



To: **Professor Antonio J. A. Meirelles, Director, Faculty of Food Engineering (FEA),  
Professor Flavio L. Schmidt, Deputy Director, FEA  
University of Campinas (UNICAMP)**

From: **The International Union of Food Science and Technology (IUFoST)**

Subject: **IUFoST Accreditation of the B.Sc. Food Engineering Programme, Faculty of  
Food Engineering, University of Campinas, Brazil**

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#### **Review Panel**

**Donald G. Mercer, PhD, P Eng. FIAFoST, Associate Professor, Food Science, Ontario  
Agricultural College, University of Guelph, Canada**

**Mary Schmidl, PhD, FIAFoST, Adjunct Professor, Department of Food Science and  
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**Judith Meech, FIAFoST, Secretary-General, IUFoST**

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#### **Introduction**

The Education Review Panel of the International Union of Food Science and Technology (IUFoST) was invited to the **University of Campinas (UNICAMP)** to assess the **B.Sc. Food Engineering Programme offered by the Faculty of Food Engineering (FEA)** to determine if it meets international guidelines in food science and technology programmes of study. The assessment process began with the receipt by the IUFoST Education Committee of an overview of the university, the FEA and the Programme. An onsite assessment is part of the final review as it is necessary to see and talk with the faculty, the students and the industry advisory panel and to visit the facilities available in order to gain a complete insight into the academic programme and its graduates and how they respond to industry, government, research and educational needs in the field.

The IUFoST Review Panel informed faculty members of the Faculty of Food Engineering that a report would be sent detailing their findings and that is the purpose of this correspondence.

#### **Findings and Recommendations**

The Review Panel's comprehensive assessment included the material submitted on behalf of the B.Sc. Food Engineering programme, discussions with students, graduates, faculty, alumni, an industry advisory group and employers, and a site visit to view the plant operations. The Panel learned about the founding of the Universidade Estadual de Campinas (UNICAMP) in 1966 and the Faculty of Food Engineering (FEA) in 1967. More than 2,000 Food Engineers have graduated from FEA-UNICAMP since that time.

The FEA is comprised of four departments: Food Science, Food Engineering, Food Technology and Food and Nutrition, and a bioenergy multidisciplinary programme operational since 2009. It maintains a high standard of excellence in education and research.

The FEA has six lecture rooms, four auditoriums, three teaching laboratories, and pilot plants for bakery, fruits and vegetables, packaging, dairy products, and meat products. Students also have access to many well-equipped research laboratories.

The library has a CAPES portal to every digital article from scientific journals; 69 current printed journals and 484 non-current printed titles; 20,890 books and 3,262 theses/dissertations. Students have access to 56 computer laboratories with multi-media screens.

It has a faculty of 58 full and associate professors, all holders of doctoral degrees; 42 also did postdoctoral studies. Eleven retired professors holding doctoral degrees also work at FEA. The Review Panel noted the temptation in some institutions to use graduate students to teach some classes, lectures and labs. Of note is that the FEA programme uses professors throughout, although graduate students can be involved.

Students must pass a UNICAMP entrance examination. FEA accepts up to 80 new students per year for the Day Programme and up to 35 new students per year for the Night Programme. In 2014, 2015 and 2016, there were 802, 774 and 706 candidates, respectively, for the Day Programme. The corresponding numbers for the Night Programme were 304, 368 and 333 candidates. A total of 710 students are currently enrolled, the Day Programme consisting of 473 students and the Night Programme having 237 students.

Described as comprehensive and multidisciplinary, the undergraduate curriculum of FEA can be completed in 10 semesters for the Day Programme (five years) and 12 semesters (six years) for the Night Programme.

The Brazilian Federal Agency (CAPES) has given the highest ratings for the FEA graduate programmes. The Food Science and Food Engineering courses rank 7 out of 7 and the Food Technology course 6 out of 7. CAPES awarded a 'very good' designation for the Food and Nutrition programme. Private evaluations have given the undergraduate programme a Five-Star rating. This reinforcement of the programme quality helps to enable FEA to receive funding and strengthen research lines.

The curriculum is periodically evaluated and updated, with the participation of professors, students, alumni and food industries. Curriculum reform discussed focused on greater integration between areas and disciplines and course organisation favouring educational practices to develop critical and creative student structure. The aim is to take the excellent science offered and use it for higher national and international impact.

The Panel heard that for many years the Undergraduate Programme in Food Engineering has topped the lists of the best Brazilian universities for this degree. More than 140 Food Engineering Programmes are available in Brazil and many more throughout South America. They all stem from FEA, as it was the first and has been heavily used as the example to structure other programmes. Graduates of FEA can be found in most of the other South American faculties,

Another important feature of FEA programming in terms of its successful innovation and funding sources is its historic success with patent submissions. FEA's patents generate the highest royalties in UNICAMP.

FEA's B.Sc. Food Engineering programme consists of 234 credits, with 25.8 % basic courses - math physics, chemistry, basic laboratories, computer, statistics - and an engineering basis of 12.5%. It includes courses on basic/fundamental disciplines, such as Differential and Integral Calculus, Analytical Geometry and Vectors, Data Processing, Numerical Calculus, Statistics, General Mechanics, Material Resistance, Electrotechnique, Chemistry and Industrial Economics. Discipline-

specific courses include Transport Phenomena, Unit Operations and Processes, Industrial Processing of Food Products, Food Chemistry, Biochemistry and Microbiology. Also included are essential topics for the professional training of Food Engineers, such as Sensory Analysis, Quality Control, Food Packaging, Toxicology, Nutrition Applied to Food Engineering, and Economic Aspects of the Food Area. It was noted that two or three courses in the programme require students to work in teams.

There is a mechanism in place for evaluation of faculty members every three or four years, and part of it is from student evaluation. Faculty outreach into the community involves food safety, labelling, social extension work, research or technological projects for helping poor communities at the national level and school lunch programmes at the municipal level. They are also involved with elderly nutrition and food science and publish at the undergraduate level.

Graduates reported positive employment experiences. One said that professors helped to get his/her first job. Others exhibited diverse professional experience: owner of an industrial technology company, sales, R&D manager, General Director of ITA, entrepreneur, and teaching.

In response to a question regarding the hiring of students, Industry Advisory Panel members indicated many internships come from UNICAMP and normally interns are hired.

Industry representatives reported a very good foundation at the university, with basic courses in chemistry biophysics, etc., and good overview of different applications. It was suggested that more management courses could be introduced at UNICAMP. A representative noted that it received candidates from different universities, and those from UNICAMP had the ability to think outside the box and to deal with complex situations and different environments and come up with creative solutions.

Good teachers and relationships were noted. Further development needs identified included management and administrative skills, entrepreneurship, innovation, economics, the environment, blending technology subjects into a supply chain, linking disciplines, product development/marketing, improved nutrition knowledge, communication and soft skills, presentation skills, and understanding of government relations.

Students reported that the programme prepares them well, allows for networking, and they had excellent professors who were readily available to them. They enjoyed working with food, engineering courses including unit operations and project management, and technology. The basics, physics, and electrotechnics courses were identified as difficult.

Internships of 180 hours are required for graduation. The Brazilian companies compete well with international companies, such as Cargill and Unilever, for interns. The Panel was told that internships were mainly for Quality Assurance rather than Research and Development. Some interns go to equipment suppliers. At the end of the semester, the student submits a report of the internship. A list of companies currently granting internships to FEA's students was provided.

The panel was very impressed with the opportunities for students to augment their education/training at FEA, such as Scientific Initiation and the Junior Enterprise (GEPEA) allowing a student to undertake research with a professor and receive fellowship from a financing agency. When the project is concluded, the student submits a report to the funding agency and is expected to publish a paper in an indexed journal. There is a lot of competition for this programme, with participants selected based on academic performance and projects by peer reviews. Forty to fifty students are enrolled in these research programmes in 2016-17 and will be encouraged to proceed into graduate programmes.

From 2011 to 2016, there have been more than 1600 curricular and extra-curricular internships. The FEA is located in a strategic area surrounded by various companies.

Students have access to student organizations and representatives: GEPEA - managed exclusively by FEA's undergraduate students, GEPEA Consulting in Foods is a non-profit Junior Enterprise that provides services and works on projects for companies, organizations and society in general in the area of Food Engineering. Students develop personally and professionally through business experiences; COMESTAG - also managed exclusively by FEA's undergraduate students. It is an Association that helps the students to obtain internships by providing contact with recruiting sectors of food companies and preparing the students for taking part in selection processes promoted by those companies.

Numerous FEA undergraduate students also have taken part in international exchange programmes in American and European universities. The undergraduate programme has an important collaboration with French universities involving a Dual Degree in Food Engineering.

FEA has four graduate programmes, all of which grant both the Master and Doctoral degrees: Food Science, Food Engineering, Food Technology, and Food and Nutrition. A fifth Doctoral Course in Bioenergy was added recently. Students of all Graduate FEA programmes total 503: Masters - Food Science 53; Food Engineering 54; Food Technology 42; Food and Nutrition 21; PhD - Food Science 98; Food Engineering 79; Food Technology 61. There are 32 Postdoctoral students. Panel Members queried how long the Food and Nutrition programme had been in existence and whether the numbers were rising.

The Master's Degree Programme takes 12 to 36 months and Doctorate Degree Programme 24 to 60 months. Lists of disciplines offered by the different programmes were provided.

FEA describes its research in different areas food science, engineering and technology as robust and mostly financed by CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico - National Council of Technological and Scientific Development) and FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo - São Paulo Research Foundation). In 2014-2016, FEA published two international books, two national books, 41 chapters in international books, 7 chapters in national books, 42 papers in Brazilian journals and 525 papers in international journals.

FEA alumni lead research institutes and other universities offering the undergraduate Food Engineering degree and graduate degrees in Food Science, Food Engineering and Food Technology throughout Brazil. FEA alumni also hold important positions in other Latin American countries.

Recognizing the importance of Food Science and Technology in the country's technical, scientific and economic development, Brazilian Ministries invite professors and alumni of FEA to be members of ad hoc technical committees. National and state research foundations have committees specific to Food Science and Technology.

From its creation, FEA has maintained close relations with the food industry. The food industry was consulted during the planning and founding of the Faculty and during the periodic updating of the Food Engineering curriculum. Food industries support events organized by professors. Many companies provide internship to FEA's undergraduate students and many of FEA's alumni founded their own companies.

In three years, 110 students have been involved in study abroad. From 2012 to 2016, there has been investment from the federal government and support from UNICAMP for the internationalization of higher education.

Foreign students have also enrolled in degree programmes at FEA, mostly from other Latin American countries, and more in graduate than in undergraduate programmes.

FEA's professors are recognized internationally. Three current professors and two retired professors are Fellows of the International Academy of Food Science and Technology. Three professors are Editors-in-Chief of international journals (Food Research International/Current Opinion in Food Science, Journal of Food Composition and Analysis and Food and Public Health). Others are members of the Editorial Boards of international journals. FEA's professors were invited to participate in Expert Consultation Meetings of FAO and WHO. The Latin American Symposium on Food Science is organized every two years by FEA's Department of Food Science. FEA also organized the 15th World Congress of Food Science and Technology.

#### **Conferment of the Certificate of Approval**

The Review Panel expresses its appreciation for the planning and execution of their visit by the Faculty of Food Engineering and is pleased to confer the Certificate of Approval on the *BSc Food Engineering programme*. The programme, facilities and reputation of FEA are of the highest level as heard and reported from numerous professional, industry and governmental sources. The opportunities for students are unparalleled and the Faculty provides an outstanding example of leadership, scientific expertise and teaching ability. This Certificate acknowledges that this Programme, its curricula and related facilities have been reviewed and meet the international guidelines for food science and technology programmes of study as a Centre of Excellence.

#### **Concluding Remarks**

The IUFoST Education Review Panel is pleased to provide any further information or guidance as requested. It has been indicated to the Faculty that this Approval is given for a period of five years.

Congratulations again for an outstanding programme of study.

Sincerely yours,



Professor Dr. Aman Wirakartakusumah  
Chair, IUFoST Education Committee



Judith Meech  
Secretary-General, IUFoST

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