2D	Period: 2 nd semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1C

SYLLABUS

Introduction to Organic Chemistry; The chemistry of carbon compounds; Physical and chemical properties of organic compounds; Organic functions: hydrocarbons, aldehydes and ketones, carboxylic acids and their derivatives; Amines, alkalis, alcohols, phenols, ethers; Sulphur organic compounds; Halogenated compounds; Isomerism; Organic reactions; Experimental part: General Safety Procedures in Laboratories of organic Chemistry; Determination of the melting point of a substance; Determination of the Boiling Point of a Substance; Vacuum filtration and recrystallization; Simple distillation; Fractional distillation and by vapour drag; Liquid-Liquid extraction; Qualitative organic analysis.

BASIC BIBLIOGRAPHY

SOLOMONS, T. W. G. **Química Orgânica**. V.1, 2nd edition; Rio de Janeiro: LTC. 2009. 698p.
SOLOMONS, T. W. G. **Química Orgânica**, V.2. 9th edition; Rio de Janeiro: LTC, 2009. 494p.
ALLINGER, N.L; CAVA. M.P.; JONGH, D.C. **Química Orgânica**. 2nd edition; Rio de Janeiro: LTC, 1976. 961p.

COMPLEMENTARY BIBLIOGRAPHY

PAVIA, D.L.; LAMPMAN, G.M.; KRIZ, G.S.; ENGEL, R.G. **Química Orgânica Experimental – Técnicas de escala pequena**. 2nd edition; Porto Alegre: Bookman, 2009. 880p.
VOGEL'S. **A Textbook of Practical Organic Chemistry**. Longman Scientific & Technical, N.Y. 1989, 5th edition.

VOGEL, **Química Orgânica**, Vol. I, II e III, Ao Livro Técnico - EDUSP, 1985.

Curriculum Contents EXPERIMENTAL PHYSICS I		Code: 2E	Period: 2 nd semester
Credits: 4 (1T+3P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1B

SYLLABUS

Theory of Errors; Readings and Measurements; Standard deviation; Error propagation; Curve linearization; Construction and analysis of graphs involving physical quantities, one-dimensional kinematics; Acceleration of gravity by different processes; Experiments on the laws of mechanics conservation; Experiments on simple and compound pendulum, or physical experiment involving static rigid body (Varignon theorem); Hydrostatic experiment; Experiment on the Stokes law; Experiment on topics of thermal physics; Experiment on Joule-Calorie equivalence; Experiments involving dissipative forces.

BASIC BIBLIOGRAPHY

HALLIDAY, D. RESNICK, R., WALKER, J. **Fundamentos da Física: Mecânica**. V. 1, 8th edition; Rio de Janeiro: LTC. 2009. 368p.
HALLIDAY, D. RESNICK, R., WALKER, J. **Fundamentos da Física: Gravitação, Ondas e Termodinâmica**. V. 2. 8th edition; Rio de Janeiro: LTC. 2009. 310p.
BARTHEM, B. R., **Tratamento e Análise de dados em Física Experimental**. Ed. Universidade Federal do Rio de Janeiro (UFRJ).

COMPLEMENTARY BIBLIOGRAPHY

TIPLER, P. A.; MOSCA, G. **Física**. V. 1, 5th edition; Rio de Janeiro: LTC. 2006. 793p.
TIPLER, P. A.; MOSCA, G. **Física**. V. 2, Rio de Janeiro: LTC.
VUOLO, J. H. **Fundamentos de Teoria de Erros**. Editora Edgar Blucher Ltda., São Paulo.

Curriculum Contents EXPERIMENTAL STATISTICS		Code: 2F	Period: 2 nd semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: None

SYLLABUS

Introduction to Statistics: Concepts and Definitions, Descriptive Statistics: Concepts, methodologies and statistical techniques; Data survey; Technical tabulation and representation of data in tables; Frequency distribution; Calculation of measures of central tendency (mean, median, mode); Dispersion measures (average deviation, coefficient of variation, variance, standard deviation); Graphical representations: data, lines, bar, column, sectors; Frequency distribution, measures of central tendency, dispersion and asymmetry; Probability and statistical errors; Basics of probability and statistics; Mean and variance; Confidence intervals; Tests of significance; ANOVA; Least-squares linear regression; Linear Regression and Correlation; Estimating Uncertainties; Applying statistics in laboratory: Using Spreadsheets for data input and statistical treatment of analytical data.

BASIC BIBLIOGRAPHY

DOWNING, D.; CLARK, J. **Estatística Aplicada**. 2nd edition. São Paulo: Saraiva, 2005.
BARBETTA, P. A.; REIS, M. M.; BORNIA, A. C. **Estatística para cursos de engenharia e informática**. 3rd edition. São Paulo: Atlas, 2010.

CRESPO, A. A. **Estatística Fácil**. 18th edition. São Paulo: Saraiva, 2002.

COMPLEMENTARY BIBLIOGRAPHY

MARTINS, G. A; FONSECA, J. S. **Curso de Estatística**. 6th edition. São Paulo: Atlas, 2006.
VIEIRA, S. **Estatística Experimental**. 2nd edition. São Paulo: Atlas, 2006
CIENFUEGOS, F. **Estatística Aplicada ao Laboratório**. Rio de Janeiro: Interciência, 2005.
HOFFMANN, R., VIEIRA, S. **Elementos de Estatística**. 4th edition. São Paulo: Atlas, 2006.

Curriculum Contents INSTRUMENTAL PORTUGUESE		Code: 2G	Period: 2 nd semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites:		None	

SYLLABUS

Fundamentals of communication in public speaking and presentation; Techniques and strategies for oral communication; Planning and preparation of meetings and seminars; The communication in group work; Business/institutional communication troubleshooting; Business/institutional writing: Memorandum, Curriculum Vitae, Memento, Report; Employment of norms in technical work.

BASIC BIBLIOGRAPHY

AZEVEDO, I. B. de. **O prazer da produção científica: diretrizes para a elaboração de trabalhos científicos**. 10. edition; São Paulo: Hagnos, 2001.
BAZERMAN, C., DIONISIO, A.P., HOFFNAGEL, J.C. **Gêneros textuais, tipificação e interação**. 2nd edition; São Paulo: Cortez. 2006. 67p.
DISCINI, N. **Comunicação nos textos**. São Paulo: Contexto, 2005.

COMPLEMENTARY BIBLIOGRAPHY

DIONÍSIO, A.P.; BEZERRA, M. de S. (Orgs.). **Tecendo textos, construindo experiências**. Rio de Janeiro: Lucerna, 2003.
KOCH, I.V. **A Coesão textual**. 19th edition; São Paulo: Contexto, 2004.
KOCH, I.V.; TRAVAGLIA, L.C. **A Coerência Textual**. 16th edition; São Paulo: Contexto, 2004.

Curriculum Contents CELL BIOLOGY AND GENETICS		Code: 2H	Period: 2 nd semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs
Prerequisites:		None	

SYLLABUS

General Organization of Cells and Viruses; Methods for studying Cells; Chemical Composition of the Cell; Biological Membranes and Intracellular Digestion; Mitochondria; Plant Cell; Cytoskeleton and Cell Movement; Core; Cell Cycle; Endoplasmic reticulum and Golgi apparatus; Cell Differentiation; Fundamental principles of genetic engineering and its correlation with fresh and processed food; Organisms and genetically modified plants; Cell evolution; prokaryotic and eukaryotic cell; Cell chemistry; Structure and physiology of the cytoplasmic components of eukaryotic cells; Plasma membrane; Principles of optical microscopy: notions of optical microscopy, electron microscopy scanning, fluorescence microscopy, dark background microscopy, phase contrast microscopy, scanning tunnelling microscopy, and atomic force microscopy; Main reagents used in microscopy; Sample preparation for microscopic analysis.

BASIC BIBLIOGRAPHY

JUNQUEIRA, L.C.U., CARNEIRO, J. **Biologia celular e molecular**. 6th edition; Rio de Janeiro:

Guanabara Koogan, 1997. 299p.

GRIFFITHS, A J.F., MILLER J. H. SUZUKI, D. T., LEWONTIN, R. C.; GELBART, W. M. **Introdução à Genética**. 7th edition; Rio de Janeiro: Guanabara Koogan. 2002.

ALBERTS, B., BRAY, D., HOPKIN, K. et al. **Fundamentos da Biologia celular**. Porto Alegre: Artmed. 2006. 864p. (with CD ROM)

COMPLEMENTARY BIBLIOGRAPHY

DE ROBERTS, E. M. F. & HIB, J. **Bases da Biologia Celular e Molecular** – 4th edition; Rio de Janeiro: Guanabara Koogan. 2006. 389p.

GARDNER, ELTON J. **GENÉTICA**. Rio de Janeiro: Guanabara Koogan, 1977. 503p.

3rd semester

Curriculum Contents CALCULUS III		Code: 3A	Period: 3 rd semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 2A

SYLLABUS

Series; Convergence Criteria; Series of functions; Taylor series; Differential and Vector Integral Calculus; Derived functions in implicit form; Understanding of Partial Differential Equations; Double and triple integrals.

BASIC BIBLIOGRAPHY

BRAUN, Martin. **Equações Diferenciais e suas aplicações**. Rio de Janeiro: Campus. 1979
GUIDORIZZI, H.L. **Um curso de Cálculo** – Col. V.1, 2, 3 e 4. Rio de Janeiro: LTC.
AYRES JR, F. **Equações Diferenciais**, Coleção Schaum. São Paulo: McGraw-Hill do Brasil

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LEITHOLD, L. **O cálculo**. 2nd edition; São Paulo: Harbra, 1982. 2 vol.
FLEMMING, D. M., GONÇALVES, M. B. **Cálculo A**. 5th edition; São Paulo: Makron, 1992.
STEWART, J. **Cálculo**. V. 1st edition; São Paulo: Pioneira, 2009. 686 p.
STEWART, J. **Cálculo**. V. 2nd. edition; São Paulo: Pioneira, 2009. 664 p.

Curriculum Contents PHYSICS III		Code: 3B	Period: 3 rd semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 2B

SYLLABUS

Coulomb's Law and electric field; Gauss' Law; Electric potential; Capacitors and dielectrics; Electric currents; Resistance and electromotive force; Circuits and instruments DC; Magnetic field of a current; Magnetic Forces on bearing currents; Induced electromotive force; Circuits AC; Magnetic properties of matter; Alternating currents; Electromagnetic oscillations; Maxwell's equations; Electromagnetic waves.

BASIC BIBLIOGRAPHY

HALLIDAY, D. RESNICK, R. WALKER, J. **Fundamentos de Física: Eletromagnetismo**. V.3. 8th edition; Rio de Janeiro: LTC, 2009. 394p.
HALLIDAY, D. RESNICK, R. WALKER, J. **Fundamentos de Física: Óptica e Física Moderna**. V. 4. 8th edition; Rio de Janeiro: LTC, 2009. 444p.
NUSSENZVEIG, H. M. **Curso de Física Básica: Eletromagnetismo**. V.3. 1st edition; São Paulo: Edgard Blücher. 2001. 323p.

COMPLEMENTARY BIBLIOGRAPHY

PURCELL, E. M. **Curso de Física de Berkeley – Eletricidade e Magnetismo**. Vol. II. São Paulo: Edgard Blücher Ltda.
TIPLER, P. A. **Física**. Vol. III. Rio de Janeiro: LTC.
SEARS, F. W.; ZEMANSKY, M. W. **Física**. Vol. III. Rio de Janeiro: LTC



Curriculum Contents QUANTITATIVE ANALYTICAL CHEMISTRY	Code: 3C	Period: 3 rd semester
Credits: 4 (1T+3P)	Type: Presential	Workload: 60 hrs

Prerequisites: 2C

SYLLABUS

Theory: Fundamentals of volumetric analysis; Classification of reactions used in volumetry; Neutralization volumetry; Precipitation volumetry; Oxidation-reduction volumetry; Complexometric titration; Potentiometric titration; Fundamentals of gravimetric analysis; Precipitation gravimetry; Operations of gravimetric analysis.

Practice: Calibration of volumetric glassware; Preparation and properties of buffer solution; Acidity indicator properties; Precipitation titrations: Mohr's method; Volhard's method; Neutralization titrations: standardization of NaOH, HCl, acetic acid dosage in vinegar; Redox titrations: permanganometry, iodometric, standardization of sodium thiosulfate; Complexometric with EDTA titrations; Gravimetric determinations: purity content in substances.

BASIC BIBLIOGRAPHY

BACCAN, N. et al. **Química analítica quantitativa elementar**. 3rd edition; rev., ampl. e reest. São: Paulo: Edgard Blucher. 2004.
VOGEL, A. **Análise Química Quantitativa**. 6th edition; Rio de Janeiro: LTC, 2002.
HARRIS, D. C. **Análise química quantitativa**. 7th edition. Rio de Janeiro: LTC, 2008.

COMPLEMENTARY BIBLIOGRAPHY

BASSETT, J.; MENDHAM. **Vogel: Análise Química Quantitativa**. 6th edition; Rio de Janeiro: LTC, 2002.
HIGSON, S. **Química Analítica**. 1st edition; Ed. McGraw-Hill Brasil. 2009.

Curriculum Contents MECHANISMS OF ORGANIC REACTIONS	Code: 3D	Period: 3 rd semester
Credits: 4 (3T+1P)	Type: Presential	Workload: 90 hrs

Prerequisites: 2D

SYLLABUS

Study of organic functions; Mechanisms of main reactions; Electrophilic substitution: aromatic, aliphatic, kinetic; Relationship between structures and physical properties of organic compounds, their main methods of obtaining, and reactions; Reactions of aldehydes and ketones; carboxylic acids and their derivatives; Nitrogen organic compounds; Phenols and aryl halides; Heterocyclic reactions, cycloaddition of beta-dicarbonyl compounds and polymerization.

BASIC BIBLIOGRAPHY

SOLOMONS, T. W. G. **Química Orgânica**. V.1, 2nd edition; Rio de Janeiro: LTC. 2009. 698p.
SOLOMONS, T. W. G. **Química Orgânica**, V.2. 9th edition; Rio de Janeiro: LTC, 2009. 494p.
ALLINGER, N.L.; CAVA. M.P.; JONGH, D.C. **Química Orgânica**. 2nd Edition; Rio de Janeiro: LTC, 1976. 961p.

COMPLEMENTARY BIBLIOGRAPHY

VOGEL, **Química Orgânica**, Vol. I, II e III, Ao Livro Técnico. São Paulo:EDUSP, 1985.

Curriculum Contents BIOCHEMISTRY		Code: 3E	Period: 3 rd semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 2D

SYLLABUS

The structure of the main chemical compounds of living beings; Study of Factors that Regulate Enzymatic Reaction; Intermediary Metabolism of carbohydrates, lipids and amino acids; Production and use of energy by living beings; Molecular biology; Metabolic integration and regulation; The effect of the environment on cellular activity; Biological oxidations and energy transfer; Degradation of carbohydrates; Anaerobic fermentations; Glycolysis via Enter-Doudoroff; Heterolactic fermentation; Fermentation of butyric acid and butanol; Mixed acid fermentation; Monophosphate oxidation; Aerobic oxidation of pyruvate; The tricarboxylic acid cycle; Glyoxylic acid cycle. Accumulation of amino acids; Glutamic acid production; Lysine production; Accumulation of aromatic amino acids; Major molecular biology techniques.

BASIC BIBLIOGRAPHY

LEHNINGER, et al **Princípios de Bioquímica**. 4th edition; . São Paulo: Sarvier, 2006.
MARZZOCO, A.; TORRES, B.B. **Bioquímica Básica**, Rio de Janeiro, Guanabara Koogan, 1999.
VOET, D.; VOET, J.G.; PRATT, C.W. **Fundamentos de Bioquímica**. Porto Alegre: Artes Médicas Sul Ltda., 2000.

COMPLEMENTARY BIBLIOGRAPHY

MONTGOMERY, R.; CONWAY, T.W.; SPECTOR, A. A. **Bioquímica: uma abordagem dirigida por casos**. Porto Alegre: Artmed, 1994.

Curriculum Contents HUMAN RELATIONS		Code: 3F	Period: 3 rd semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: None

SYLLABUS

Personality structure; Human communication; Subjectivity in social ties; The individual and the group; Interpersonal development; Conflict management; New models of leadership. The modern management strategy; The executive action; Foundations of ethics; Coverage of ethics; Ethics and religion; Ethics and morals; Moral sense and conscience; The freedom; Ethics and social life; Ethics in politics; Professional ethics: personal and social dimensions; Understanding the concepts and practices relating to the management and development of human resources in organizations; Focusing on labour relations in the current context and its prospects in the industries. The process of communication, training and management of groups and teams.

BASIC BIBLIOGRAPHY

ARRUDA, M.C.C. **Fundamentos de ética empresarial e econômica**. São Paulo: Atlas, 2001.
BERGAMINI, C.W. **Liderança: administração do sentido**. São Paulo: Atlas, 1994.
BOWDITCH, J.L. **Elementos de Comportamento Organizacional**. São Paulo: Pioneira, 2004.

COMPLEMENTARY BIBLIOGRAPHY

DESSEN, M. A. e Costa Jr., A. L. **A ciência do desenvolvimento humano: tendências atuais e perspectivas futuras**. Porto Alegre: Artmed, 2005.
DUBAR, C. **A socialização: construção das identidades sociais e profissionais**. São Paulo: Martins Fontes, 2005.



- PAPALIA, D.; OLDS, S. W.; FELDMAN, R. D. **Desenvolvimento humano**. Porto Alegre: Artmed, 2006.
- RENESCH, J. **Liderança para uma nova era**. São Paulo Cultrix, 1994.
- SÁ, A. L. **Ética profissional**. 6th edition; São Paulo: Atlas, 2005.
- SEN, A. **Sobre ética e economia**. São Paulo: Cia das Letras, 1999.
- TAILLE, Y. **Moral e ética: Dimensões intelectuais e afetivas**. Porto Alegre: Artmed. 2006.
- VÁZQUEZ, A. S. **Ética**. 23rd edition; Rio de Janeiro: Civilização Brasileira, 2002.
- VRIES, M., KETS, F. R. **Liderança na Empresa**. São Paulo: Atlas, 1997.

Curriculum Contents GENERAL MICROBIOLOGY		Code: 3G	Period: 3 rd semester
Credits: 4 (2T+2P)	Type: Presential	Workload: 60 hrs	

Prerequisites: 2F

SYLLABUS

Theory: Characterization and classification of microorganisms; Microbial growth curve; Nutrition and cultivation of microorganisms; The main groups of microorganisms; Morphology, physiology, reproduction, classification and growth of microorganisms;

Practice: Techniques of microbiology laboratory; Bio safety standards; Principles of optical microscopy; Basic procedures for disinfection; Sterilization and material preparation; Microscopy; Cultivation of microorganisms.

BASIC BIBLIOGRAPHY

- CASE, C.L., FUNKE, B.R, TORTORA, G.J. **Microbiologia**. Porto Alegre: Artmed, 2005.
- PELCZAR JR, M.; REID, R.; CHAN, E. C. S. **Microbiologia: Conceitos e Aplicações**. Vol 1. São Paulo: Mac Graw Hill do Brasil, 1996.
- MADIGAN, M.T.; MARTINKO, J.M.; PARKER, J. **Microbiologia de Brock**, São Paulo, 10th edition, Pearson Prentice Hall, 2004, 624p.

COMPLEMENTARY BIBLIOGRAPHY

- BARBOSA, H.R.; TORRES, B.B. **Microbiologia Básica**. São Paulo: Editora Atheneu, 1998.
- FRANCO, B.D.G.M.; LANDGRAF, M. **Microbiologia dos Alimentos**. São Paulo: Editora Atheneu, 2005.
- JAY, J. M. **Microbiologia de Alimentos**. Porto Alegre: Artmed, 2005.

Curriculum Contents EXPERIMENTAL ORGANIC CHEMISTRY		Code: 3H	Period: 3 rd semester
Credits: 4 (0T+4P)	Type: Presential	Workload: 60 hrs	

Prerequisites: 2D

SYLLABUS

Laboratory practice of the disciplines: Organic Chemistry and Mechanisms of Organic Reactions; Health and Safety in chemistry laboratories; Determination of physical properties of organic compounds; Solvent extraction; Purification of solids by recrystallization; Distillation: simple, fractional and by steam drag; Thin-layer and column chromatography; Functional transformations.

BASIC BIBLIOGRAPHY

- SOLOMONS, T. W. G. **Química Orgânica**. V.1, 2nd edition; Rio de Janeiro: LTC. 2009. 698p.
- SOLOMONS, T. W. G. **Química Orgânica**, V.2. 9th edition; Rio de Janeiro: LTC, 2009. 494p.
- PAVIA, D.L.; LAMPMAN, G.M.; KRIZ, G.S.; ENGEL, R.G. **Química Orgânica Experimental –**

Técnicas de escala pequena. 2nd Edition; Porto Alegre: Bookman, 2009. 880p.

COMPLEMENTARY BIBLIOGRAPHY

ZUBRICK, J.W. **Manual de sobrevivência no laboratório de química orgânica: guia de técnicas para o aluno.** Rio de Janeiro: LTC. 2005. 262p.

VOGEL'S. **A Textbook of Practical Organic Chemistry.** Longman Scientific & Technical, N. Y. 1989, 5th edition;

4th SEMESTER

Curriculum Contents NUMERICAL CALCULATION		Code: 4A	Period: 4 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 3A

SYLLABUS

Systems of linear equations: algebraic methods and iterative; Resolution of polynomial equations; Resolution of transcendental equations; Numerical interpolation; Numerical differentiation; Numerical integration; Numerical solutions of differential equations.

BASIC BIBLIOGRAPHY

BARROSO, L.C.; BARROSO, M.A.; CAMPOS FILHO, F. F.; CARVALHO, M.L.B.; MAIA, L. **Cálculo numérico com aplicações**. 2nd edition; São Paulo: Harbra, 1987. 367p
RUGGIERO, M.A.G.; LOPES, V.L.R. **Cálculo Numérico: Aspectos Teóricos e Computacionais**. 2nd Edition; São Paulo: Makron Books, 1996. 410p.
CARDOSO, A.B.; CUNHA, R. **Introdução ao Cálculo Numérico**. Série do Instituto de Matemática, UFRGS, 2002.

COMPLEMENTARY BIBLIOGRAPHY

ROQUE, W. L. **Introdução ao Cálculo Numérico**. São Paulo: Atlas, 2000.
CLAUDIO, D.M.; MARINS, J.M. **Cálculo numérico computacional: teoria e prática**. São Paulo: Atlas, 1994.

Curriculum Contents INTRODUCTION TO FOOD SCIENCE		Code: 4B	Period: 4 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites:	None		

SYLLABUS

Introduction, Fundamental Concepts; Feeding throughout history; Feeding purposes; Nutrition phases; Classification of foods; fundamental laws of nutrition; Study of nutrients: concepts, chemical composition, classification, functions, calorie and food sources; Carbohydrates; Lipids, Proteins, Vitamins, Minerals, Fibres, Water; Study of food groups and food pyramid: meats, milk, eggs, cereals, legumes, vegetables, fruits.

BASIC BIBLIOGRAPHY

PHILIPPI, S. T. **Nutrição e Técnica Dietética**. 2nd edition; : Manole, 2006.
DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition. Porto Alegre: Artmed, 2010.
MAHAN, L. K.; ESCOTT-STUMP-KRAUSE. **Alimentos, nutrição e dietoterapia**. 11th edition; : Roca, 2005.

COMPLEMENTARY BIBLIOGRAPHY

CUPPARI, L. **Nutrição Clínica no Adulto**. 2nd edition; : Manole, 2005.
PENTEADO, M. V. C. **Vitaminas - Aspectos Nutricionais, Bioquímicos, Clínicos e Analíticos**. 1st edition; Manole, 2002.
EVANGELISTA, J. **Alimentos: um estudo abrangente**. 2nd edition; Atheneu, 2000.
DUTRA-DE-OLIVEIRA, J. E.; MARCHINI, J. S. **Ciências Nutricionais**. 1st edition; Sarvier, 1998.

SGARBIERI, V.C. **Proteínas em alimentos protéicos - propriedades, degradações, modificações.** São Paulo: Varela, 1996.
 BAUERNFEIND, J.C.; LACHANCE, P.A. **Nutrient additions to food; nutritional, technological and regulatory aspects.** Trumbull: Food & Nutrition Press, 1991.
 LAZLO, H.. **Química de Alimentos: Alteração dos Componentes Orgânicos.** 1st edition; Nobel, 1986.
 MULLER, M. G.; TOBIN, G. Z. **Nutrición y Ciencia de los alimentos.** 1st edition; Espanha: Acribia Zaragoza, 1986.
 CHEFTEL, J. C.; CHEFTEL H. **Introducción a la bioquímica y tecnología de los alimentos.** 1st edition; Espanha: Acribia, 1983.

Curriculum Contents FLUID MECHANICS		Code: 4C	Period: 4 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 3A e 2B

SYLLABUS

Physical properties of fluids; Dimensional analysis and similarity; Kinematics of fluid particle; Theory of elementary movement of fluid particle; Movements; Swirling and non-swirling; Individual movements; Fundamental equations of fluid mechanics; Kinematic behaviour of real fluids; Continuity equation; Equation of motion quantity; Moment equation of quantity movement; Equation of kinetic energy; Principles of thermodynamics; General equations of fluid statics; Fluid balance in the gravity field (or hydrostatic); Balance of compressible fluids in the gravity field (or aerostatic); Physics of surfaces, general properties and equations of perfect fluid dynamics; Applications of perfect fluid dynamics; General equations and properties of real fluid dynamics in laminar movement; Reynolds transport theorem; Elements of the dynamic boundary layer; Fluid action on obstacles; Fundamentals of turbulent flow; Permanent fluid mechanics; Application to circular duct section; Incompressible flow in conduits under pressure; Installations of pumps and reaction turbines; Water hammer; Permanent one-dimensional gas flow in conduits; Flow in channels; Hydraulic networks.

BASIC BIBLIOGRAPHY

FOX, R.W.; MCDONALD, A.T.; PRITCHARD, P.J. **Introdução à Mecânica dos Fluidos.** 7th edition; Rio de Janeiro: LTC. 2010. 728p.
 BIRD, R. B.; STEWART, W.E.; LIGHTFOOT, N.R. **Fenômenos de Transporte.** 2nd edition; Rio de Janeiro: LTC. 2004. 808p.
 LIVI, C.P. **Fundamentos de fenômenos de transporte.** Rio de Janeiro: LTC. 2004.

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BRAGA FILHO, W. **Fenômenos de transporte para engenharia.** Rio de Janeiro: LTC. 2006.
 MUNSON, B. **Fundamentos da Mecânica dos Fluidos.** 4th edition; São Paulo: Edgard Blücher 2004. 584p.
 OLIVEIRA, L.A.; LOPES, A.G. **Mecânica dos fluidos.** 3th edition; São Paulo: ETEP. 2010.792p.

Curriculum Contents PHYSICAL CHEMISTRY		Code: 4D	Period: 4 th semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 3A e 2B

SYLLABUS



Distribution functions; Kinetic theory of gases; Transport properties; Speed of chemical reactions; Empirical chemical kinetics; Kinetics of complex reactions; Photochemical reactions; Catalysts; Chemical reaction dynamics; Collision theory; Theory of activated complex; Controlled reactions by diffusion; Dynamics of molecular collisions; Processes on solid surfaces; Growth and structure; Adsorption; Isotherms; Catalytic activity.

BASIC BIBLIOGRAPHY

ATKINS, P. W. **Fundamentos de Físico-Química**. 3rd edition; . Rio de Janeiro: LTC, 2003. 488p.
MOORE, W. **Físico-Química**. V. 1 e 2. 1st edition; São Paulo: Edgar Blücher, 2000.
CASTELLAN, G. **Fundamentos de Físico-química**, 1st edition; Rio de Janeiro: LTC. 1986. 527p.

COMPLEMENTARY BIBLIOGRAPHY

BUENO, W.A.; DEGRÈVE, L. **Manual de Laboratório de Físico-Química**, Editora McGraw-Hill do Brasil.

Curriculum Contents MICROBIOLOGICAL ANALYSIS OF FOOD	Code: 4E	Period: 4 th semester
Credits: 4 (1T+3P)	Type: Presential	Workload: 60 hrs

Prerequisites: 3G

SYLLABUS

Theory: Intrinsic and extrinsic factors affecting the development of microorganisms in foods; Curve of microbial growth in foods; Microorganisms of importance in major food groups; Sources of microbial contamination of food; Microbial control in foods: physical and chemical methods of preservation; The role of microorganisms in food production; Microorganisms and public health: food poisoning; Parasites; Protozoa and myiasis.

Practice: Biochemical tests for identification; Rapid methods for detection; Practical Training; Counting and identification of microorganisms: yeast and mold count; Count of total and fecal coliforms; Lactic acid bacteria count; Count of reducer clostridium sulphite; Identification of species of food interest.

BASIC BIBLIOGRAPHY

FORSYTHE, S. J. **Microbiologia da Segurança Alimentar**. Porto Alegre: Artmed, 2002.
FRANCO, B.D.G.M.; LANDGRAF, M. **Microbiologia dos Alimentos**. São Paulo: Atheneu, 2005.
JAY, J. M. **Microbiologia de Alimentos**. Porto Alegre: Artmed, 2005.

COMPLEMENTARY BIBLIOGRAPHY

BARBOSA, H.R.; TORRES, B.B. **Microbiologia Básica**. São Paulo: Editora Atheneu, 1998.
PELCZAR JR, M.; REID, R., CHAN, E. C. S. **Microbiologia: Conceitos e Aplicações**. V.2. São Paulo: Mac Graw Hill do Brasil, 1996.

Curriculum Contents INSTRUMENTAL METHODS OF FOOD ANALYSIS	Code: 4F	Period: 4 th semester
Credits: 2 (2T+0P)	Type: Presential	Workload: 30 hrs

Prerequisites: 3C

SYLLABUS

Theory: Introduction to the instrumental method; Theoretical foundations and applications of analytical spectrometry; Conductometry, potentiometry and chromatography (spectrophotometry UV / Vis, flame photometry, IR spectrophotometry, atomic absorption spectrophotometry, mass spectrometry, thin layer chromatography, column chromatography, gas chromatography, high performance liquid chromatography, Conductometry, potentiometry, polarography, refractometry); Interference in instrumental analysis;

Instrumental calibration: calibration curve, internal and external standardization; Processing of data and calculation results.

Practice: Preparation of analytical standards; Construction of spectrophotometric calibration curve; Application of spectrophotometry UV / Vis in food; Application of Flame Photometry in food; Application of atomic absorption spectrometry in foods; Application of Potentiometry, Conductometry, Retinoscopy and Polarography in food; Chromatographic applications in foods.

BASIC BIBLIOGRAPHY

SKOOG, D.; HOLLER, F. J.; NIEMAN, T. A. **Princípios de análise instrumental**. 5th edition; Porto Alegre: Bookman, 2002.

HARRIS, D. C. **Análise química quantitativa**. 7th edition; Rio de Janeiro: LTC. 2008.

CIENTIFUEGOS, F.; VAITSMAN, D. **Análise Instrumental**. Rio de Janeiro: Interciência. 2000.

COMPLEMENTARY BIBLIOGRAPHY

Curriculum Contents QUALITY MANAGEMENT		Code: 4G	Period: 4 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites:		None	

SYLLABUS

History of quality and its definitions: quality, quality system and quality management; Principles of quality management; Quality assurance; Basic tools for quality control: data collection sheet, Pareto diagram, stratification; Cause and effect diagram; Histogram; Scatter diagram; Control chart; Quality Systems and its updates; Applications and procedures (ISO 9000, ISO 14000 and ISO 20000); Certification and accreditation; definitions, applications, certification bodies for quality systems and accreditation, such as ABNT, ISO and INMETRO).

BASIC BIBLIOGRAPHY

PALADINI, E.P. **Gestão da qualidade: teoria e prática**. 1st edition; : Atlas, 2001.

BRASSARD, M. **Qualidade: Ferramentas para uma melhoria contínua**. 1st edition; : Qualitymark, 1991.

MIGUEL, P. A. C. **Qualidade: enfoques e ferramentas**. 1st edition; : Artiliber, 2001.

COMPLEMENTARY BIBLIOGRAPHY

ABNT. **NBR ISO 9001 - Sistemas de gestão da qualidade – Requisitos**, 2000.

ABNT. **NBR ISO 14001 - Sistemas de gestão ambiental - Especificação e diretrizes para uso**, 1996.

ABNT. **NBR ISO 9004 - Sistemas de gestão da qualidade - Diretrizes para melhoria de desempenho**, 2000.

ABNT. **NBR ISO 22000 - Sistemas de Gestão da Segurança de Alimentos – Requisitos para qualquer organização da cadeia de alimentos**, 2005.

BIANCO, M.F.; SALERNO, M.S. **Como o tqm opera e o muda nas empresas? Um estudo a partir de empresas líderes no Brasil**. Gestão e Produção. 2001.

CAMPOS, V. F. **TQC: Controle da qualidade total**. 1st edition; : Fundação Christiano Ottoni, 1992.

GITLOW, H. S. **Planejando a qualidade, a produtividade e a competitividade**. 1st edition; : Qualitymark, 1993.

HAROLDO, R. **5S - A Base para a Qualidade Total**. 2nd edition; : Casa da Qualidade, 1996.

MELLO, C.H.P.; SILVA, C.E.S.; TURRIONI, J.B.; de SOUZA, L.G.M. **Sistema de gestão da qualidade para operações de produtos e serviços: ISO 9001:2000**. 1st edition; São Paulo: Atlas, 2002.

PALADINI, E.P. **Controle de qualidade: Uma abordagem abrangente**. 1st edition; : Atlas, 1989.



Curriculum Contents PHYSICS IV	Code: 4H	Period: 4 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 3B

SYLLABUS

Microscopic theory of electrical conduction; Magnetic field; Absence of magnetic monopoles: divergence of $B = 0$; Sources of magnetic fields; Magnetic induction; Alternating current circuits; Electrostatic field as a conservative field; Microscopic theory of electrical conduction; Maxwell's equation: Scalar and vector potentials; Dielectric and magnetic materials; Electromagnetic energy.

BASIC BIBLIOGRAPHY

REITZ, J.R., MILFORD, F.J.; CHRISTY, R.W. **Fundamentos da Teoria Eletromagnética**. Rio de Janeiro: Campus. 1982. 516p.
NUSSENZVEIG, H. M. **Curso de Física Básica: Eletromagnetismo**. V.3. 1st edition; São Paulo: Edgard Blucher. 2001. 323p.
HALLIDAY, D. RESNICK, R. WALKER, J. **Fundamentos de Física: Eletromagnetismo**. V.3. 8th edition; Rio de Janeiro: LTC, 2009. 394p.

COMPLEMENTARY BIBLIOGRAPHY

WANGSNESS, R. K., **Electromagnetic Fields**. John Wiley & Sons.
FEYNMAN, R., LEIGHTON, R. B. e SANDS, M. L. **The Feynman Lectures on Physics**. Vol. II. Menlo Park, California. Ed. Addison-Wesley, 1963.
FRENKEL, J. **Princípios de Eletrodinâmica Clássica**. São Paulo: Edusp, 1996.
PURCELL, E.M. **Curso de Física de Berkeley – Eletricidade e Magnetismo**. V. 02. São Paulo: Edgard Blücher, 1973.

Curriculum Contents EXPERIMENTAL PHYSICS II	Code: 4I	Period: 4 th semester
Credits: 2 (2T+0P)	Type: Presential	Workload: 30 hrs

Prerequisites: 3B

SYLLABUS

Electric field; electric potential; Capacitors; Electric current and resistance; Ohm's Law; Ohmic and non ohmic elements; DC circuits; Magnetic field; Inductance; Alternating current circuits; Concept of electrical impedance; Capacitive and inductive reactance; Series and parallel resonant circuits (RLC). Use and handling of measurement instruments (multimeter, oscilloscope, function generator, power supply AC/DC). Checking of the influence of the internal resistance of voltmeters and ammeters; Verification of optical and wave phenomena: reflection, refraction, polarization, interference, diffraction and diffraction gratings.

BASIC BIBLIOGRAPHY

HALLIDAY, D. RESNICK, R. WALKER, J. **Fundamentos de Física: Eletromagnetismo**. V.3 e 4. 8th edition; Rio de Janeiro: LTC, 2009.
NUSSENZVEIG, H.M. **Curso de Física Básica: Ótica, Relatividade, Física Quântica**. V.4. 1st edition; São Paulo: Edgard Blucher. 2002. 437p.
TIPLER, P. A.; MOSCA, G. **Física para Cientistas e Engenheiros**. V.1 e 2. 1st edition; Rio de Janeiro: LTC. 2009.

COMPLEMENTARY BIBLIOGRAPHY

SEARS, F. W.; ZEMANSKY, M. W. **Física**. V. 3 e 4. Rio de Janeiro: LTC
ALONSO, M. S. & FINN, E. S. **Física**. V. II, São Paulo: Edgar Blucher.

5th SEMESTER

Curriculum Contents FOOD CHEMISTRY		Code : 5A	Period: 5 th semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 3E

SYLLABUS

Theory: The water molecule; Water-solute interaction; Water in Food; Water activity and food preservation; Variations in water activity with temperature; Lipids: hydrolytic rancidity, oxidative rancidity; Catalytic effects on hydroperoxide decomposition; Phases of oxidative rancidity; Pro oxidants and antioxidants; Properties and characteristics of the main antioxidants; Reversal; Carbohydrates: Reactivity and main chemical transformations; Maillard reaction; Caramelization reaction; Solubility and hygroscopicity of sugars; Structural polysaccharides of land plants; Starch; Carbohydrates of land plant seeds; Land plants carbohydrates exudates; Carbohydrates produced by microorganisms; Functional properties of gums; Protein: types of proteins and protein foods; proteins of animal origin; functional properties of proteins; Vitamins: types of vitamins; Vitamin stability.

Practice: Analysis of drinking water quality parameters; separation of proteins and milk lactose; Curd formation: pH and salts actions in its formation.

BASIC BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition. Porto Alegre: Artmed, 2010.

BOBBIO, F. O.; BOBBIO, P. A. **Manual de laboratório de química de alimentos**. São Paulo: Varela, 2003.

RIBEIRO, E. P.; SERAVALLI, E. **Química de Alimentos**. 2nd edition. São Paulo: Edgard Blücher, 2007.

COMPLEMENTARY BIBLIOGRAPHY

SILVA, D.J.; QUEIROZ, A.C. **Análise de alimentos: métodos químicos e biológicos**. 3rd edition; UFV, 2005.

COULTATE, T. P. **Alimentos – A Química de seus Componentes**. 3rd edition; Porto Alegre: Artmed, 2004.

Curriculum Contents FOOD BIOCHEMISTRY		Code : 5B	Period: 5 th semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 3E

SYLLABUS

Introduction to the study of the biochemistry of food; Biochemical systems in food and their behaviour during the processing technology; Natural components with biological action; Agents and mechanisms of chemical and biochemical deterioration of food; Enzymatic reactions: nature, specificity and kinetics. Relevant enzymes in the food industry: protease, amylase, lipase and pectinase. Enzymatic browning; Use of enzymes in food industries; Biochemical transformations in fruits and vegetables after harvest; Biochemical transformations in cereals; biochemical transformations in post-mortem meat and fish; Fats and sugars substitute in foods; Identification of genetically modified foods; Experimental part: Assessment of protein by Biuret and Lowry methods; Effect of pH on the catalytic activity of enzymes; Effect of pH on stability of enzymes; Study on the specificity of enzyme substrate; Effect of temperature on enzyme activity; Carbohydrate fermentation - alcohol fermentation;

Determination of glucose concentration in full fat milk and low lactose content by methods of glucose oxidase and Somogyi-Nelson; Sour taste formation in citrus fruits; Study of action of peroxidase and catalase in foods; Study of amylolytic and pectinolytic enzymes actions.

BASIC BIBLIOGRAPHY

MACEDO, G. A.; PASTORE, G. M.; SATO, H. H.; PARK, Y. G. K. **Bioquímica Experimental de Alimentos**. São Paulo: Varela, 2005
 KOBLITZ, M. G. B. **Bioquímica de Alimentos**. Editora Guanabara Koogan, 2008.
 SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotecnologia Industrial V. 3 – Processos Fermentativos e Enzimáticos**. São Paulo: Edgar Blücher, 2001. 293p.

COMPLEMENTARY BIBLIOGRAPHY

SILVA, D.J.; QUEIROZ, A.C. **Análise de alimentos: métodos químicos e biológicos**. 3rd edition; Viçosa: UFV, 2005.
 MORETO, E.; FETT, R.; GONZAGA, L.; KUSKOSKI, E.M. **Introdução à ciência de alimentos**. 2nd edition; Santa Catarina: UFSC, 2002.
 GAVA, Altanir. **Princípios e tecnologia de alimentos**. 1st edition; Nobel, 2002.
 BOBBIO, F.; BOBBIO, P. **Química do processamento dos alimentos**. 3rd edition; Varela, 2001.
 MORETO, E.; FETT, R. **Tecnologia de óleos e gorduras vegetais na indústria de alimentos**. 1st edition; São Paulo: Varela, 1998.

Curriculum Contents HEAT TRANSFER AND MASS		Code : 5C	Period: 5 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 4C e 4D

SYLLABUS

Introduction to heat transfer; Heat transfer mechanisms; Temperature distribution in solids and fluids in stationary and transient TYPE, and laminar flow; Energy equation; Natural and forced convection; Boiling, condensation and cooling; Radiation; Theories of film, boundary layer, and penetration; Fundamentals of mass transfer; Unidirectional mass transfer in laminar flow or in a solid; Equations of conservation of mass and chemical species: continuity equation for a chemical species and different systems of coordinates; Transfer in laminar flow of a fluid or solid with two independent variables; Convective mass transfer; Mass transfer between phases.

BASIC BIBLIOGRAPHY

INCROPERA, F. P.; DEWITT, D. P.; BERGMAN, T. L.; LAVINE, A. S. **Fundamentos de Transferência de Calor e de Massa**. 6th edition; Rio de Janeiro: LTC, 2008.
 BRAGA FILHO, W. **Fenômenos de transporte para engenharia**. Rio de Janeiro: LTC, 2006.
 CANEDO, E. L. **Fenômenos de Transporte**. Rio de Janeiro: LTC, 2010.

COMPLEMENTARY BIBLIOGRAPHY

LIVI, C.P. **Fundamentos de fenômenos de transporte**. Rio de Janeiro: LTC, 2004.

Curriculum Contents SENSORY ANALYSIS		Code : 5D	Period: 5 th semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 2F e 4B

SYLLABUS

Introduction; Definition; Terminology applied to sensory analysis; Factors that may modify eating habits; History of sensory analysis; Europe; United States; Brazil; The four phases in the methodology of sensory quality; Kramer circle; Scope of sensory analysis and its importance in the control of food quality; Frequently asked questions on sensory analysis; Understanding sensation and sensory perception; Principles of sensory physiology; Senses: sight, hearing, smell, taste and touch/ Kinaesthetic; Stimuli to each sense organ and transmission of nerve signals; Sense organs chemoreceptors; Sensation and perception of the sense organs; Test environments: laboratory, lighting, equipment, teams of tasters; Sample and its preparation; Submission of samples; Factors influencing the sensory analysis: personality or attitude factors; Physiological errors; Psychological errors; Requirements for selection and training of assessors; Profile of sensory characteristics of food; Methodologies in sensory analysis: discriminative methods, descriptive methods, subjective or affective methods; Experimental part: procedures for selection of tasters, taste test / intensity; odour recognition test; Difference test applied to the product; Tasters training procedures; Aspiration techniques; Flavour techniques; Texture assessment techniques.

BASIC BIBLIOGRAPHY

CHAVES, J.B.P.; SPROESSER, R.L.V. **Práticas de Laboratório de Análise Sensorial de Alimentos e Bebidas (livro texto)**. Viçosa: UFV, 1999.
ALMEIDA, T. C. A. et. al. **Avanços em análise sensorial (livro texto)**. São Paulo. Varela, 1999.
DUTCOSKY, S.D. **Análise sensorial de alimentos**. 20th edition;: Champagnat, 1996.

COMPLEMENTARY BIBLIOGRAPHY

FARIA, E.V. **Técnicas de análise sensorial**. Campinas: ITAL 2002.
Sociedade Brasileira de Ciência e Tecnologia de Alimentos. **Análise sensorial: Testes Discriminativos e Afetivos**. Campinas; São Paulo: SBCTA: PROFIQUA, 2000.
CHAVES, José Benício Paes. **Análise Sensorial – Glossário**. Viçosa: UFV, 1998.
CHAVES, José Benício Paes. **Análise Sensorial – História e Desenvolvimento**. Viçosa: UFV, 1998.
CHAVES, José Benício Paes. **Métodos de Diferença em Avaliação Sensorial de Alimentos**. Viçosa: UFV, 1998.

Curriculum Contents THERMODYNAMICS	Code :5E	Period: 5 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 4C e 4D

SYLLABUS

fundamental concepts; pure substances; Equations of state; Ideal and real gases; Thermodynamic tables; Energy; Work and heat; Conservation Law; First Law of Thermodynamics; Second Law of Thermodynamics; Entropy; Entropy generation; Irreversibility and availability (energy); Thermodynamic relations; Thermodynamic cycles.

BASIC BIBLIOGRAPHY

VAN NESS, H.C.; SMITH, J.M.; ABBOTT, M.M. **Introdução à termodinâmica da engenharia química**. 7th edition; Rio de Janeiro: LTC, 2007. 640p.
SONNTAG, R.E.; BORGNAKKE, C. **Introdução à termodinâmica para engenharia**. Rio de Janeiro: LTC, 2003.
MORAN, M. J.; SHAPIRO, H. N. **Princípios de termodinâmica para engenharia**. 6th edition; Rio de Janeiro: LTC, 2009.

COMPLEMENTARY BIBLIOGRAPHY

BEJAN, A., **Advanced Engineering Thermodynamics**, John Wiley & Sons, 1997;
KOTAS, T.J. **The Exergy Method of thermal Plants Analysis**, Krieger P. Company, 1995;
ZEMANSKY, **Heat And Thermodynamics**, Mcgraw-Hill, 1968



Curriculum Contents FUNDAMENTALS OF NUTRITION	Code : 5F	Period: 5 th semester
Credits: 3 (3T+0P)	Type: Presential	Workload: 45 hrs

Prerequisites: 3E

SYLLABUS

Digestion, absorption and metabolism of macronutrients; Introduction: Importance of the digestive tract in the processing of nutrients; Study of the digestive tract; Digestion, absorption and metabolism of carbohydrates; Digestion, absorption and metabolism of proteins; Digestion, absorption and metabolism of lipids; Bioavailability of nutrients; Introduction: Biopotency; Bioconversion; Bioavailability; Factors that influence the bioavailability of nutrients: intrinsic or physiological factors; Dietary or extrinsic factors; Interaction rating: nutrients vs. nutrients; Interactions according to their location in the body; Nutrition care to minimize the interactions; Understanding some diet-related diseases: obesity, malnutrition, diabetes mellitus, hypertension, hypercholesterolemia / hypertriglyceridemia, anaemia; Study of nutraceuticals; Pre-biotic, pro-biotic, Glutamine, Isoflavones; Omega-3 fatty acids; Processing effects on the nutritional quality of foods; Protein denaturation and degradation; Maillard reaction and caramelization; Rancidity hydrolytic and oxidative.

BASIC BIBLIOGRAPHY

TIRAPEGUI, J. **Nutrição: Fundamentos e Aspectos Atuais**. 2nd edition;; Atheneu, 2006.
SHILS, M.E.; OLSON, J. A. ; SHIKE, M.; ROSS, A. C. **Tratado de Nutrição Moderna na Saúde e na Doença**. 9th edition;; Manole, 2002.
COZZOLINO, S. M. F.. **Biodisponibilidade de Nutrientes**. 2nd edition;; Manole, 2007.

COMPLEMENTARY BIBLIOGRAPHY

RIBEIRO, E. P.; SERAVALLI, E. A. G. **Química de Alimentos**. 2nd edition;; Edgard Blücher, 2007.
PHILIPPI, Sonia Tucunduva. **Nutrição e Técnica Dietética**. 2nd edition;; Manole, 2006.
MAHAN, L. Kathleen; ESCOTT-STUMP-KRAUSE. **Alimentos, nutrição e dietoterapia**. 11th edition;; Roca, 2005.
CUPPARI, LILIAN. **Nutrição Clínica no Adulto**. 2nd edition;; Manole, 2005.
WAITZBERG, D. L. **Nutrição oral, enteral e parenteral na prática clínica**. 3rd edition;; Atheneu, 2005.
MORETO, Eliane; FETT, Roseane; GONZAGA, Luciano; KUSKOSKI, Eugênia Marta. **Introdução à ciência de alimentos**. 2nd edition;; UFSC, 2002.
MONTEIRO, B. J. **O papel dos macronutrientes na dieta**. *Endocrinologia & Metabologia*; 45(4), 2001.

Curriculum Contents INTRODUCTION TO ENVIRONMENTAL MANAGEMENT	Code : 5G	Period: 5 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: None

SYLLABUS

Theory: Understanding ecology; Systems ecology: structure and functioning of ecosystems, energy flow and matter in ecosystems; Ecosystem types and their characteristics; Natural resources and renewable resources; Importance of the maintenance of plant and animal biodiversity; Concepts of sustainability; Use and Conservation; Environmental aspects in industrial processes: good environmental practices; Cleaner production; Normative/standards ISO 14000-14001, 14004; Environmental management instruments; Current model of environmental management.; Environmental impact: characteristics, identification, methods of environmental impact assessment (EIA); Principles of environmental biotechnology; Environmental ethics: Corporate Social

Responsibility (CSR) and Sustainable Development (SD); Introduction to strategies for minimization and waste treatment; Characteristics of waste in the food industry; Treatment of gaseous waste: waste gas characteristics, systems for gas treatment, solid waste treatment: characteristics of the solid waste classification systems and solid waste treatment. Recycling of solid waste; Liquid waste from food industries: types and methods of treatment.

BASIC BIBLIOGRAPHY

DONAIRE, D. **Gestão ambiental na empresa**. São Paulo: Atlas, 1995.
MOURA, L. A. A. **Qualidade e gestão ambiental: sugestão para implantação das normas ISO-14.000 nas empresas**. São Paulo: Mendes, 1998.
REIS, L. F. S. S. D., QUEIROZ, S. M. P. **Gestão ambiental em pequenas e médias empresas**. Rio de Janeiro: Qualitymark, 2000.

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ABNT. **NBR ISO 14001 - Sistemas de gestão ambiental - especificação e diretrizes para uso**. Rio de Janeiro, 1996.
ABNT. **NBR ISO 14004 - Sistemas de gestão Ambiental - diretrizes gerais sobre princípios, sistemas e técnicas de apoio**. Rio de Janeiro, 1996.
AGENDA 21. **Cúpula da Terra: Conferência das Nações Unidas sobre o Meio Ambiente e Desenvolvimento**. Rio de Janeiro: Centro de Informações das Nações Unidas, 1992.
DYLICK-BREZINGER, T. ; GILGEN, H. P. W.; HAFLIGER, B.; WARMER, R. **Guia da Série de Normas ISO 14001 - Sistemas de Gestão Ambiental**. Schweizerische Arbeitsgemeinschaft für Qualitätsförderung: Olten, 1996.
REIS, M. J.L **Gerenciamento ambiental: Um novo desafio para sua competitividade**. Rio de Janeiro: Qualitymark, 1995.
VITERBO JR, E. **Sistema integrado de gestão ambiental**. São Paulo: Aquariana, 1998.

6th SEMESTER

Curriculum Contents ELECTROTECHNICAL		Code: 6A	Period: 6 th semester
Credits: 4 (3T+1P)	Type: Presential		Workload: 60 hrs

Prerequisites: 4H

SYLLABUS

Electrical quantities; Electric currents; Voltage; Electrical power; Energy; Frequency; Energy sources and their origin; Hydroelectric power; Thermoelectric energy; Understanding alternative energy; Electric power system in an alternating current; Power factor; Monophasic power (active, reactive, apparent); Triphasic power (active, reactive, apparent); Understanding electrical machines; Electric motors; Types of electric motors; Principles of electric motor operations; Main characteristics of induction motors; Electric generators; Types of generators; Principle of operation; Genset; Understanding transformers and electric energy distribution systems; Measuring electric power; Low and high voltage measurement; Measurement of active and reactive energy; Light sources; Incandescent and fluorescent lamps; Mixed lamps; High-pressure sodium vapour lamps; Mercury vapour lamps; Metal-halide lamp; Analysing lamp efficiency; Electric shock hazards: cardiac cycle, ventricular fibrillation, physiological reactions; Voltage contact; Understanding distribution boards; Command bulletins; Feeder circuits; Industrial electrical maintenance.

BASIC BIBLIOGRAPHY

COTRIM, A. **Instalações Elétrica**. Makron Books. São Paulo, 1992.
KINDERMAN, G. **Choque Elétrico**. Sagra-Luzzatto:Porto Alegre, 1995.
MAMEDE FILHO, J. **Instalações Elétricas Industriais**. Livros Técnicos e Científicos: Rio de Janeiro, 1996.

COMPLEMENTARY BIBLIOGRAPHY

EDMINISTER, Joseph A. **Circuitos Elétricos - Resumo da Teoria, Problemas**, Coleção Schaum, Mc Graw-Hill, 1991.
COTRIM, Ademaro A. M. B.: **Instalações Elétricas**, Mc Graw-Hill.
ABNT, **NBR 5410, Instalações elétricas de baixa tensão**. Rio de Janeiro, 1990
LIMA FILHO, D.L. **Projeto de Instalações Elétricas Prediais**, 9th edition; , Editora Érica, 2004.

Curriculum Contents MECHANICS AND RESISTANCE OF MATERIALS		Code: 6B	Period: 6 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 1B e 3A

SYLLABUS

Geometric characteristics of composite plates sections; Area; Static moment; Centroid. Moments of inertia; Concepts stresses and strains; Normal and shear stresses; Stress-strain diagrams; Axial loading; Application in cables, bars and trusses; Pure shear; Riveted joint applications; Pure torsion; Application in axles; Pure and simple flexion; Applications in beams; Combined efforts; Applications in shafts subjected to bending at torsion; Energy deformation.

BASIC BIBLIOGRAPHY

MELCONIAM, S. **Mecânica Técnica e Resistência dos Materiais**. 10th edition; São Paulo: Érica,

2000. 376p.
HIBBELER, R. C. **Resistência dos Materiais**. 8th edition; Pearson, 2005.
BEER/JOHNSTON. **Resistência dos Materiais**. São Paulo: McGraw Hill do Brasil, 1994.

COMPLEMENTARY BIBLIOGRAPHY

NASH, W.A. **Resistência dos Materiais**. 2nd edition; São Paulo: McGraw Hill do Brasil, 1982.
TIMOSHENKO, **Mecânica dos Sólidos**. Vol. 1 e 2. São Paulo: Livros Técnicos e Científicos, 1992.

Curriculum Contents BASIC LABORATORY I	Code: 6C	Period: 6 th semester
Credits: 4 (0T+4P)	Type: Presential	Workload: 60 hrs

Prerequisites: 5C e 5E

SYLLABUS

Fundamental concepts in metrology; Errors of measurement; Sources of error; Characteristics of the measurement system: indication range, operating range, scale division, digital increment; Resolution; Systematic error; Dispersion measurement; Nominal and real transfer function; Error curve; Measurement uncertainty; Sensitivity and sensitivity fluctuation; Floating zero; Hysteresis; Precision and accuracy; Measuring results; Errors and data processing; Error propagation.

BASIC BIBLIOGRAPHY

FOUST, A.S.; WENZEL, L.A.; CLUMP, C.W.; MAUS, L.; ANDERSEN, L.B. **Princípios das operações unitárias**. 2nd edition; Rio de Janeiro: LTC. 1982.
FOX, R.W.; MCDONALD, A.T.; PRITCHARD, P.J. **Introdução à Mecânica dos Fluidos**. 6th edition; Rio de Janeiro: LTC 2006.
BIRD, R. B.; STEWART, W.E.; LIGHTFOOT, N.R. **Fenômenos de Transporte**. 2nd edition; Rio de Janeiro: LTC. 2004. 808p

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BLACKADDER e NEDDERMAN. **Manual de Operações Unitárias**. Editora Hemus, 2004.

Curriculum Contents FOOD ANALYSIS I	Code: 6D	Period: 6 th semester
Credits: 4 (2T+2P)	Type: Presential	Workload: 60 hrs

Prerequisites: 4B e 5A

SYLLABUS

Sampling: General rules for collection of samples in routine analysis; Conventional and instrumental analytical methods; Acidity and pH; Densitometry; Retinoscopy; Spectrophotometry; Chromatography; Texture; Colour; Water Activity; Proximate composition of basic foods: Water, Minerals, Proteins, Lipids, Carbohydrates, Fibre; Comparative analysis of data obtained with standards and legislation.

BASIC BIBLIOGRAPHY

INSTITUTO ADOLFO LUTZ. **Métodos físicos e químicos para análise de alimentos**. 4th edition; São Paulo: Instituto Adolfo Lutz, 2005.
CECCHI, H.M. **Fundamentos Teóricos e Práticos em Análise de Alimentos**. 2nd edition; Campinas: BOBBIO, F. O.; BOBBIO, P. A. Manual de laboratório de química de alimentos. Livraria Varela, 2003.

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BOBBIO, P.; BOBBIO, F. **Introdução a Química de Alimentos**. 3rd edition; São Paulo: Varela. 2003. 240p.
SILVA, D.J.; QUEIROZ, A.C. **Análise de alimentos: métodos químicos e biológicos**. 3rd edition; : UFV, 2005.

Curriculum Contents MANAGEMENT AND ECONOMICS FOR ENGINEERING		Code: 6E	Period: 6 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs
Prerequisites: None			

SYLLABUS

Introduction to Economics: concepts and definitions; Economic systems: Capitalist Vs. Socialist; Concepts: main analyzes of the proposed models; Socioeconomic implications of current models; Macroeconomic Models: concepts and definitions; Introduction to microeconomics: microeconomic analysis in the food industry; Models of market structures: Perfect Competition, monopoly, oligopoly, monopolistic competition; Technical investment analysis: Equivalent annual value, present value, income rates, cost-benefit analysis; Organizations: Origin, concepts and definitions; Organizational theories; Management and Administration theory, Organizational design; Human relations approach; Marketing: Creating customer value; Human Resources: Introduction, systems and subsystems; Technological innovations: organizational and operational processes.

BASIC BIBLIOGRAPHY

CHIAVENATO, I. **Introdução à Teoria Geral da Administração**. 6th edition; . São Paulo: Campus, 2006;
GREMAUD, A. P.; PINNHO, D. B.; VASCONCELLOS, M.A.S. **Manual de economia**. 4th edition; São Paulo: Saraiva, 2005;
ROSSETTI, J P. **Introdução a Economia**. São Paulo: Atlas, 2005

COMPLEMENTARY BIBLIOGRAPHY

MAXIMIAMO, A. C. A. **Teoria Geral da Administração**. São Paulo: Atlas, 2006;
SLACK, N.; CHAMBERS, S. **Administração da Produção**. São Paulo: Atlas, 2002.
VASCONCELLOS, M. A. S; GARCIA, M. E. **Fundamentos de economia**. São Paulo: Saraiva, 2005.
GRIECO, F. A. **O Brasil e a nova economia global**. São Paulo: Aduaneiras, 2001;
KOTLER, P. **Administração de Marketing**. São Paulo: Atlas, 2002;
PASSOS, C. R. M; NOGAMI, O. **Princípios de economia**. 3rd edition; São Paulo: Pioneira, 2001.

Curriculum Contents QUALITY CONTROL IN THE FOOD INDUSTRY		Code: 6F	Period: 6 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs
Prerequisites: 4G			

SYLLABUS

History; Concepts; Principles and functions in Quality Control (QC); Quality assurance: legislation and control; Principles relating to the consumer and supplier; Quality specifications; Raw materials; Packaging; Process control: Physiochemical, microbiological, sensory storage and transportation; Subjective measures of quality; Analysis of sensory characteristics; Microscopy of food: Concepts, methods and techniques; Application; Objective measures; Physical and chemical analysis: Instruments and analytical techniques employed, precision and accuracy of measurements, mean, standard deviation, coefficient of variation, variance, mean difference, correlation coefficient; Basic principles of QC operation in the company; QC hierarchical position in the company; Characteristics and attributes of a system; Statistical QC; Concepts in sampling inspection: inspection, attributes and

variables, conformity, and defects; Batch and batching, Inspection schemes; Acceptable Quality Level (AQL); Operating Characteristic Curve (OCC); Numbers of accepted and rejected; Seller's risk; Buyer's risk; Probability of acceptance (PA); Product unit (PU); Defective percentage; Types of sampling: Single, double, multiple, sequential, sampling plans by attributes (tables sampling); Military Standard - 105D: Table (examples); USDA table sampling inspection for processed products: table (examples); Sampling plan for microbiological quality; Degree of risk to health; Good manufacturing practices: Objectives and definitions; Place of production and operation; Cleaning, sanitizing, storage and distribution; Ensuring quality control; Hazard analysis and critical control points (HACCP): History, objectives, and planning; Risk analysis; Checklist; Identification of critical points; Monitoring; Control in various points of food processing; Food Services and Nutrition; Study of the Code of consumer protection.

BASIC BIBLIOGRAPHY

CHAVES, J.B.P. **Controle de Qualidade para Indústrias de Alimentos (Princípios Gerais e Métodos Gerais)**. Viçosa: Imprensa Universitária UFV, 1980. 94p.
PALADINI, E. P. **Controle de Qualidade: uma visão abrangente**. São Paulo: Atlas, 1990.
COSTA, A.F.B.; EPPRECHT, E.K.; CARPINETTI, L.C.R. **Controle Estatístico de Qualidade**. 2nd edition; Rio de Janeiro: LTC. 2005. 334p.

COMPLEMENTARY BIBLIOGRAPHY

LANZELOTTI, H. S.; OLIVEIRA, M.C. **Pontos de Controle**. Rio de Janeiro, 1987. 255p.
INSTITUTO DE TECNOLOGIA DE ALIMENTOS – ITAL. **Qualidade na Indústria de Alimentos**. Campinas: ITAL, 1993. 130p.
JURAN, J.M.; GRZYNA, F.M. **Controle de Qualidade de Juran Handbook**. São Paulo: MAKRON Books do Brasil – Mc Graw Hill. 1990, 9th volume.

Curriculum Contents UNIT OPERATIONS I	Code: 6G	Period: 6 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 4C

SYLLABUS

Mass and energy balance; Pressure and flow measurements; Flow in fixed porous and fluidized beds; Transport of fluids: Pipes, pumps, valves & compressors; Pumping power calculation; Particulate systems: Milling, grain size analysis, screening; Gravitational and centrifugal sedimentation; Cyclones and hydrocyclones; Flotation; Filtration; Membrane separation; Agitation and mixing.

BASIC BIBLIOGRAPHY

FOUST, A.S.; WENZEL, L.A.; CLUMP, C.W.; MAUS, L.; ANDERSEN, L.B. **Princípios das operações unitárias**. 2nd Edition; Rio de Janeiro: LTC, 1982.
BLACKADDER e NEDDERMAN. **Manual de Operações Unitárias**. São Paulo: Hemus, 2004.
HIMMELBLAU, D.M.; RIGGS, J.B. **Engenharia Química - princípios e cálculos**. 7th Edition; Rio de Janeiro: LTC, 2006.

COMPLEMENTARY BIBLIOGRAPHY

VICENTE, A M. **Manual de indústrias dos alimentos**. São Paulo, Varela, 1995.
SHREVE, R.N.; JOSEPH A.; BRINK JR. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 2008.

7th SEMESTER

Curriculum Contents INSTRUMENTATION AND CONTROL		Code: 7A	Period: 7 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: 4C e 5C

SYLLABUS

Process instrumentation; Flow sensors; Pressure sensors; Temperature sensors; Level sensors; Specific sensors: ° brix, humidity, concentration, pH, turbidity; Actuators: control valves and electric motors; Process dynamics; First and Second order systems; Laplace transform; Transfer function; Process control; Elements of the control loop; Block diagram; Process control strategies; Controllers action: p, pi and pid controllers; Classical methods for controller tuning; Stability analysis and performance of closed-loop systems.

BASIC BIBLIOGRAPHY

BALBINOT, A.; BRUSAMARELLO, V. J. **Instrumentação e Fundamentos de Medida**. V. 1. 2nd edition; Rio de Janeiro: LTC, 2010.
BALBINOT, A.; BRUSAMARELLO, V. J. **Instrumentação e Fundamentos de Medida**. V. 2. Rio de Janeiro: LTC, 2007.
SMITH, C. S.; CORRIPIO, A. B. **Princípios e Prática do Controle Automático de Processos**. 3rd edition; LTC Publishing, 2008.

COMPLEMENTARY BIBLIOGRAPHY

JOHNSON, C.D., **Controle de Processos: tecnologia da instrumentação**. Fundação Calouste Gulbenkian, 1990.
COUGHANOWR, D.R.; KOPPEL, L. P. **Análise e Controle de Processos**. São Paulo: Guanabara Dois, 1978.
ALVES, J. L. L. **Instrumentação, Controle e Automação de Processos**. 2nd edition; Rio de Janeiro: LTC, 2010.

Curriculum Contents WORKPLACE SAFETY		Code: 7B	Period: 7 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: None

SYLLABUS

Historical aspects; Legislation and general concepts in occupational safety; Influential factors on human health in the workplace; Occupational Diseases (Professional and Labour); Work accidents and their causes; Disabilities; Safety inspection and accident investigation; Risk map; Insalubrities (NR15) and Hazard (NR16); First Aid; Chemical hazards. Understanding Normative Regulations: General Aspects and inspections. NR2 - Previous inspection; NR3 - Embargo or prohibition; NR4 - SESMT; NR5 - CIPA; NR6 - EPI; NR7 - Medical examination and PCMSO (Occupational Health Control Program); NR9 - Program for Prevention of Environmental Risks (PPRA); NR10 - Security of facilities and electricity services; NR17 - Ergonomics; NR23 - Fire hazards protection; NR24 - Sanitation and comfort in the workplace (health assessment); NR26 - safety signs. Rules regarding safety from ABNT (Brazilian Association of Technical Standards) and other standards applied.

BASIC BIBLIOGRAPHY

FUNDACENTRO. **Engenharia de Segurança do Trabalho na Indústria da Construção**.



Fundacentro.

GONÇALVES, E. A. **Manual de Segurança e saúde no Trabalho**. LTR: São Paulo, 2000.

OLIVEIRA, S. G. **Proteção Jurídica a Segurança e Saúde no Trabalho**. LTR: São Paulo, 2002.

COMPLEMENTARY BIBLIOGRAPHY

Segurança e Medicina do Trabalho – Normas Regulamentadoras e Legislação Complementar. 62nd edição. São Paulo: Atlas, 2008.

GONÇALVES, E. A. **Segurança e Saúde no Trabalho em 600 Questões Objetiva**. São Paulo: LTR, 2004.

Curriculum Contents UNIT OPERATIONS II	Code: 7C	Period: 7 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 5C

SYLLABUS

Principles of heat transfer applied to food processing: Thermal properties of foods; Thermal processing of food; Heat exchangers; Evaporators; Thermal radiation; Microwave heating; Mass transfer and simultaneous heat operations; Mass transfer processes applied to the food industry; Absorption of gases; Distillation; Psychrometry and humidification; Drying; Crystallization; Adsorption; Solid-liquid extraction; Liquid-liquid extraction.

BASIC BIBLIOGRAPHY

FOUST, A.S.; WENZEL, L.A.; CLUMP, C.W.; MAUS, L.; ANDERSEN, L.B. **Princípios das operações unitárias**. 2nd edition; Rio de Janeiro: LTC, 1982.

BLACKADDER e NEDDERMAN. **Manual de Operações Unitárias**. São Paulo: Hemus, 2004.

HIMMELBLAU, D.M.; RIGGS, J.B. **Engenharia Química - princípios e cálculos**. 7th edition; Rio de Janeiro: LTC. 2006.

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VICENTE, A M. et. al. **Equações Diferenciais e suas aplicações**. São Paulo, Varela, 1995.

SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 1997. 732p.

Curriculum Contents LABORATÓRIO BASIC II	Code: 7D	Period: 7 th semester
Credits: 4 (0T+4P)	Type: Presential	Workload: 60 hrs

Prerequisites: 6G

SYLLABUS

Conducting laboratory practice involving concepts of mass transfer phenomena and unit operations of heat and mass quantity transfer: Casco and tube heat exchangers; Plate heat exchangers; Cooling Systems; Drying; Spray Dryer; Distillation; Evaporation; Extraction; lyophilisation (freeze-drying).

BASIC BIBLIOGRAPHY

BLACKADDER e NEDDERMAN. **Manual de Operações Unitárias**. São Paulo: Hemus, 2004.

INCROPERA, F. P.; DEWITT, D. P.; BERGMAN, T. L.; LAVINE, A. S. **Fundamentos de Transferência de Calor e de Massa**. 6th edition; Rio de Janeiro: LTC, 2008.

VAN NESS, SMITH E ABBOTT. **Introdução à termodinâmica da engenharia química**. 7th edition; Rio



de Janeiro: LTC, 2007.

COMPLEMENTARY BIBLIOGRAPHY

VICENTE, A .M. **Manual de indústrias dos alimentos**. São Paulo, Varela, 1995
SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th edition; Rio de Janeiro: LTC, 1997. 732p.

Curriculum Contents PROCESSES IN THE FOOD INDUSTRY	Code: 7E	Period: 7 th semester
Credits: 2 (2T+0P)	Type: Presential	Workload: 30 hrs

Prerequisites: 6G

SYLLABUS

Food pre-processing operations; Reception; Classification; Cleaning; Washing; Drying; Cutting; Key processes used in food processing: Size reduction of solids (grinding) and liquids (emulsification and homogenization); Processes mixing solids and liquids (shaking); Moulding; Separation processes: centrifugation, filtration, pressing, membrane separation; Extrusion; Baking; Frying; Toppings; Filling; Flowcharts and production line equipment involving the main types of food industries.

BASIC BIBLIOGRAPHY

ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Componentes dos Alimentos e Processos**. V. 1. Porto Alegre: Artmed, 2007.
FELLOWS, P. J. **Tecnologia do Processamento de Alimentos – Princípios e Prática**. 2nd edition; Porto Alegre: Artmed, 2006.
GAVA, A. J. **Tecnologia de Alimentos – Princípios e Aplicações**. São Paulo: Nobel, 2009.

COMPLEMENTARY BIBLIOGRAPHY

SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 1997. 732p.
EVANGELISTA. J. **Tecnologia de alimentos**. 2nd Edition; Rio de Janeiro: Atheneu, 2001.
VICENTE, A M. **Manual de indústrias dos alimentos**. São Paulo: Varela, 1995.

Curriculum Contents FOOD PRESERVATION TECHNIQUES	Code: 7F	Period: 7 th semester
Credits: 2 (2T+0P)	Type: Presential	Workload: 30 hrs

Prerequisites: 4E

SYLLABUS

Conservation methods by applying moist heat: blanching, pasteurization, sterilization (UHT method and airtight food preservation); Cold conservation: refrigeration and freezing; Conservation by reduced water activity: a) Natural drying, dehydration (drying tunnels and greenhouses, spray drying, freeze drying, smoking); b) Concentration (evaporation), c) Salting, curing and adding sugar; Conservation by lowering the pH: canned food, fermentation, addition of acidulants; Chemical additives: preservatives, organic acids, fatty coatings; Modified atmosphere; Vacuum; Combined factors method; Food processing by microwaves; Using high hydrostatic pressure; Irradiation.

BASIC BIBLIOGRAPHY

EVANGELISTA. J. **Tecnologia de alimentos**. 2nd edition; Rio de Janeiro: Atheneu, 2001.
ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Componentes dos Alimentos e Processos**. V. 1. Porto Alegre: Artmed, 2007.
FELLOWS, P. J. **Tecnologia do Processamento de Alimentos – Princípios e Prática**. 2nd edition;

Porto Alegre: Artmed, 2006.

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VICENTE, A M. **Manual de indústrias dos alimentos**. São Paulo: Varela, 1995.

GAVA, A. J. **Tecnologia de Alimentos – Princípios e Aplicações**. São Paulo: Nobel, 2009.

Curriculum Contents FOOD ANALYSIS II		Code: 7G	Period: 7 th semester
Credits: 4 (1T+3P)	Type: Presential		Workload: 60 hrs

Prerequisites: 6D

SYLLABUS

Theory: Quality control of cereals and starch; Quality control of sugars and derivatives; Quality control of honey; Quality control of fruits and derivatives; Quality control of meat, fish and derivatives; Quality control of milk and derivatives; Quality control of oils and fats; Quality control beverages.

Practice: Analysis of honey: Organoleptic characteristics, adulteration, and classification of honey; Physicochemical determinations; Analysis of cereals: pH, acidity, starch, gluten, bleaches, oxidizing; Analysis of oils and fats: iodine, acidity of peroxides, saponification, detection of aldehydes, unsaponifiable matter, refractive index, and cholesterol; Analysis of meat and meat products: Eber reactions, determination of ammonia, pH, sulphide, nitrates in meat, starch and chloride in embedded; Analysis fish: pH, test for ammonia and H₂S, volatile basic nitrogen; Analysis of milk and derivatives: density at 15 ° C, Dornic acidity, normal solution and acetic acid, Alizarol test, total solids dry extract, pH, fat content, determination of sucrose, starch, formaldehyde, urine, hydrogen peroxide, reducing carbohydrates in lactose, cryoscopic index, phosphatase test and peroxidase; Preservative research; Analysis of beverages (coffee, tea, guaraná): determination of caffeine, aqueous and alcoholic extracts; Spirits (alcohol by volume, dry residue at 105°C, volatile acids, reducing and non-reducing carbohydrate), wine (alcohol by volume, dry residue at 105°C, total acidity), beer (alcohol by volume at 20°C, total acidity, extract real and primitive reducing and non-reducing carbohydrates), soft drinks (total acidity determination of phosphoric acid and benzoic acid, pH), juices (refractive index and °Brix, total acidity, pH, vitamin C).

BASIC BIBLIOGRAPHY

INSTITUTO ADOLFO LUTZ. **Métodos físicos e químicos para análise de alimentos**. 4th edition; São Paulo: Instituto Adolfo Lutz, 2005.

COELHO, D. T. **Práticas de Processamento de Produtos de Origem Animal**. Viçosa : UFV, 2000.

BEHMER, M. L. **Tecnologia Do Leite (Produção, Industrialização e Análise)**. 15th edition; São Paulo: Varela, 1996.

COMPLEMENTARY BIBLIOGRAPHY

SILVA, D.J.; QUEIROZ, A.C. **Análise de alimentos: métodos químicos e biológicos**. 3rd edition; Viçosa: UFV, 2005.

BOBBIO, F.O.; BOBBIO, P. A. **Manual de laboratório de química de alimentos**. São Paulo: Varela, 2003.

Curriculum Contents RAW MATERIALS OF ANIMAL ORIGIN		Code: 7H	Period: 7 th semester
Credits: 3 (3T+0P)	Type: Presential		Workload: 45 hrs

Prerequisites: 6D

SYLLABUS

Structure of animal production in Brazil; Milk: structure of dairy industry; Systems of milk production; Milk composition; Physical chemistry of milk; Physiology of lactation and milk composition; Conservation and hygienic milking; Milk microbiology; Quality control of raw milk; Collection and transportation; Quality control of milk in reception; Poultry and eggs: Structure of the poultry production; Production of chickens, turkeys and eggs; Poultry cutting; Yield and pH of poultry; Hygienic yield of poultry; Poultry and raw material processing; Candling and egg quality testing; Hygienic egg productions; Eggs as a raw material; Fish: The importance of aquaculture, species, nomenclature and freshness of fish; Fish catching and conservation; Threading, produce and composition; Fish as raw material processing. seminars; Red meat: structure and composition of meat; Rigor Mortis; Colour, pH, and water holding capacity of beef; Quality characteristics; Beef and pork as raw material for processing; Texture of meat; Hygienic produce; Carcass classification and properties of meat.

BASIC BIBLIOGRAPHY

ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Alimentos de Origem Animal**. V.2. Porto Alegre: Artmed, 2007.
LIMA, U.A. **Matérias primas dos Alimentos**. São Paulo: Edgar Blucher. 2010. 424p.
RAMOS, E.M.; GOMIDE, L.A.M. Avaliação da qualidade de carnes – Fundamentos e Metodologia. Viçosa: UFV, 2009. 600p.

COMPLEMENTARY BIBLIOGRAPHY

PARDI, M. C. **Ciência, Higiene e Tecnologia da Carne**. V.1 e 2. Goiás: UFG, 2001.
LAWRIE, R. A. **Ciência da Carne**. 6th edition; Porto Alegre: Artmed. 2004, 384p.
DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.

Curriculum Contents RAW MATERIALS OF PLANT ORIGIN		Code: 71	Period: 7 th semester
Credits: 3 (3T+0P)	Type: Presential		Workload: 45 hrs

Prerequisites: 6D

SYLLABUS

Features of the main raw materials of plant origin used in the food industry: cereals, pulses, coffee, fruits, vegetables, sugar cane, oilseeds, nomenclature, sources of production; Varieties and cultivars; Principles of physiology; Post-harvest physiology of fruits and vegetables; Collection, transportation and storage; Major pests and diseases of products; Industrial use and its economic importance.

BASIC BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.
CHITARRA, M. I. F.; CHITARRA, A. B. **Pós-colheita de frutas e hortaliças – fisiologia e manuseio**. 2nd edition. Lavras: UFLA, 2006.
SILVA, J. S. **Secagem e Armazenamento de Produtos Agrícolas**. Viçosa: Aprenda Fácil. 2000.

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FILQUEIRA, F. A. R. **Novo Manual de Olericultura: agrotecnologia moderna na produção e comercialização de hortaliças**. Viçosa: UFV. 2000.
MURAYAMA, S. **Fruticultura**. Instituto Campineiro de Ensino Agrícola, Campinas, 1984.
KLUGE, R.A.; NACHTIGAL, J.C.; FACHINELLO, J.C.; BILHALVA, A.B. **Fisiologia pós-colheita de frutas de clima temperado**. Campinas: Rural, 2002.

8th SEMESTER

Curriculum Contents ENZYMATIC AND FERMENTATION TECHNOLOGIES		Code: 8A	Period: 8 th semester
Credits: 4 (3T+1P)	TYPE: Presential		Workload: 60 hrs

Prerequisites: 3E e 3G

SYLLABUS

Microbial and enzyme kinetics; Fermentative processes. Continuous and discontinuous fermentation; Agitation and aeration. Scale-up; Industrial Sterilization: equipment, environment and air; Introduction to the calculation of reactors; Fermented food products; Production and application of enzymes in food processing; Immobilization of enzymes and their application in foods; Isolation of enzymes; Yield and productivity calculations; Practical classes: microbial and enzyme kinetics.

BASIC BIBLIOGRAPHY

SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotecnologia Industrial** V. 1 – Fundamentos. 1st edition; São Paulo: Edgar Blücher Ltda., 2001. 254p.
SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotecnologia Industrial** V. 2 – Engenharia Bioquímica. São Paulo: Edgar Blücher, 2001. 539p.
SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotecnologia Industrial** V. 4 – Biotecnologia da Produção de Alimentos. São Paulo: Edgar Blücher, 2001. 523p.

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SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotecnologia Industrial** V. 3 – Processos Fermentativos e Enzimáticos. São Paulo: Edgar Blücher, 2001. 293p.
COSTA, N.M.B.; BOREM, A. **Biotecnologia e Nutrição**. 1st edition; São Paulo: Nobel, 2003. 216p.

Curriculum Contents FOOD HYGIENE AND LEGISLATION		Code: 8B	Period: 8 th semester
Credits: 2 (2T+0P)	TYPE: Presential		Workload: 30 hrs

Prerequisites: 4E

SYLLABUS

Importance of hygienic practice and environmental sanitising; Personal hygiene; Cleaning agents: detergents and surfactants (types, characteristics, functions, chemical and technical specifications); Sanitizing agents: physical and chemical sanitizers (types, active principle, mechanisms of action, application conditions, efficiency tests); Sanitization Methods: Manual; By immersion; through tunnel - car wash type; By spraying; By nebulization or atomization; By circulation (CIP- Cleaning In Place); Water quality: physicochemical control parameters; Bacteriological hygiene water control parameters; Cleaning and sanitising procedures evaluation: Swab; Contact plates; Bioluminescence; Integrated pest control: Methods applied to vector control; Proper disposal of waste from food industries; Health food legislation: principles and applications; Food of animal and plant origin legislation, under the Ministry of Health (ANVISA); Good manufacturing practices: GMP/GMP - principles and applications; Hazard and critical point control analysis: HACCP (principles and applications); Food of animal origin under the Ministry of Agriculture; Livestock and Food Supply: RIISPOA; Animal traceability; Legislation on packaging and labelling of food; Legislation on irradiated foods; Legislation on GM foods; ISO 22000: principles and applications; International Food Trade; CODEX Standards.

BASIC BIBLIOGRAPHY

ARRUDA, G. A. **Manual de boas práticas na produção e distribuição de alimentos**. São Paulo: Ponto Crítico, 1996.
ARRUDA, G. A. **Manual de boas práticas - Unidade de Alimentação e Nutrição**. V. II. São Paulo: Ponto Crítico, 1998.
SILVA JR, E.A. **Manual de Controle Higiênico-Sanitário em Serviços de Alimentação**. 6th edition; São Paulo: Varela, 2007.

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SACCOL, A.L.F.; HECKTHEUER, L.H.; RICHARDS, N.S.; STANGARLIN, L. **Lista de avaliação para boas práticas em serviços de alimentação - RDC 216**. 1st edition; São Paulo: Varela, 2006. 48p.
GIORDANO, J.C. **Análise de perigos e pontos críticos de controle – APPCC**. Campinas: SBCTA.
MORTIMORE, S. **HACCP**. 1st edition; Espanha: Acribia. 2004.

Curriculum Contents TECHNOLOGY OF MEAT, FISH, EGGS AND DERIVATIVES		Code: 8C	Period: 8 th semester
Credits: 4 (3T+1P)	TYPE: Presential		Workload: 60 hrs

Prerequisites: 7H

SYLLABUS

Meats: Concept, structure and biochemistry; Animals for meat production; Slaughterhouses: Areas of slaughter, depilation or skinning, gutting, treatment of viscera, head and offal. Area for industrialization of food and products; Slaughter: Reception of animals; Treatment and ante-mortem inspection. Stunning and bleeding. Skinning, depilation and plucking. Evisceration and treatment of glands and offal; Cooling of carcasses; Boning and commercial cuts; Industrial meat; Meat freezing; Maturation, emulsion and Bones and cuts commercial and industrial meat . Freezing meat; Maturation; Meat emulsion; Biological Processes; Industrial Processes: physical, chemical, mixed process; Canned meats; Development of products: bologna, sausages, sausages, cured and canned ham. Practice: Packaging of meat products; Warehousing and storage; Processing by-products; Processing of fishery products and by-products; Conservation and egg processing: liquid and powder egg.

BASIC BIBLIOGRAPHY

ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Alimentos de Origem Animal**. V.2. Porto Alegre: Artmed, 2007.
PARDI, M. C. **Ciência, Higiene e Tecnologia da Carne** V.1. Goiás: UFG, 2001.
PARDI, M. C. **Ciência, Higiene e Tecnologia da Carne** V.2. Goiás: UFG, 2001.

COMPLEMENTARY BIBLIOGRAPHY

LAWRIE, R. A. **Ciência da Carne**. 6th edition; Porto Alegre: Artmed; 2004, 384p.
DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.

Curriculum Contents TECHNOLOGY OF FRUITS AND VEGETABLES		Code: 8D	Period: 8 th semester
Credits: 4 (3T+1P)	TYPE: Presential		Workload: 60 hrs

Prerequisites: 7I

SYLLABUS

Operations Pre-processing operations; Fruits and vegetables processing; Waste recovery; Equipment and specifications; Productivity and quality; Production of minimally processed vegetables; Production of canned vegetables; Canned fruit production; Production of jams and sweet paste; Production of

candied fruit; Pasteurized juices and pulps; Dehydrated fruits and vegetables.

BASIC BIBLIOGRAPHY

ITAL. **Manual Técnico n.º 8. Industrialização de frutas.** Campinas: ITAL, 1991.
ITAL. **Manual Técnico n.º 4. Processamento de Hortaliças.** Campinas: ITAL, 1994.
LOVATEL, J. L.; COSTANZI, A. R. CAPELLI, R. **Processamento de Frutas e Hortaliças.** Rio de Janeiro: Educus, 2004.

COMPLEMENTARY BIBLIOGRAPHY

FILQUEIRA, F. A. R. **Novo Manual de Olericultura: agrotecnologia moderna na produção e comercialização de hortaliças.** Viçosa: UFV, 2000.
MURAYAMA, S. **Fruticultura.** Campinas: Instituto Campineiro de Ensino Agrícola, 1984.
KLUGE, R.A.; NACHTIGAL, J.C.; FACHINELLO, J.C.; BILHALVA, A.B. **Fisiologia pós-colheita de frutas de clima temperado.** Campinas: Rural, 2002.
SILVA, J. S. **Secagem e Armazenamento de Produtos Agrícolas.** Viçosa: Aprenda Fácil, 2000.
JACKIX, M. H. **Doces, geléias e frutas em calda.** São Paulo: Ícone, 1988.
EMBRAPA. **Manual de Processamento Mínimo de Frutas e Hortaliças.** Embrapa, 2008.

Curriculum Contents ADDITIVES, COADJUTANTS AND PACKAGING FOR THE FOOD INDUSTRY	Code: 8E	Period: 8 th semester
Credits: 3 (3T+0P)	TYPE: Presential	Workload: 45 hrs

Prerequisites: 5A

SYLLABUS

Study of the use of additives and coadjutants in food processing in general: technological, nutritional and functional importance; Additives: bulking agents, defoamers/sparkling anti-humectants, antioxidants, dyes, preservatives, sweeteners, thickeners, gelling, stabilizing, flavouring, anti-humectants/humectants, acidity regulators, acidulants, emulsifiers, flour improvers, flavour enhancers, chemical ferments, firming agents, sequestering agents, colour stabilizers; Coadjutants: Catalysts, biological yeasts, clarification/filtration agents, clotting agents, microbial control agents, flocculating agents, enzyme immobilization agents and support, washing and/or stripping agents, cooling/freezing by contact agents; Enzymes or enzyme preparations; Propellant gasses; Gases for packing; Lubricants; Moulding and demoulding nutrients; Ion exchange resins; Membranes and molecular sieves; Solvent extraction and processing agents; Enzyme inhibition before bleaching stage; Detergents; History and function of packing in the food industry; Packing barrier properties: light, oxygen, carbon dioxide and water; Using packing in the food industry: function, characteristics and objective; Flexible plastic packing: rigid and semi-rigid: types and characteristics, mechanical and barrier properties; thermal resistance, processes for obtaining, processing and printing; Paper packing: types and characteristics, mechanical and barrier properties; Metal packaging: materials, manufacturing, internal and external coatings, mechanical and barrier properties; Glass containers; Criteria for selection of packaging; Bottling systems; Relevant legislation; safety aspects, nutrition labelling and markings; Market and cost aspects; Packing and the environment; Environmental impact.

BASIC BIBLIOGRAPHY

BOBBIO, F. O.; BOBBIO, P.A. **Introdução À Química de Alimentos.** 3rd edition; São Paulo: Varela, 2003. 240p.
BANZATO, J. M. **Embalagens.** São Paulo: IMAM.
CARVALHO, M. A. **Engenharia de Embalagens – Uma abordagem técnica do desenvolvimento de projetos de embalagem.** São Paulo: Novatec, 2008.

COMPLEMENTARY BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema.** 4th edition; Porto Alegre: Artmed, 2010. 900p.

Curriculum Contents TECNOLOGY OF MILK AND DAIRY DERIVATIVES	Code: 8F	Period: 8th semester
Credits: 4 (3T+1P)	TYPE: Presential	Workload: 60 hrs

Prerequisites: 7H

SYLLABUS

Characterization of milk: Organoleptic, chemical and physical composition, and chemical properties of milk; Definition and classification of Milk and Derivatives; Law of milk and dairy products; Instrumental methods of milk analysis; Stages of processing fluid milk, Thecnology and processing of derivates: cream, butter and others; Technology and processing of derivates concentrated and dehydrated products; Technology and processing of derivates and other dairy desserts; Principles and use of ultra-filtration, industrial use of whey; Conservation and quality of milk and dairy products; equipment used in the dairy industry; New technology trends.

BASIC BIBLIOGRAPHY

BEHMER, M.L.A. **Tecnologia do Leite**. 10th edition; , São Paulo: Nobel, 1980.
FURTADO, M.M., LOURENÇO NETO, J.P.M. **Tecnologia de queijos: manual Técnico para a produção industrial de queijos**. São Paulo: Dipemar, 1994.
ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Alimentos de Origem Animal**. V.2. Porto Alegre: Artmed, 2007.

COMPLEMENTARY BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.

Curriculum Contents TECNOLOGY OF CEREALS, ROOTS AND TUBER VEGETABLES	Code: 8G	Period: 8th semester
Credits: 4 (3T+1P)	TYPE: Presential	Workload: 60 hrs

Prerequisites: 7I

SYLLABUS

Introduction: Cereals, Roots and Tubers; Grinding cereals, roots and tubers: Theory, operating equipment and products; Starch and farina: Production and equipment; Chemical and physical modifications; Bakery and pasta products: Production processes and equipment; Ingredients for baking; Bakery technology, pasta, starches and derivates.

BASIC BIBLIOGRAPHY

CAUVAIN, S. P.; YOUNG, L. S. **Tecnologia da Panificação**. 2nd Edition; São Paulo: Manole, 2009.
ORDÓÑEZ, J. A. **Tecnologia de Alimentos - Componentes dos Alimentos e Processos**. V. 1. Porto Alegre: Artmed, 2007.
GAVA, A. J. **Tecnologia de Alimentos – Princípios e Aplicações**. São Paulo: Nobel, 2009.

COMPLEMENTARY BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.
SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 1997. 732p.

9º SEMESTER

Curriculum Contents TECHNOLOGY OF WATER AND WASTEWATER	Code: 9A	Period: 9 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 3C

SYLLABUS

Water treatment: introduction; Water treatment station (ETA); Fundamentals of water treatment; Aeration; Coagulation; Flocculation; Decantation; Filtration; Disinfection; Fluoridation; Reservoir distribution; Control of physicochemical and microbiological water; Wastewater management and treatment: sewage system unit; Separating system; System tab; Extensions; Collection system; Interceptors; Outfalls; Pumping stations; sewage treatment plants; Sewage treatment: Preliminary treatments, railings, litter boxes, solid removal tanks, oils and greases; Primary treatment: primary sedimentation, digestion, drying and final disposal of sludge; Secondary treatment; Biological processes: septic tanks, oxidation ditches, stabilization ponds, biological filtration; Technologies for monitoring the control of effluent action into receiving bodies; Advanced treatment systems.

BASIC BIBLIOGRAPHY

NUNES, J.A. **Tratamento Físico-Químico de Águas Residuárias Industriais**. ABES, 2001.
SPERLING, M.V. **Princípios do Tratamento Biológico de Águas Residuárias - Introdução à qualidade das águas e ao tratamento do esgoto – V. I, II e III**. UFMG: Belo Horizonte, 1996.
SPERLING, M.V. **Princípios do Tratamento Biológico de Águas Residuárias - Introdução à qualidade das águas e ao tratamento do esgoto – V. IV e V**. UFMG: Belo Horizonte, 1997.

COMPLEMENTARY BIBLIOGRAPHY

ADAD, J.M.T. **Controle químico de qualidade**. Rio de Janeiro: Guanabara dois, 1982.
BRAILE, P.M.; CAVALCANTI, J.E. **Manual de tratamento de águas residuárias industriais**. São Paulo: CETESB, 1979.
MACEDO, J. A. B. **Águas & Águas**. Juiz de Fora: CRQ-MG; 2001.
SANTOS FILHO, D. F. **Tecnologia de tratamento de água**. Nobel: São Paulo, 1989. FELICIDADE, N.; MARTINS, R. C.; LEME, A. A. **Uso e gestão de recursos hídricos no Brasil**. São Carlos: Rima, 2001.
FREITAS, W. P.; GRAF, A. C. B.; SILVA, F. Q.; PACIORNIK, J. I.; RIBEIRO, J.; MALUCELLI, M.; BRUNONI, N. **Águas: aspectos jurídicos e ambientais**. Paraná: Juruá. 2000.
SPERLING, M. V. **Princípios do Tratamento Biológico de Águas Residuárias - Introdução à qualidade das águas e ao tratamento do esgoto – V. VI**. Belo Horizonte: UFMG, 2001.

Curriculum Contents REFRIGERATION	Code: 9B	Period: 9 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 5E

SYLLABUS

Food and cold chain; Influence of low temperatures in food; Water and solutions; Water and food; Storage temperature; Microbiological aspects; Thermal load; Cooling and freezing of food; Initial data transmission; Infiltration; Product; Other sources; Total thermal load; Pre-processing; Water and freezing; Cooling and thermal load; Freezing time and speed; Freezing systems; loss of weight and moisture control during storage; Air properties; Product properties; Transpiration; Influence of

temperature, humidity and air circulation; Humidification; Control with or without humidification; Cooling system components; Compressors; Condensers; Expansion devices; Evaporators; Types of refrigerants; Refrigeration chambers; Dimensions; Construction; Isolation; Vapour barrier; Cold conservation; Insulation used in cooling technique; Calculating the thickness of insulation; Insulation of equipment and plumbing; Refrigerator doors; Containers and enclosures for the storage of cold.

BASIC BIBLIOGRAPHY

COSTA, E. C., **Refrigeração**, 3rd edition; São Paulo: Edgard Blucher. 1982.
DOSSAT, R. J. **Princípios de Refrigeração**. 1^a Edition; São Paulo: Hemus. 1980. 884p.
LAUAND, C.A. **Manual prático de geladeiras – refrigeração industrial e residencial**. 1st edition; São Paulo: Hemus, 2004. 245p.

COMPLEMENTARY BIBLIOGRAPHY

NEVES FILHO, L. C., **Apostila: Refrigeração e Alimentos**, Campinas: FEA/UNICAMP. IBF. 2002.
BOAST, M., **Refrigeración**, Espanha: Acribia, 1997.

Curriculum Contents TECHNOLOGY OF OILS AND FATS		Code: 9C	Period: 9 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: 7I

SYLLABUS

Extraction; Refining; Consistency change: Hydrogenation, Interesterification and Fractionation; Manufacture of Margarine: equipment and specifications; Yield and quality; Functional properties of oils and fats in the food industry; Processing butter, creams, chocolate ice cream and confectionery.

BASIC BIBLIOGRAPHY

DAMODARAN, S.; PARKIN, K. L.; FENNEMA, O. R. **Química de Alimentos de Fennema**. 4th edition; Porto Alegre: Artmed, 2010. 900p.
SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th edition; Rio de Janeiro: LTC, 1997. 732p.
MORETTO, E.; FETT, R. **Óleos e Gorduras Vegetais – processamento e análises**. 2nd edition; Florianópolis: UFSC, 1989.

COMPLEMENTARY BIBLIOGRAPHY

ITAL. **Aplicação de gorduras em chocolates, sorvetes, confeitos e panificação**, 1999.
ITAL. **Lipídeos: aspectos funcionais e novas tendências**, 2002.
ITAL. **Seminário sobre óleos e gorduras: tendências e inovações**, 1999.

Curriculum Contents TECHNOLOGY OF BEVERAGES		Code: 9D	Period: 9 th semester
Credits: 4 (4T+0P)	Type: Presential		Workload: 60 hrs

Prerequisites: 7I e 8A

SYLLABUS

Reception and control of raw material for production of beverages; Storage; Legislation for alcoholic and non-alcoholic drinks and beverages; Processing of non-alcoholic beverages: mineral water, tea, juices, soft drinks; Processing fermented and distilled alcoholic beverages: beer, wine, rum, whisky, and vinegars; Equipment; Inputs, additives and adjuvants; Processes conservation; Packaging used.

BASIC BIBLIOGRAPHY



VENTURINI FILHO, W. G. **Tecnologia de Bebidas**. São Paulo: Edgard Blücher, 2005.
SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotechnologia Industrial V. 4** –
Biotechnologia da Produção de Alimentos. São Paulo: Edgar Blücher, 2001. 523p.
SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotechnologia Industrial V. 3** –
Processos Fermentativos e Enzimáticos. São Paulo: Edgar Blücher, 2001. 293p.

COMPLEMENTARY BIBLIOGRAPHY

SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 1997. 732p.

Curriculum Contents FACILITIES, PLANNING AND DESIGN OF FOOD INDUSTRY	Code: 9E	Period: 9 th semester
Credits: 4 (4T+0P)	Type: Presential	Workload: 60 hrs

Prerequisites: 1E

SYLLABUS

Overview of industrial planning and production engineering ; Constitution of the company and its goals; Market analysis; Sales forecasting; Buildings, facilities and their location; Product planning and process; Factory planning; Production planning; Management organization; Production costs; Economic analysis of results; Financial forecasting; Labour analysis; Purchasing; Stock; Product planning process; Product considerations; Product adaptation to the process; Production process; Raw materials; Equipments; Energy, utilities and peripherals; Industrial plants location; Decision factors and their importance; Evaluation of alternatives; Industrial buildings; Building types; Characteristics of industrial buildings; Building materials; Supporting areas; Physical layout; Presenting and defending the preliminary design; Preliminary project elaboration: Presenting and defending it.

BASIC BIBLIOGRAPHY

TELLES, P. C. S. **Tubulações Industriais – Materiais, Projeto, Montagem**. 10th edition; Rio de Janeiro: LTC, 2001.
MACINTYRE, A.J. **Equipamentos Industriais de Processo**. Rio de Janeiro: LTC, 1997.
TELLES, P. C. S. **Tubulações Industriais – Cálculo**. 9th edition. Rio de Janeiro: LTC, 1999.

COMPLEMENTARY BIBLIOGRAPHY

MACINTYRE, A. J. **Bombas e Instalações de Bombeamento**. 2th Edition; Rio de Janeiro: LTC, 1997.

Curriculum Contents PROCESS MODELLING AND SIMULATION	Code: 9F	Period: 9 ^o semester
Credits: 3 (2T+1P)	Type: Presential	Workload: 30 hrs

Prerequisites: 4A

SYLLABUS

Mathematical models of food engineering systems; Food: classification models; Steady models; Models for transient; Phenomenological models; Empirical models; Process simulation: introduction to simulation of industrial processes, simulation of static and dynamic processes; Determining of stationary points; Process analysis; Process optimization: basics of process optimization, formulation of an optimization problem; Constrained and unconstrained problems; Introduction to technical/optimization tools.

BASIC BIBLIOGRAPHY

BROCKMAN, J. B. **Introdução à Engenharia - Modelagem e simulação de problemas**. Rio de Janeiro: LTC, 2010.
 PERLINGEIRO, C. A. G. **Engenharia de Processos – Análise, Simulação Otimização e Síntese de Processos Químicos**. São Paulo: Edgard Blücher, 2005.
 POWELL, S. G.; BAKER, K. R. **A arte da modelagem com planilhas**. Rio de Janeiro: LTC, 2006.

COMPLEMENTARY BIBLIOGRAPHY

Curriculum Contents SUGARCANE PRODUCTION		Code: 9G	Period: 9 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: 7I e 8A

SYLLABUS

Introduction: Sugar formation of sugarcane; Maturation; Harvest; Transport; Sugar cane payment by Sucrose content; Preparation and grinding of sugarcane; Sulphitation; Liming; Decanting; Evaporation; Cooking; Crystallization; Drying sugar; Types of sugar; Preparation or Must; Fermentation; Distillation; Product quality control.

BASIC BIBLIOGRAPHY

SHREVE, N. R.; BRINK JR, J. **Indústrias de Processos Químicos**. 4th Edition; Rio de Janeiro: LTC, 1997. 732p.
 SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotechnologia Industrial V. 4 – Biotechnologia da Produção de Alimentos**. São Paulo: Edgard Blücher, 2001. 523p.
 SILVA, J.S. **Produção de álcool combustível na fazenda e em sistema cooperativo**. Viçosa, 2007.

COMPLEMENTARY BIBLIOGRAPHY

SCHMIDELL, W.; LIMA, U.A.; AQUARONE, E.; BORZANI, W. **Biotechnologia Industrial V. 3 – Processos Fermentativos e Enzimáticos**. São Paulo: Edgard Blücher, 2001. 293p.

Curriculum Contents DEVELOPMENT AND MARKETING OF NEW PRODUCTS		Code: 9H	Period: 9 th semester
Credits: 2 (2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: None

SYLLABUS

Importance, definition and characterization of new products; Consumer interaction/new products; Introduction to the market and the way of new product development; Market characterization; Conditions to be met by the new product; Relationship success x failure of a new product; Marketing strategy: product, price, logistics and channel advertising and promotion, management, international sales, grocery; Measurement and prediction of demand; Planning supermarkets; Marketing and Nutrition.

BASIC BIBLIOGRAPHY

CASTRO, L.T.E.; NEVES, M. F. **Marketing e estratégia em agronegócios e alimentos**. São Paulo: Atlas, 2003.
 DORNELAS, J. C. A. **Empreendedorismo, Tornando Idéias em Negócios**. Rio de Janeiro: Campus, 2001.

NEGRÃO, C.; CAMARGO, E. **Design de Embalagem – do marketing à produção**. São Paulo: Novatec, 2008.

COMPLEMENTARY BIBLIOGRAPHY

BERMUDEZ RODRIGUEZ, M. **Marketing de alimentos y bebidas – uma aplicación de la economía de experiencias**. Bogotá: Universidade Externado de Colômbia, 2006.

Curriculum Contents FOOD TOXICOLOGY		Code: 9I	Period: 9 th semester
Credits: 2(2T+0P)	Type: Presential		Workload: 30 hrs

Prerequisites: 3G e 8E

SYLLABUS

Fundamentals of food toxicology; Natural toxins in animal products and vegetable products; Toxins fungal food (mycotoxins); Microbial toxins; Additives in foods; Pesticides; Heavy metals and other environmental contaminants in food; Toxic compounds formed during food processing; Carcinogenic chemical compounds in food; Contamination of food during production; Transportation, processing and storage; Knowledge of the characteristics involving acute and chronic poisoning by ingesting chemicals transmitted by food; Detection of toxins and contaminants in food.

BASIC BIBLIOGRAPHY

MIDIO, A.F. **Toxicologia de Alimentos**. São Paulo: Varela, 2000.

MIDIO, A.F.; MARTINS, D.I. **Herbicidas em alimentos**. São Paulo: Varela, 1997.

SEIZI, O. **Fundamentos de Toxicologia**. 3rd edition; São Paulo: Atheneu, 2008.

COMPLEMENTARY BIBLIOGRAPHY

HOBBS. **Higiene y toxicologia de los alimentos**. Espanha: Acribia. 1997

BJELDANES; SHIBAMOTO; TAKAYUKI. **Introduccion a la toxicologia de los alimentos**. 1st edition; Espanha: Acribia. 1996.

10th SEMESTER

Content by workload FINAL PROJECT		Code: 10A	Period: 10 th semester
Credits: 6 (1T+5P)	Type: Presential and in compliance with the required minimum workload		Workload: 90 hrs
Prerequisites:	80% of the curriculum components (subjects) met (Section 2.2.5.1 of this ECP)		
Content by workload CURRICULAR INTERNSHIP		Code: 10B	Period: 10 th semester
Credits: 12 (0T+12P)	Type: Presential and in compliance with the required minimum workload		Workload: 180 hrs
Prerequisites:	(Item 2.2.5.2 from this ECP)		

2.2.7 FORMS OF ACCESS TO THE COURSE

Candidates to have access to the course are required to have completed high school or equivalent, and to be classified within the number of vacancies through selection examinations which will be published in edicts released biannually.

The edict of the respective selection process will follow the terms of the Regulatory Ordinance Nº 40/2007, i.e., it will be published at least 15 days prior to the selection and should contain at least the following information:

- a) Name and qualifications of the course;
- b) Act of authorization of the course;
- c) Number of vacancies offered per shift;
- d) Number of students per class;
- e) Course location;
- f) Access standards;
- g) Validity of admissions.

2.2.8 PLANNED EDUCATIONAL PRACTICES

The pedagogical principles that guide the course are made up of activities such as seminars, technical visits and laboratory practices. This curricular flexibility is due to the need of integration/interaction with the labour market and the technological and scientific innovations of a globalized society.

Classes are developed primarily using audio-visual resources, oral exposition and the development of activities such as: group work, seminars, practical classes. The field classes (external) and technical visits are part of the work methodology and are always designed in an interdisciplinary manner in order to achieve predetermined goals set by disciplines. Besides these practices, some disciplines are used in the preparation of projects for the development of the knowledge to be acquired by students.

2.2.9 CURRICULAR FLEXIBILITY

The Food Engineering course enables studies carried out by students in other higher education institutions to be used at IFMT, provided that they correspond with the content in the syllabus of the disciplines. There are not any training courses and alternative/optional modules .

IFMT-MT provides integration activities with the labour market and the community, such as seminars, symposiums, extension activities, and the incentive to carry out extra-curricular internships, research activities and volunteering. This way, the engineer to be will develop the knowledge, skills and competences necessary for their vocational training.

The curricular flexibility also extends to the curriculum matrix of this course, allowing the student to enrol in mandatory curriculum components (Table 2) required in the syllabus of other Higher Education courses located solely on the same campus. The designation of enrolment can be offered as long as there vacancies in curricular component requested and the final opinion of the course coordinator.

2.2.10 EXPECTED SYSTEM FOR REVIEW OF TEACHING - LEARNING

The evaluation of school performance is made by curricular unit and per semester , focusing on aspects of attendance and performance - both eliminatory.

The attendance relates to lectures, school activities, application exercises and practices. A student who fails to attend 25 % (twenty five percent) or more of the total teaching hours is considered failed.

The performance is assessed through continuous monitoring of the student and the results obtained by them in the exams and/or activities such as individual assessment, group work, seminars and projects). Verification of learning will be expressed in marks, on a scale of 0.0 (zero) to 10.0 (ten), assuming a decimal point and the mark being the sum of the evaluation of the knowledge acquired value 8.0 (eight), with the note of the attitudinal evaluation, value 2.0 (two). The two points of attitudinal assessment comprise: 0.5 (half) point regarding attendance and punctuality, 0.5 (half) point regarding the implementation of school activities, 0.5 (half) point regarding discipline and respect; 0.5 (half) point regarding self-assessment . The student will fail if the result of their learning verification is less than 7.0 (seven).

2.2.11 EVALUATION SYSTEM DESIGN COURSE

In IFMT there are two moments for the institutional evaluation of courses. One of these moments is where evaluation of project progress occurs through ordinary calls (at beginning and end of semester) and extraordinary calls made by the course coordinator. The college consists of the President and two (02) faculty representatives (holder and alternate), 02 (two) student representatives (holder and alternate) and the other teachers who teach subjects in the course , to be part of this plenary council. It is the responsibility of this collegiate: all the changes, additions and deletions contained in this Educational Project Course (PPC), as well as evaluating the specific profile of their course, when it comes to planning, evaluating processes, expected outcomes, obtained through its educational activities and projects created. The ratification of the Core Teacher Structuring must always be present.

The collegiate of Education Department consists of the President, i.e. the very head of the Department of Education, Campus Courses coordinators, faculty representatives, student representatives and representatives of the technical and administrative Campus, by calling for recognition of the plenary and decision making regarding the ratification of the decisions of the Collegiate Course.

The other time is through the Self Assessment Committee (CPA), formed by members appointed by the rector and has autonomy regarding council meetings and other collective bodies existing in the institution. This committee is composed of faculty representatives, student representatives, technical and administrative representatives and representatives of organized civil segments of the community, being forbidden the composition that favours the absolute majority of one of the segments, in accordance with Law 10.861/2004.

2.2.12 ENROLLMENT IN SUBJECTS OF SUBSEQUENT SEMESTERS

Students can register in the disciplines of the following semester, provided that:

- a) The curriculum contents required are being offered in that semester, except for contents with required workload (Table 2);
- b) The student has completed the courses that are prerequisite to take the course required;
- c) The total workload attended in the semester in question does not exceed 480 hours;

- d) There is vacancy for joining the course, since each course has 35 places or more (in this case with the granting of teachers in that semester) that are made available primarily to regular students of the semester in which the course is allocated.

2.2.13 EXPECTED POLICY FOR INTEGRATION OF EDUCATION, R&D (APPLIED RESEARCH AND DEVELOPMENT) AND RELATIONSHIP WITH SOCIETY

The research and extension activities have the function of making the link between the educational activities contained in the educational projects of the course and the needs of development and quality of life in the state and the region, providing essential elements for the institution to participate actively in community, but also in the political social, cultural, administrative and professional bodies.

The Federal Institute for Education, Science and Technology of Mato Grosso - IFMT / MT aims to educate and train professionals in the field of technology education at different levels and types of education for the various sectors of the economy, as well as to conduct applied research and promote technological development of new processes, products and services, in close liaison with the productive sectors and society, especially at a local and regional level, providing mechanisms for continuing education.

The overall objective of the institution is focused on empowering citizens to autonomous and continuous learning, in the aspects of essential, common and general competencies. It also aims at developing professional hinged skills in an innovative way to a solid basic education, seeking for excellence in professional education, along with the full development of students, so that they can be prepared for the exercise of citizenship by contributing to the social and technological development of the State of Mato Grosso and Brazil.

Thus, the IFMT has among its institutional goals, especially with regard to research, the strengthening and expansion of scientific production, by conducting applied research, stimulating the development of technological solutions creatively and extending its benefits to the community.

Such objective was strengthened in the Institutional Self-Assessment conducted in 2005/2006, whose focus is on the possibility of making the accreditation with society. This is done through critical and dynamic views, strategically oriented toward the changes of the modern world in order to ensure quality standards due to their function. They also aim at maintaining skills and achieving transparency that ensures the credibility of society, the government and citizens. This means identifying the conditions of education offered to students, especially those relating to the faculty profile, the physical facilities and the didactic-pedagogic organization.

Scientific research is contemplated in the strategic planning of the institution for the period 2005-2009, in the following objectives:

1. Provide teaching in a coordinated manner to develop the scientific, critical thinking and creativity in students, by the exercise of investigative capacity.

Strategic actions:

- a. Implement a program of research initiation to students of technical courses, technologists, undergraduate and postgraduate, under the guidance of teachers, preferably masters and doctors, linked to the research lines;
- b. Set as a priority the articulation between the completion of course work (final project) and research lines adopted by the Institution, at a minimum rate of 30% per course.
- c. Include the participation of students of all courses in at least 30% of the research projects under development in the respective areas;

- d. Implement a program of research grant for students, establishing a quota scholarships per course, prioritizing those who participate in research projects linked to institutional lines;

2. Encourage research and scientific research aimed at the development of science and technology and promote its divulgation.

Strategic actions:

- a. Systematize the Institutional Program for Scientific Research, defining core groups and lines of research in the areas of knowledge of the courses offered by IFMT-MT.
- b. Define at least three projects by area of knowledge, for the creation and maintenance of each research centre;
- c. Subscribe at least one research project per area for fundraising external funding agencies;
- d. Establish Ethics Committee and Scientific Merit for the assessment of research projects;
- e. Promote the divulgation of research results through publications in refereed journals and/or communications in events of relevant areas, in a ratio of at least 5% of the number of teachers in 2007 and 10% in subsequent years;
- f. Edit annually two numbers of the Journal PROFICIENTIA / IFMT with scientific professionals of the institution;
- g. Hold at least one annual scientific meeting for divulgation of the scientific areas of strategic research;
- h. Establish merit award for academic work every semester, granting the award to the top three of the Institution;
- i. Establish annual quota, per area of study, to fund teacher participation in scientific events for presentations of academic work;
- j. Publish bi-annual compilations and summaries of all publications from IFMT.

Furthermore, scientific research are inserted in reciprocal relationship with society, by offering services to the community resulting from the activities of teaching, research and scientific initiation, with the implementation, development and dissemination of knowledge obtained, as well as the diagnosis and characterization of the needs of society with regard to research.

As for institutional planning in terms of development of infrastructure, the Federal Institute of Education, Science and Technology of Mato Grosso, has for the past few years invested in modernization, construction, renovation and maintenance of the physical infrastructure in order to meet the needs of the institution and provide conditions of offering quality education to students.

Most of these investments came from resources originated from the decentralization the Ministry of Education and some parliamentary amendments, but they are not sufficient to meet the entire demand of the institution, including with regard to the implementation of projects to implement infrastructure research.

Thus, in order to expand and consolidate the scientific and technological research, through the association of investment to improve the management of the infrastructure and the definition and implementation of institutional strategies, it is essential that IFMT-MT gets support for the institutional

development plan so it can achieve the strategic objectives: "to promote the strategic advancement of the institution, providing it with growing conditions of personnel and physical, technological and operational infrastructure, generating positive impacts on the quality of the academic programs offered at all levels and modalities. "

In order to achieve these goals and carry out actions effectively, in was approved in 2006 the new Bylaws of IFMT-MT, at which time more space for research could be increased with the creation of the Policy Coordination Program for Scientific Initiation, whose tasks are:

- a. prepare the planning and execution of activities of their coordination;
- b. coordinate the development of research projects and initiation courses, taking as references the institutional design and the relevant legislation;
- c. keep research projects up dated in order to adapt them to new requirements of the market and the needs of students;
- d. permanently monitor the development of research activities at all levels to ensure the completion of ongoing projects;
- e. maintain permanent contact with teachers, recording information about the development of their work; propose policies for the maintenance of the Institutional Program of Scientific Research ;
- f. maintain constant contact with the production and labour market to ensure the adequacy of the profile of research with market expectations;
- g. participate in the preparation of materials to disseminate the research projects for students and external community ;
- h. select relevant projects through interviews, curriculum analysis or other relevant means, having as parameter the pedagogical project of the courses, and forward the results to the Board of Education for the respective measures;
- i. coordinate the research project activities;
- j. be responsible, along with the leaders of the project, for the compliance with the schedule of the research ;
- k. ensure the safeguarding of assets and facilities available to the coordination;
- l. prepare the Researchers' Evaluation Plan;
- m. perform other duties within their competence or assigned to it by the higher jurisdictions.

This way, scientific research at IFMT is expected to leverage in order to achieve the objectives proposed in the Development Plan of the institution and increase the economic and social relevance, and research strategies, so to insert the science and technology activities in the process of sustainable socio-economic development of the region and the country.

2.2.14 INTENDED POLICY FOR RELATIONSHIP WITH BUSINESS

The IFMT celebrates formal instruments such as agreements, contracts, terms of partnership with public and private institutions for referrals of students for internships and has a curriculum database of

technical graduates for forwarding to the labour market. In recent years, several agreements were signed with the objective of technical cooperation, academic, scientific and cultural partnerships and internships.

2.2.15 ACADEMIC RECORDS ON CAMPUS

Academic records are maintained and managed by a system called Q-Academic. The Q-Academic is an integrated academic management, designed to manage the various sectors and departments of educational institutions, saving time, eliminating rework, providing accurate information and with agility to the entire academic community.

Through this system, teachers can manage their academic life regarding the release of material taught, attendance and student grades, update personal information, attach files for queries and downloads for students, and refers to the history courses taught in current and previous semesters.

Students can check and update their personal data, monitor their academic life (attendance, grades, enrolment in subjects, transcripts and content covered by discipline) and copy the materials provided by faculty members.

2.2.16 FACULTY OF BELA VISTA CAMPUS CUIABÁ

The table below shows the faculty campus Bela Vista, which will act along the course of Food Engineering. The faculty consists of 45 teachers, where 15.55% of teachers have PhD, 51.11% of teachers have Master's degree, 28.89% are specialist graduates, and 4.44% are regular graduates (Table 3).

NAME	TYPE	GRADUATION	POST GRADUATION
Adriana Paiva de Oliveira	40hrs	Licentiate Chemistry	Master: Chemistry Doctorate: Chemistry Environmental
Alencar Garcia Bacarji	DE	Bachelor Science Economics	Master: Agrobusiness
Antonio Carlos Maglia	DE	Licentiate Chemistry	Specialization: Educational Planning
Carolina Balbino Garcia dos Santos	DE	Bachelor Food Engineering	Specializing (in progress): Processing and Quality Control of Meat, Milk and Eggs
Carla Maria Abido Valentini	DE	Licentiate Science - Habilitation in Chemistry	Specialization: General Didactics Master: Physics and the Environment Doctorate: Tropical Agriculture
Cleide Ester de Oliveira	DE	Licentiate in Linguistics	Specialization: Spanish Language and Spanish Literature Master: Linguistic Studies Doctorate (in progress): Social Psychology

NAME	TYPE	GRADUATION	POST GRADUATION
Cristiane Lopes Pinto	DE	Bachelor in Nutrition	Master: Surgery, Nutrition and Metabolism.
Daryne Lu Maldonado Gomes da Costa	DE	Bachelor in Food Engineering	Master: Food Science Specialization: Teaching in Higher Education Doctorate (in progress): Environmental Chemistry
Edgar Nascimento	40hrs	Licentiate in Mathematics	Specialization: Methodology in Teaching Mathematics Doctorate: Electrical Engineering - Energy Control and Optimization
Elaine de Arruda Oliveira Coringa	DE	Licentiate and Bachelor in Chemistry	Specialization: Educational Planning Specialization: Processing and Quality Control in Meat, Milk, Eggs and Fish. Master: Tropical Agriculture Doctorate (in progress): Tropical Agriculture
Eleusa Maria Almeida	DE	Licentiate Geography	Specialization: Environmental Analysis and Urban Planning in Geography Master: Tropical Agriculture
Eliane Dias de Almeida	DE	Licentiate Science - Habilitation in Chemistry	Specialization: Methodology of Technological Teaching Master: Physics and the Environment Doctorate (in progress): Environmental Chemistry
Eucarlos de Lima Martins	DE	Bachelor and Licentiate in Chemistry	Master: Tropical Agriculture Doctorate (in progress): Environmental Chemistry
Felicíssimo Bolivar da Fonseca	DE	Bachelor of Philosophy	Master: Education Doctorate (in progress): Social Psychology
Franciolly Marcos Batista Siqueira	40hrs	Bachelor in Geography	Master Geography
Francisco Carlos de Oliveira	DE	Bachelor in Agronomy	Specialization: Methodology in Technological Teaching
Ivani Maria Tomaz da Silva	DE	Licentiate Pedagogy	Specialization: Education for Young and Adults Master (in progress): Education Science
James Moraes de Moura	DE	Licentiate Biological Sciences	Master: Tropical Agriculture Doctorate (in progress): Chemistry Environmental
Jandinei Martins dos Santos	DE	Licentiate Chemistry	Specialization: Fundamentals of Education
Jeremias de Oliveira	40hrs	Licentiate of Primary School / Bachelor Chemistry	Specialization: Methodology in Technological Teaching

NAME	TYPE	GRADUATION	POST GRADUATION
João Maia	40hrs	Pharmaceutical and Biochemical	Specialization: Chemistry Laboratory
Jonas Spolador	DE	Licentiate in Physics	Specialization: Environmental Education Master: Environmental Physics
Jorge Luiz da Silva	40hrs	Licentiate in Biological Sciences	Master: Ecology and Biodiversity
Josias do Espírito Santo Coringa	DE	Licentiate Chemistry	Specialization: Impact Assessment in Health and Environment Master: Tropical Agriculture Doctorate (in progress): Environmental Chemistry
Kátia Terezinha Pereira Ormond	40hrs	Bachelor and Licentiate in History	Specialization: History of Mato Grosso Master (in progress): Territories and Frontiers
Luiz Both	DE	Licentiate in Science – Habilitation in Chemistry	Specialization: Methodology in Technological Teaching Master: Education Doctorate (in progress): Environmental Chemistry
Luiz Diego Marestoni	DE	Licentiate in Physics	Master: Physics Doctorate (in progress): Chemistry Environmental
Marcelo César Velasco e Silva	DE	Licentiate Artistic Education	Master: Linguistic Studies
Marco Antônio de Oliveira Barros	40hrs	Licentiate Mathematics	
Marco Aurélio Bulhões Neiva	40hrs	Bachelor in Electrical Engineering	Specialization: Safety in Workplace Engineering Doctorate: Law and Social Sciences
Marcos Feitosa Pantoja	DE	Licentiate in Chemistry	Master: Science and Material Engineering Doctorate: Science and Material Engineering
Maria Ubaldina Costa Sanches	DE	Licentiate in Science - Habilitation in Chemistry/Pharmacy	Specialization: Methodology in Technological Teaching Master: Education, Culture and Society
Moacir Penazzo	40hrs	Licentiate in Sciences (Mathematics)	Specialization: Methodology in Higher Education Teaching
Nadja Gomes Machado	DE	Licentiate in Biological Sciences	Master: Ecology and Biodiversity Doctorate: Environmental Physics
Nilton César Ribeiro	40hrs	Bachelor in Industrial Chemistry	Specialization: Soil Fertility and Nutrition of Plants in Agrobusiness Master (in progress): Electrical Engineering

NAME	TYPE	GRADUATION	POST GRADUATION
Olavo Ivo Pereira	DE	Licentiate in Sciences – Habilitation in Chemistry	Specialization: Teaching Chemistry Master (in progress): Science in Education
Paulo Sesar Pimentel	40hrs	Linguistics: Portuguese - Literature	Master: Linguistic Studies
Raquel Martins Fernandes	DE	Bachelor in Philosophy	Master: Education Doctorate (in progress): Education - Social Movements
Rozilaine Aparecida Gomes de Faria	40hrs	Bachelor Sanitary Engineering	Master: Organic Chemistry Doctorate: Tropical Agriculture
Sandra Mariotto	DE	Licentiate in Biological Sciences	Specialization: Specialization in Health Surveillance and Epidemiology Master: Ecology and Biodiversity Doctorate: Genetics and Evolution
Suzana Aparecida da Silva	DE	Licentiate Chemistry	Master: Health and the Environment Doctorate (in progress): Environmental Geotechnics
Valéria de Souza	DE	Licentiate Chemistry	Master: Chemistry Doctorate: Chemistry Environmental
Veralucia Guimarães de Souza	40hrs	Linguistics: Portuguese - English	Master: Linguistic Studies Doctorate (in progress): Linguistics
Wander Miguel de Barros	DE	Bachelor in Pharmacy	Master: Health and the Environment Doctorate: Health Science
Wellington Soares	40hrs	Licentiate in Biological Science	Specialization: Environmental Education Mestrando: Biotechnology

* DE : Exclusive dedication

For the implementation of the Food Engineering course and the maintenance of the Food Technician course it is necessary to hire nine more teachers with the following education:

- Two engineers with Master's degree in Food Science or Food Technology;
- One Food Engineer with a Masters in Food Engineering;
- Two Chemical Engineers and Industrial Chemists with a Master's in Chemical Engineering or Chemistry;
- One Physicist with a Master's in Physics;
- One Mathematician with a Master's in Mathematics;
- One Nutritionist with a Master's degree;

- One Pharmacist with Master's degree in Science or Food Technology.

2.2.17 ADMINISTRATIVE TECHNICIANS IN THE CUIABÁ BELAVISTA CAMPUS

Table 4 - Administrative technicians in the campus

NAME	POST/FUNCTION
Aliete Anuniação Malheiros Nunes	Administrative Technician
Aline de Arruda Benevides	Laboratory Technician
Alinor Soares de Farias	Administrative Technician
Andréia Andreoli Silvestre	Laboratory Technician
Antonio Borromeu	Guard
Ben Hur Cardoso	Accountant
Celso Perreira	Porter
Claudia de Paula Norkaitis	Psychologist
Douglas Willer F. L. Vilela	I.T. Technician
Elton Schalm	Administrative Technician
Francisca Ivany Viana Guerra Dutra	Librarian
Francis-Elpi de Oliveira Nascimento	Educational Issues Technician
Francismeiry Cristina de Queiroz	Social Assistant
Gilmar Lopes	Administrative Technician
Gilvani Alves	I.T. Technician
Isabela Cristina do Carmo	Administrative Technician
Luzo Vinicius Pedroso Reis	Administrative Technician
Milena Athie Goulart	Administrative Technician
Maicon Weippert de Oliveira	Administrative Technician
Natacha Chabalin Ferraz Suquere	Administrative Technician
Reinaldo Silva Barbosa	Administrative Technician
Renata Crancio Maciel	Administrator
Ricardo Riva	Administrative Technician
Rogéria Brito Arcanjo Oliveira	Librarian
Rosimeire Montanucci	Pedagogue
Sônia Maria de Almeida	Pedagogue

2.2.18 INFRASTRUCTURE

The tables below present the infrastructure of the Bela Vista Campus.

Table 5 - Course support structure

ENVIRONMENT	QUANTITY	DESCRIPTION
Auditorium	01	Room with capacity for 90 places.
Restrooms	10	05 Male and 05 Female.
Sector Library	01	Room with 5 air conditioning, 1 cupboard, 2 lockers, 1 drinking fountain, 6 swivel chairs, 40 study chairs, 1 book trolley, 11 computers, 20 shelves, 1 exhibitor shelf, 1 file, 1 map file, 1 L shape table, 2 collective tables for computers, 1 small table, 4 computer desks, 9 study tables, 1 TV set, 1,318 titles distributed in 2,661 copies.
Course Coordination	01	Room with 2 Shelves MDF, 2 large doors, 2 green swivel chairs, 4 green office chairs, 2 files with 3 drawers, 3 L shaped office tables, 1 table for meetings in MDF, 1 rack for 3 computers, 1 MDF cupboard with 2 small doors, 2 air conditioners Springer 18,000 BTUs, 4 computers with LCD screen, 7 data show sets, 2 desktops, 1 drinking fountain, 1 counter for public services, 2 telephone land lines, internet hub, 1 laser printer Brother HL-5350 DN.
General Directorate	01	Room with 1 stringer, 3 places, 1 MDF desk, 1 HP Printer Laser Jet 1320, 3 computers with peripheral monitors, 1 swivel chair, 1 office armchair, 4 swivel chairs, 1 table for meetings, 1 L shaped table, 1 air conditioner Springer 18.000 BTUs, 1 MDF shelf with two doors, 1 desktop, 1 stabilizer.
Department of Education	01	Room with 2 MDF tables (L shape), 4 green office tables, 4 green office chairs, 1 air conditioner Springer 18.000 BTUs, 2 Computer with LCD monitors and peripherals, 1 file, 1 telephone land line.
Department of Administration and Planning	01	Room with steel cabinets, 1 MDF shelf, 1 stringer with 3 chairs, 6 green swivel office chairs, 4 green office chairs, 1 notebook, 2 L shaped office desks, 4 rectangular tables, 2 air conditioners Springer 18.000 BTUs, 4 Computers with LCD monitors and peripherals, 1 telephone land line, wireless for internet connection, 1 laser printer.
Coordination of Research and Postgraduate	01	Room with 2 MDF shelves with 2 large doors, 4 green office chairs, 3 office rectangular tables, 1 air conditioner Springer 18.000 BTUs, 1 Computer with LCD monitors e peripherals, 1 notebook, wireless for internet connection.
Teacher's Room	01	Room with desks, 1 table for meetings, 1 sofa with 2 places, 1 TV set SEMP TOSHIBA 29 inches, 4 computers with monitors and peripheral, 1 drinking fountain, 1 air conditioner, 1 desk for computers.
General Secretary for School Documentation	01	Shared room with 1 Samsung monitor 15 inches, 1 small wooden shelf, 1 drinking fountain, 2 MDF files with 4 drawers, 1 wooden desk with four drawers, 2 study desks, 1 printer LEXMARK E232, 1 Computer with monitor and peripherals, 3 green office chairs, 4 green swivel chairs, 3 MDF shelves with 2 doors, 3 computer racks, 1 Samsung computer with monitor and peripherals, 1 L shaped table, 2 air conditioners Springer 18.000 BTUs, 1 computer with monitor and peripherals, 1 wooden desk with 3 drawers, 1 office L shaped table, 1 computer with monitor and peripherals, 1 computer rack, 1

ENVIRONMENT	QUANTITY	DESCRIPTION
		printer Kiocera ecosys fs 1030d, 1 fax, 1 telephone set, 3 electricity stabilizers.
Warehouse	01	Room with 3 wooden shelves, 1 wooden cabinet with 3 divisions, 4 metal shelves for chemical products stocking, glassware and other metals.

Table 6 – Classroom infrastructure

Classrooms	AVAILABLE STRUCTURE
1	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 blackboard, 02 air conditioners
2	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 blackboard, 02 air conditioners
3	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 blackboard, 02 air conditioners
4	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 blackboard, 02 air conditioners
5	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 blackboard, 02 air conditioners
6	25 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
7	25 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
8	25 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
9	25 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
10	30 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
11	30 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
12	30 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
13	30 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 02 air conditioners, 03 ceiling fans
14	40 student chairs with arm, 01 teacher's table, 01 armless chair, 01 glass board, 01 air conditioner

LIBRARY

TYPE OF INSTALLATION: Library

IDENTIFICATION: Library "Francisco de Aquino Bezerra"

AVAILABILITY: Area designated for consulting, borrowing books, and internet access

QUANTITY: 01

CAPACITY: 100 students

USE OF INSTALLATIONS: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Book; Magazines; Video library, Periodicals, Video library; Encyclopaedias; Monographs; Microcomputers for full internet (cabinets, monitors, mice and keyboards), air conditioners, cabinets, shelves for books, tables, chairs.

GENERAL CHEMISTRY LABORATORY

TYPE OF INSTALLATION: Chemistry Laboratory

IDENTIFICATION: General Chemistry Laboratory

AVAILABILITY: Specific area for theoretical and practical classes

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATIONS: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Scales; Greenhouse; pH Meters; Keg; heating plate; distiller water; cabinet; Washers pipette; Muffle, air conditioners, fire extinguisher, Analytical Balance Mark 210A; Chapel; Emergency Shower;

COMPLEMENT: Because the laboratory is more used in the first years of the IFMT courses, the General Chemistry laboratory meets research projects and practical lessons in the areas of chemistry studying the basics: laws, principles and theories that allow to characterize the chemical phenomena that occur with substances. It has stands in the form of islands and a side wall bench.

ANALYTICAL CHEMISTRY LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Analytical chemistry laboratory

AVAILABILITY: Specific area for theoretical practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATIONS: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Teacher's desk; steel cabinet with 02 glass doors, steel cabinet with 01 glass door; Bunsen Burners, Centrifugal, Air Conditioners, Stabilizers; pipe agitator; Muffle Furnace; Barrels; heating plate; Centrifuge; fire extinguisher.

COMPLEMENT: Built with island shaped benches and a lateral wall bench, the analytical chemistry laboratory serves research projects and practical lessons in the areas of analytical chemistry, involving methods aimed at determining the composition of matter. Qualitative methods generate information about the identity of the atomic or molecular species, or functional groups in the sample. As for the quantitative methods, they provide numerical results related to the amount of components in the sample.

ORGANIC CHEMISTRY LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Organic Chemistry Laboratory

AVAILABILITY: Specifica are for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATIONS: Shared between long distance (UAB/IFMT) and presential course at IFMT

ORGANIC CHEMISTRY LABORATORY

Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Teacher's desk; Barrels; air conditioners; Extractor sebelin; Greenhouse; Rotary evaporator; Scale; Distiller; Chair Professor; Blankets - 0.5 Liter; Manta 250; fire extinguisher; Vacuum Pump.

COMPLEMENT: Laboratory of Organic Chemistry meets research projects and practical lessons in the areas of organic chemistry studying the behavior of carbon compounds. These compounds have extremely varied applications: plastics, petroleum, fibers, rubber, medicine, biochemistry, etc.

WATER ANALYSIS LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Water analysis laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 25 students

USE OF INSTALLATIONS: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: PH meter / Bench 110/220V; distiller of essential oils; equipment to measure COD - COD - 01; Spectrophotometer UV-VISQ-108U2M; Hot Plate Q313-21; Greenhouse BOD Microprocessor Q-315M13/23; Stabilizer; Apparatus Jor Test; Determinator BOD-Q 411-2; Distiller Water-Q 341-22; deionizer; Karl Fischer Titrator DL 18; Colorimeter Nessler Quanti 200; Jor Test Apparatus, core barrels, air conditioners, fire extinguisher; Scale semi-analytical Mod Mark 500; kiln drying and sterilization (microbiological).

COMPLEMENT: Built with a bench-type centre island with benches around the wall. The lab serves waters research projects and practical classes in the areas of water analysis, Environmental Pollution, Environmental Chemistry, Wastewater, Chemical Analysis Instruments, and Calibration Instruments.

ENVIRONMENTAL MONITORING LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Environmental monitoring laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATION: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Rotating evaporator; solutions shaker, tube shaker; Atomic Absorption; Keg; pipette washer; sebelin extractor; flame atomic absorption; Distiller; Greenhouse; Spectrum UV photometer; spectrum photometer, PH meters, scales, vacuum pump; fire extinguisher; air conditioners.

COMPLEMENT: Environmental monitoring is an important tool for natural resource management. It provides knowledge and basic information to assess the presence of contaminants, and to understand environmental systems. The laboratory meets the needs of environmental monitoring research projects and practical classes.

SOIL LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Soil laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATION: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Greenhouse; orbital shaker table; Washer pipettes; Greenhouse with circulation and air renewal; Macro-mill; Keg 30L; Scale; Pipettor 025mL; Electronic Scale; Centrifuge; stabilizers; Refrigerator; Bureau; Magnetic stirrer without heating; Block digester; Controlled micro digester block; tube shaker; air conditioner.

COMPLEMENTO: The most common analysis in soils are the physico-chemical analyzes. Laboratory equipped with two island type benches, a wall type bench with separation of the hot area. The lab meets the needs of soil research projects and practical classes.

BROMATOLOGY LABORATORY

TYPE OF INSTALLATION: Chemistry laboratory

IDENTIFICATION: Bromatology laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATION: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: PH Meter, Electronic Scale; Nitrogen distillers; Centrifuge; Stabilizers; Determinator of reducing sugars; Keg; Multi-use mill; Magnetic stirrers with heating; Bureau; Fibre determinator; Crusher; Fat determinator; muffle; greenhouse; Refrigerator; electric microwave oven; Digester block; Vacuum pump; Air conditioners, and fans.

COMPLEMENT: Bromatology is the science of aliments. It allows us to know their qualitative and quantitative composition; The meaning of hygienic and toxicological changes and contamination, how and why they occur and how to avoid them; The most appropriate technology to solve these problems and how to apply it; How to use the Law; Food safety; Food protection and consumers; Analytical methods to be applied to determine their composition and to determine its quality; Bromatology laboratory meets research projects and practical classes.

GENERAL MICROBIOLOGY LABORATORY

TYPE OF INSTALLATION: Laboratory of Chemistry and Biology

IDENTIFICATION: General Microbiology laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATION: Shared between long distance (UAB/IFMT) and presential course at IFMT

GENERAL MICROBIOLOGY LABORATORY

Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Microscopes; Stabilizers; Keg, Keg 30L; Refrigerator; Scale; Darkroom UV; Colony counter; Orbital shaker for micro-plates; Small culture green house; Large culture green house; Tube shakers; Electric microwave oven; Bio security hood for laminar flow; Air conditioner; Microbiological preparation sinks; Sinks for washing and waste disposal; Chairs; Fans; Centrifuge; Test tube; Semi-automatic micropipettes;

COMPLEMENT: Microbiology is a field of science dedicated to the study of microorganisms, namely prokaryotic organisms (bacteria, archaeas), lower eukaryotes (algae, protozoa, fungi) and also viruses, with focus on understanding the morphology, physiology, genetic and molecular behaviour by the use of techniques. It aims at meeting research projects and practical classes needs.

INFORMATICS LABORATORY

TYPE OF INSTALLATION: Information Technology laboratory

IDENTIFICATION: Informatics laboratory

AVAILABILITY: Specific area for theoretical and practical classes.

QUANTITY: 01

CAPACITY: 20 students

USE OF INSTALLATION: Shared between long distance (UAB/IFMT) and presential course at IFMT Bela Vista Campus

SPECIFICATION OF EQUIPMENT / FURNITURE: Glass frame, countertops, complete microcomputers (cabinet, monitors, mice and keyboards), table, chairs, air conditioner, specific programs for courses taught on site.

COMPLEMENT: Information technology is a cross-sectional area used in the various sciences, allowing students to approach recent technologies of information regarding the application and use of software and hardware, processing and data management, GIS and georeferencing, applied technical drawing, applied statistics and other related areas.
