

**Katholieke Hogeschool Sint-Lieven**



**Hochschule Anhalt**



**Hochschule Anhalt (FH)**  
Hochschule für angewandte Wissenschaften

**Dublin Institute of Technology  
Kevin Street College**

DUBLIN INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHT ÁTHA CLIATH



**Universidade Catolica Portuguesa  
Escola Superior de Biotecnologia**



# **European MSc Degree in Food Science, Technology and Nutrition**

**(Document A)**

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## **1. MARKET DEMAND AND SUPPORT**

### **1.1 Programme Background**

The European MSc in Food Science, Technology and Nutrition has been developed by partners in four European countries with the support of the European Socrates/Erasmus programme 28027-1C-6- 2001-BE-ERASMUS-EPS-1. The degree will be offered in each of the partner countries. The partners comprise the Dublin Institute of Technology (DIT), Katholieke Hogeschool Sint-Lieven (KAHO), Gent, Belgium, Hochschule Anhalt (HSANH), Kothen, Germany and Universidade Catolica Portuguesa (UCP), Escola Superior de Biotechnologia (ESB), Porto, Portugal.

For the Erasmus Mundus II programme the four original partners will be joined by five associate partners:

Gerald J and Dorothy R Friedman School of Nutrition Science and Policy, Tufts University, USA  
National Institute of Public Health of Mexico (NIPH)

Michurinsk State Agrarian University Russa

National Dairy Research Institute in Karnal, India

Northwest A&F University, China

These partner and associate partner institutions offer undergraduate and postgraduate courses in biochemistry/food science/nutrition and engineering. Previous co-operation between the institutions in Erasmus, Socrates and Tempus programmes has resulted in a good knowledge of undergraduate and postgraduate courses run in the various institutions. These experiences in organising and participating in intensive courses, lecture programmes and seminars, and involvement in student exchange projects have built up strong relationships and will facilitate the development and maintenance of common quality standards for delivery of the MSc programme. All partners are familiar with the ECTS system.

### **1.2 Market Demand**

In the EU different types of food science, technology and nutrition study programmes exist. Reviews of the literature and databases on European higher education conducted as part of the European Socrates/Erasmus programme indicated that few advanced and postgraduate programmes exist in this field. Food, Nutrition and Health are key sectors within the EU. The continuing enlargement of the number of EU membership countries and development of EU

directives, along with ongoing problems and concerns with regard to food safety (BSE, genetically modified foods, etc), nutrition (obesity, diabetes, etc) and environmental issues (waste management, genetically modified plants, etc) require that postgraduate courses such as the MSc proposed herein are available. This will ensure that ongoing educational opportunities are available to appropriately qualified and experienced science graduates. Furthermore the food/nutrition industry is a very competitive industry with narrow profit margins, increasing trade, and continuing scale-up and sophistication of agriculture, production, preservation and distribution. Thus postgraduates also need to be kept up to date with regard to technical developments in these areas.

Market research has taken place in the four partner countries, which has confirmed that there is a demand for the course. Potential Chinese students and Industrialists at an International trade fair in China have also expressed interest (Appendix 1). A report published in Ireland entitled "The supply and demand for skills in the biotechnology sector" (Forfas, September, 2003) highlighted the need for education in biotechnology. This latter subject has been included as a compulsory core module in the MSc degree in order to ensure that graduates in food and allied industries also have the opportunity to develop their knowledge in this key area.

This European MSc programme will be offered in a fulltime and part-time modular format. This modular format will be attractive to recent graduates and to graduates currently working in industry, health services, the education sector and research institutes. This initiative is in keeping with both the strategy of the EU Partner Institutions and EU policy to provide lifelong learning in order to advance the competitiveness of the Community.

It should also be noted that *Erasmus Mundus* is a recent funding initiative to promote the EU as a centre of excellence around the world, by supporting inter-university Masters Courses. It will also provide EU-funded scholarships for third country nationals participating in these European postgraduate programmes. This Sefotech partnership has submitted an *Erasmus Mundus* proposal for this MSc Degree in 2004. This *Erasmus Mundus* application has passed the technical and academic committees in Brussels. (For details on *Erasmus Mundus* see Appendix 2).

## **2. ACCOMMODATION AND RESOURCES TO RUN THE COURSE**

The Programme will be delivered using the specialised staff expertise and resources available in the four partner European Institutions. This will foster synergy, exchange of expertise, technology transfer and an increased awareness of Food Science, Technology, Nutrition and Health trends and developments in a broad European context. Video conferencing facilities will be used for course delivery of selected topics.

### **2.1 Accommodation and Resources DIT**

The College of Sciences and Health has a substantial number of lecture/tutorial rooms that accommodate class sizes from 20 to 120, most of which are equipped with AV facilities. The smaller rooms are ideal for tutorials and the larger rooms for workshops and seminars. Ideally a dedicated room is required for full-time students on this programme.

#### **2.1.1 Office Space DIT**

Within the School of Biological Sciences the Head and two Assistant Heads have individual offices. The remaining academic staff share accommodation in five offices. One large office accommodates twelve members of the staff while the remaining offices accommodate two, three or four staff members each. Additional office space is required. Standards need to be upgraded to allow staff to work efficiently in a good safe environment.

#### **2.1.2 Laboratory Accommodation DIT**

DIT Kevin Street has well-equipped laboratories for foundation and advanced science. Each School has laboratories designated for project and research work. Within the School of Biological Sciences there are a total of nine undergraduate teaching laboratories and five project/research laboratories. Two laboratories (317 and 318) have recently been extensively refurbished to provide a single, large, modern, fit for purpose multifunctional laboratory catering for practical work in biochemistry, cell biology, clinical chemistry, immunology, nutrition and molecular biology. The AV systems in all remaining laboratories have also been recently upgraded. The laboratories and facilities are listed (Table 2). The School has submitted a business plan detailing the case for the further refurbishment of laboratory space this summer (2011).

**Table 2: Laboratories and Facilities**

Room Number	Room Function	Size
202A / 203	Clinical Cytology (Microscopy laboratory)	68m <sup>2</sup>
210	Cellular Pathology	94m <sup>2</sup>
211	Research	20m <sup>2</sup>
212a	Research	32m <sup>2</sup>
212	Physiology/Nutrition	63m <sup>2</sup>
213	Biology	94m <sup>2</sup>
214	Haematology/Transfusion Science	94m <sup>2</sup>
230	Projects/Research	110m <sup>2</sup>
233	Cell and Molecular Biology Preparation Area	97m <sup>2</sup> 17m <sup>2</sup>
241	Microbiology – Research	7m <sup>2</sup>
243	Microbiology	95m <sup>2</sup>
244	Microbiology/Biotechnology	61m <sup>2</sup>
317/318	Biochemistry, Cell Biology, Clinical Chemistry, Immunology, Nutrition and Molecular Biology	188m <sup>2</sup>
328	Centrifuge Room	10m <sup>2</sup>
329	Nutrition/Food Science – Research	47m <sup>2</sup>
G29	Food Science – Processing	140m <sup>2</sup>

### 2.1.3 Laboratory Equipment

All of the laboratories are well equipped with instrumentation and facilities to conduct experiments in biochemistry, molecular biology, immunology, bioanalytical science, microbiology, biotechnology, cell culture, nutrition and clinical chemistry. New equipment purchased recently for teaching and research includes a 2D electrophoresis unit, UV/visible spectrophotometers, a cold cabinet for protein purification and column chromatography, ion selective electrode, oxygen analyser, centrifuges, 35 standard microscopes. The designated microscopy laboratories (room 2002a and 2003) have 15 screening microscopes and a high specification digital camera/microscope system as well as a multiheaded teaching microscope



which provides a state of the art teaching facility. The recent purchase of an additional high specification microscope and a fluorescent microscope both incorporating a digital camera system will support both teaching and research interests within the school. The main equipment available in the laboratories is as follows:

- Microscopes (standard, inverted, screening, multihead, high specification & fluorescent).
- Digital camera system for high specification and fluorescent microscopes
- Spectrophotometers (visible, UV/visible).
- Incubators [water-baths, cabinets (4C to 45C), rooms (4°C, 37°C), incubator shaker (2), carbon dioxide incubators (2)].
- DNA analyser, Light cycler, Primus 96 Plus PCR machine, PCR machines (6), Hybridisation oven.
- Safety cabinets and laminar flow units.
- Autoclave, drying cabinet, laboratory bench top fermenters (7, one and two litre capacity).
- Centrifuges (micro, refrigerated micro, bench top, universal, disc bowl).
- Stirred ultrafiltration cell unit.
- Chromatography columns, fraction collectors (4) chromatography cold cabinet.
- Electrophoresis equipment (mini and large gel PAGE units, 2D unit), Densitometer.
- GC and GC-MS chromatography
- Autoanalysers (Roche Cobas, 2), Flame Photometer, Na/K/Li Analyser
- Water purification units, liquid nitrogen freezer and transport units.
- Freezers (-20°C, -80°C, blast freezer).
- Oxygen analyser, oxygen/carbon dioxide analyser.
- Pasteuriser, cheese vat, spray drier, freeze drier, fluidized bed dried, homogenisers.

#### **2.1.4 Computer Facilities**

Two of the project/research laboratories are equipped with computer facilities. Students have access to facilities operated by the School of Computing and School of Electrical and Control Engineering that are also based in the Kevin Street Campus. These computers are connected to the DIT network (DIT-NET). The DIT Computer Centre at Aungier Street provides an internet link between DIT-NET and other world-wide networks via the HEA-NET. Within the School of Biological Sciences, all academic and technical staff have PCs and are connected to the DIT-NET. Printers, scanners and other ancillary equipment are also available.

### **2.1.1.5 Library / Information Resources & Services DIT**

The library of 1200 sq metres comprises the entire second floor of the newest extension to the College (*Library Facilities (DIT)* <http://www.dit.ie/library/index.html>) This includes the provision of a separate room for access to Internet and electronic information resources, a viewing room for video, and a room for seminars and training and can accommodate 405 individuals.

#### **General Library Automation and remote access to Online Public Access Catalogue (OPAC)**

Extensive inter-library facilities (including direct on-site borrowing) are available to any user in possession of a user card. The web homepage for general library information is [www.dit.ie/library](http://www.dit.ie/library).

All constituent libraries of DIT Library jointly use the Millennium system for circulations, ordering and the catalogue. Reference to most items, from whatever DIT Library site, can be accessed by using the OPAC (**Online Public Access Catalogue**) by clicking <library catalogue> on the library homepage.

The collective DIT periodical title holdings are also available from the OPAC. Printed lists are also available at all libraries.

#### ***Electronic Information Resources:***

##### ***Web based information services***

Increasingly, DIT information resources are switching format to Web-based services. It is envisaged that the use of more web-based information resources between all the constituent site libraries of DIT will be developed, which can be delivered to the desk top of the end user. Most of the electronic information resources are available via the link <Information resources> within the library webpage. <Databases> is one of the most useful links here, and includes several valuable resources such as:-

- Web of Science
- British Standards Online
- IEE/IEEE IELElectronic Library online
- Zetoc (British Library database) and many more.

Since March 2003, access to past examination papers is also available in electronic format via the library catalogue.

### ***Electronic full text journals***

In 1998, the DIT Library Central Services unit commenced subscription to **Swetsnet**, a service of which all DIT constituent libraries can avail. A selection of around 90 full text journals for which the DIT subscribes to the print format, is available. The simplest access is from the <information resources> link, and click on <electronic journals>.

### ***Access from home***

Electronic information services via all of the above categories are constantly updated as far as possible within the resources available to the library. Access to many of these services are available to staff and students of the Institute from home and can be accessed at <http://intranet.dit.ie/library/Libintra/access.html>.

***Internet Facilities. (General)*** In April 2000, a dedicated room was set aside in the Library premises for the provision of Internet facilities to students. There are 12 pc's available on a "walk-in" basis. This is also a number of free internet access points for users' own laptops within the general library premises.

### ***Inter Library Loan Service and library cooperation***

The library offers a very extensive Inter Library Loan Service to offset any limitations on periodical title subscriptions. Most requests are transmitted electronically to the British Library, and more than 75% are satisfied in 5-10 days.

DIT Library is also a member of Academic Libraries Co-operating In Dublin (ALCID). On production of an ALCID card (available from library staff), a full-time staff member or postgraduate student, may access any of the participating libraries. The majority of higher education libraries in Dublin, Cork, Galway and Limerick are participants. There is also a formal arrangement with Trinity College Dublin, by which all DIT library members may gain access to the Trinity College Library, with a letter of referral. The library also subscribes to the Trinity College Information Service and the Irish Trade Board.

### ***User education***

Library induction courses are given at the beginning of every academic year, usually from late September to early October. However, seminars on general library services, or specifically related to any of the above resources or services can be arranged by appointment at any time during the year. Groups of 1-10 may be included on any one appointment.

## **2.2 Accommodation and resources UCP**

All teaching and laboratory work on the programme is accommodated in the UCP, ESB. Video conferencing facilities in the College will be used for delivery of selected topics.

UCP, ESB has a substantial number of lecture/tutorial rooms that accommodate class sizes from 20 to 120, most of which are equipped with projection screens, and some rooms are equipped with Power Point facilities.

It is envisaged that each project will be closely linked to a particular company or research institute and will largely be conducted off-site or in the pilot plant facilities in the UCP, ESB.

### **2.2.1 Specialised Equipment and Facilities UCP**

#### **2.2.1.1 Laboratory Accommodation UCP, ESP**

ESB's research building includes twelve offices for faculty and post-graduate students, and eight laboratories (Analytical Chemistry, Enzymatic Technology, Food Bioprocess Technology, Non Food Bioprocess Technology, Microbiology 1, Microbiology II and Plant Biotechnology 1 and Plant Biotechnology II). The R & D centre also includes Applied Transfer Phenomena and Post-Harvest Technology laboratories, located in an adjacent building and a Pilot Plant (500m<sup>2</sup> area). The centre has support facilities such as distribution of compressed air, pure analytical gases, and burning propane; electrical power generator; and water storage and distribution. The research laboratories have a total building area of 1.382m<sup>2</sup>, composed of completed (2.000m<sup>2</sup>) and expansion areas (382m<sup>2</sup>).

#### **2.2.1.2 Office Space UCP**

ESB's research building includes twelve offices for faculty and post-graduate students.

#### **2.2.1.3 Computer Facilities UCP**

Project/research laboratories are equipped with computer facilities. Students have access to facilities in the IT Services and through a campus wide Wireless LAN. The computers in the laboratories are connected to the main computer network at 100 Mbit/s. The computer centre at

IT Services provides an internet link between the Porto campus and other world-wide networks via the 2Mbit/s link. Within the College of Biotechnology all academic staff have PCs and are connected to the LAN. Printers, scanners and other ancillary equipment are also available.

#### **2.2.1.4 Equipment UCP**

##### **(a) Wine Laboratory**

- Amino acid autoanalyser.
- PFLC system.
- Epifluorescence microscope.
- Automatic titrator.
- Horizontal autoclave.
- A HPLC system with different detection modes.
- Gas chromatography systems, including a GC-MS-MS.
- Spectrophotometer.

##### **(b) Fats and Oils Technology**

- A HPLC system with different detection modes.
- Gas chromatography systems, including a GC-MS.
- Spectrophotometers.
- Soxhlet extractor.

##### **(c) Fruit and Vegetables Processing Technology**

- Controlled temperature chambers.
- Spectrophotometers.
- Gas chromatograph.
- Minolta Colorimeter.

##### **(d) Pilot plants**

- Supercritical extraction unit.
- Ultracentrifuge.
- Dryers of different sizes and types.
- Pasteurisers.
- Multifunctional autoclave.

- Freeze-driers.
- Air blast freezing.
- Plate freezer.

### 2.2.1.5 Library/Information Resources & Services (UCP)

ESB has a library, for two types of users:

- Students, professors, employees and collaborators of this Institution: **Internal Readers**
- General public and other staff of the Institution: **External Readers**

Services offered to the users:

- Actual document reading and consultation.
- Consultation regarding Data bases in CD ROM and InterNet.
- Access to video cassettes and COMPACT DISC I (s).
- Document loan.
- Reference service: orientation and support given to the users in the bibliographical catalogue research, databases in CD ROM, sources of information in the InterNet, etc.
- Service of information diffusion: bibliographical bulletin, bibliographical information, informative leaflet, publication list, etc.
- Purchase of documents from other Libraries (scientific articles, monographs, etc).
- Supply of scientific publications from ESB authors to the exterior.
- Sale of ESB publications.
- Photocopy Service in regimen of self-service.

## **2.3 Accommodation and Resources KAHO**

All teaching and laboratory work on the programme is accommodated in the College for Engineering – Department, KAHO, Sint-Lieven. Video conferencing facilities in the Department of Engineering will be used for delivery of selected topics.

The Department of Chemistry and Biochemistry has a substantial number of lecture/tutorial rooms that accommodate class sizes from 20 to 120, and auditoria (200 and 400 seats) all of which are equipped with projection screens, overhead projectors, and some rooms are equipped with Power Point facilities.

It is envisaged that each project will be closely linked to a particular company or research institute and will largely be conducted off-site or in CBOK, the on-campus company of the Chemistry Department. CBOK is a well known research and service company in the area of food and animal feed production, meat production and brewing.

### **2.3.1 Specialised Equipment and Facilities KAHO**

#### **2.3.1.1 Laboratory Accommodation KAHO**

KAHO Sint-Lieven has well-equipped laboratories for foundation and advanced science and engineering courses. Each department has laboratories designated for project and research work. Pilot plant facilities are available for brewing, meat processing and biotechnology courses. Within the Department of Chemistry and Biochemistry of the Department of Engineering there are a total of 9 undergraduate teaching laboratories, (16-24 workplaces per laboratory), 7 project/research laboratories (8 workplaces per laboratory) and 4 pilot plant laboratories (144-600m<sup>2</sup>). The facilities are to be used for the following modules/topics:

- Malting and Brewing Technology.
- Enzyme Technology.
- Fermentation Technology.
- Meat Technology.
- Food Quality and Safety Management, HACCP.
- Environmental Technology.
- Flavour Analysis.



### **2.3.1.2 Office Space KAHO**

All professors and laboratory supervisors have their individual offices either annexed to their laboratories or in the immediate vicinity. Each of these offices is equipped with a telephone line and a link to the central server system, giving access to the intranet and the internet. Individual computers and auxiliary equipment are available.

All collaborators and researchers have at their disposal an individual workstation in the laboratory, equipped with a personal computer with intranet and internet access.

There is a fulltime secretarial person within the Department of Chemistry and Biochemistry.

### **2.3.1.3 Computer Facilities KAHO**

All of the project/research laboratories are equipped with computer facilities (6). Students have access to facilities in the Department of Engineering (Chemical Engineering Lab and Library).

These computers are connected to the KAHO network that provides an internet link between KAHO and other worldwide networks via the LAN and KAHO central server. Within the Department of Chemistry, all academic staff members have PCs, which are connected to the KAHO-LAN. Printers, scanners and other auxiliary equipment are available.

### 2.3.1.4 Equipment KAHO

#### Pilot brewery and accessories

- Milling
- Dual mill system

#### Preparation of brewing water

- Reversed osmosis installation and water correction equipment

#### Brewery

- Capacity: up to 4hl.
- Mashing: computerised PLC-control and steam heating (Clayton steam generator).
- Filtration unit.
- Wort boiling.
- Whirlpool.
- Wort cooling.
- Wort aeration unit.

#### Yeast Strains – Culture Collection

- Over forty different strains of yeast are currently available in fresh and frozen (-70°C) conditions.

#### Yeast Propagation

Yeast starter cultures are prepared in sterile conditions under 'laminar air flow' (Gelaire, Gelman Instrument).

Fully instrumented and automated installation for fed-batch and (semi-) continuous propagation of microorganisms.

#### Fermentation

Single walled stainless steel fermentation vessels: 2 x 800 litre (Vyncke).

Double walled cilindro-conical RVS stainless steel fermentation vessels, Pt 100 temperature controlled (cooling to -1°C): 4 x 70 l (Packo); 2 x 120 l (Packo); 1 x 800 litre.

Stainless steel vessels 10, 20 25, 30 and 50 litre.

### **Lagering**

Cool room (-1°C).

Lagering tanks: 5 x 300 litre (glass; 5 x 250 litre (stainless steel tanks).

### **Filtration**

Centrifuge (Alfa-Laval); capacity: 10hl).

Kieselguhr/cellulose filter (Velo-Legendre).

### **Bottling**

Manual CO<sub>2</sub>-back pressure filling equipment (Servinox) and pneumatic crown cap mounting (Elephant).

Automated bottling equipment (10 hl/h).

### **Incubation room**

Capacity: 10hl of beer; temperature: 20°C, 25°C or 30°C.

### **Cooling Room**

Beer cellar at  $\pm 15^\circ\text{C}$  for fermentation and ageing.

### **Additional brewery accessories and apparatus**

Malt analysis equipment.

Densimeters (Anton Paar).

EBC colour comparator (Hellige).

Turbidimeter (Haffmans Hazemeter).

Foam stability tester (Haffmans).

Conductivity meter (Consort K620).

Research microscope (Olympus BX).

### **Analytical apparatus**

#### **Photometry**

Varian UV – Visible Spectrophotometer (Cary 100 Bio).

#### **Fluorometry**

Shimadzu Spectrofluorophotometer (RF-510).

## **Beeralcolyzer**

Type Anton Paar (Thermo Scientific)

## **Specific Extraction-apparatus**

Two super critical liquid extractors (Dionex, SFE-703).

Solid phase extraction unit (Macherey & Nagel).

Vacuum distillation unit.

CD-CE - Lickers-Nickerson extraction units.

## **High Pressure Liquid Chromatography**

Merck Hitachi liquid chromatograph with programmable HPLC pump L-7100, diode array detector L-7450A and solvent degassing L-7612.

Merck Hitachi liquid chromatograph with programmable HPLC pump L-7100, UV detector L-7400, column oven L-7350 and automatic injector L-7250.

## **Capillary gas chromatography**

Gas chromatograph ThermoQuest CE GC 8000 Top Series flame ionisation detector and cold-on-column injector.

Gas chromatograph ThermoQuest CE Trace GC 2000 Series, flame ionisation detector, cold-on-column injector, AS-2000 auto-sampler, smelling port and purge & trap system (Tekmar 3100 sample concentrator) for dynamic headspace.

## **Analytical Procedures**

All standard beer analysis and advanced hop analysis.

## **Fermentation Technology**

Fully instrumented and automated fermentors of 1,5 – 15, 150 litres (stainless steel vessels, sterilisation in situ).

Solid state fermentation equipment with control on temperature, gas composition (CO<sub>2</sub> and O<sub>2</sub>), determination of heat production during fermentation.

Two controlled incubation room (30 m<sup>3</sup>) controlled for temperature, relative humidity, light and CO<sub>2</sub>.

Semi-industrial filtration equipment.

Centrifugation equipment (see brewery).

### **Meat Technology**

- Semi-commercial kitchen.
- Cutter Stephan Universal Machine UM 12.
- Filling device.
- Slicing machine.
- Tin can filling apparatus.
- Vacuum packaging apparatus.
- Tumbler: Ruhle high Tech MKR 150
- Installation for drying and seasoning of meat products (3 modules)
- Combisteamer: Rational CPC 61
- Basic equipment for determination of the main physical, (bio)chemical and microbiological characteristics of meat and meat products (pH, DW, humidity, fat, protein, ...NaCl, NaNO<sub>2</sub>, NaNO<sub>3</sub>, water activity, colour, colour stability, microbiological determinations).
- Dew point hygrometer: DECAGAON CX-3.
- Chromameter: Minolta CR-300

### **Food Quality and Safety**

- Clean air
- Cooled sterile room.
- Laminar flow units: 3

### **Water**

- Water sampling and investigation equipment

### **Cell cultures**

- A culture collection of bacteria, yeasts and fungi is kept frozen at –70°C.

### **Incubation rooms and cabinets**

- Incubation rooms at 25 and 30°C; incubation cabinets (100 and 300 litre).
- Anaerobic Cabinet Don Whitley.

### **Cool Room**

- Cool room at  $\pm 2^{\circ}\text{C}$ ; incubation cabinets at  $\pm 15^{\circ}\text{C}$  (230 litre).

### **Enumeration and BOD**

- Colony counter Don Whitley.
- Complete instrumentation for BOD-determination.

### **Sterilisation**

- Autoclave 80 litre.
- Pasteur-oven.
- Drying cabinets.

### **Lyophilisation**

- Lyophilisator Hetosicc

### **Microscopes**

- Research microscope (Olympus BX) with digital camera and digital image processing equipment.
- Microscopes Olympus and Neovar.
- Video camera and microscope adaptors for demonstration of microscopic images.

### **Analytical apparatus**

#### **Specific Extraction Devices**

- Thermal extraction unit for extraction of mineral oils from sludge.
- Vacuum distillation unit isolation of volatile components.
- Lickers-Nickerson extraction unit for steam distillation extraction.

#### **Photometry**

- Varian UV-Visible Spectrophotometer (Cary 100 Bio).
- Vitatron UPM.

#### **Fluorometry**

- Shimadzu Spectro-fluorophotometer (RF-510).

## **HPLC**

- Merck Hitachi 655A HPLC unit with programmable pump unit and UV detector.

## **Capillar gas chromatography**

- Gas chromatograph 'ThermoQuest CE Trace GC 2000 Series', Flame ionisation detector, cold-on-column injector, AS-2000 autosampler.

## **Capillar Ion Analysis**

- Waters Capillar Ion Analyser; UV-detector

## **General basic apparatus for**

- Mixing, milling and homogenisation
- Stomacher – homogeniser.
- Ultra Turrax – homogeniser.
- Lab blender and Virtis "45" mixers.

## **Measuring devices**

- pH meter
- Redox-potential meter
- Oxygen meter
- Conductivity meter

## **Heating and cooling**

- Edmund Buhler UKT30 Cryostat
- Cryostatic baths (2)
- Microwave oven

## **Centrifugation**

- Centrifuge ALC 3229

## **Flavour Analysis**

- Sampling and extraction devices.
- Gas chromatography coupled with mass spectrometry (GC-MS) for analysis of extracts.

- GC-MS with dynamic headspace sampling (DHS-GC-MS).
- High Performance Liquid Chromatography with UV-detection (HPLC-UV).
- Gas chromatography-olfactometry (GCO) with flame ionisation detector (FID).
- Flame photometric detector (FPD) and sniffing port.
- Organo-leptic testing room.

#### **2.3.1.5 Library Resources and Services KAHO**

KAHO Sint-Lieven offers centrally organised library facilities on all three campuses, including the campus in Gent. The library service provides an on-line public access at <http://extern.kahosl.be/mediatheek/default.htm>. By means of its electronic catalogue (BIDOC) the library offers access for staff and students to the central library collections, to the decentralised collections in the educational and research laboratory, and to several web based information services. The library on the Campus Rabot in Gent offers a reading room seating 50, with 12 PC's with internet connection for student work. By association agreements KAHO staff and students have free access to the library of the Catholic University of Leuven (K.U.Leuven), to which KAHO has been associated since 2002.

By bilateral contracts KAHO staff and students have free access to the library of the University of Gent, situated at walking distance from the KAHO campus. Participating in an inter-library loan and exchange service assures an easy and fast delivery of (photocopies from) books and publications from all Belgian universities and many university libraries all over the continent.



## **2.4 Accommodation and Resources HSANH**

All teaching and laboratory work on the programme is accommodated in the Department of Agriculture, Nutritional Science and Landscape Architecture (Department 1) at the Bernburg Campus and in the Department of Food Technology and Biotechnology/Chemical and Environmental Engineering (Department 7) at the Koethen campus of the Hochschule Anhalt (FH) University of Applied Sciences.

Video conferencing facilities in the Campus Bernburg will be used for delivery of selected topics.

Both Departments have a substantial number of lecture/tutorial rooms that accommodate class sizes from 20 to 370, most of which are equipped with projection screens, overhead projectors, etc and some rooms are equipped with PowerPoint facilities.

It is envisaged that each project will be closely linked to a particular company or research institute and will largely be conducted off-site or in the pilot plant facilities in Departments 1 and 7.

### **2.4.1 Specialised Equipment and Facilities HSANH**

#### **2.4.1.1 Laboratory Accommodation HSANH**

The Bernburg and Koethen campus has well equipped laboratories for foundation and advanced science and engineering courses. Each department has laboratories designated for project and research work. Pilot plant facilities are available for technology courses in:

- brewing and malting.
- meat and meat products.
- cereal and cereal products.
- dairy products.
- biotechnology.
- food engineering.
- nutrition.

Within the Departments 1 and 7 there are a total of 12 undergraduate teaching

laboratories/project/research laboratories. The facilities to be used for the following modules/topics are described below:

- Malt and Brewing Technology
- Fermentation Technology
- Meat Technology
- Cereal Technology
- Food Biotechnology
- Food Quality and Safety Management, HACCP
- Environmental Technology
- Flavour Analysis

List of equipment in the pilot plant area:

- pilot plant for malting (20kg of barley)
- pilot plant for brewing (120 L wort)
- pilot plant for juice including fruit crusher, fruit press, separator and pasteurising unit (90kg fruits)
- food engineering (falling film evaporator, scraped heat exchanger, several filtration plants).
- catering line.

Equipment in the technological laboratories:

Dairy products:

- Cheese manufacturing machine.
- Churner.
- Milk separator.
- Soft ice cream producer.

Meat and meat products:

- Mincer
- Cutter
- Sausage filler
- Smoking chamber
- Autoclave

Cereals and cereal products:

- Kneader
- Dough divider and roller
- Fermentation cupboard
- Baking oven
- Noodle forming engine

Food engineering lab (also used for different food technologies):

- Rotating autoclave
- Spray dryer
- Packaging machine
- Fluidised bed dryer
- Several flow-filtration units
- High-pressure homogenisator
- Freeze dryer
- Separator

pH-Value, density,  $a_w$ -Value, weight, water content, humidity, fat content and protein content can be performed in associated laboratories.

Rheological and physical measuring equipment:

- Laser-master-sizer
- Zeta-Ziser
- Coultervounter
- Several visosimeters
- Several texture analysers
- Pentrometer
- Colour measurement
- Microscopy and automatical image analysis
- Sieve analysis
- Electronical nose

The chemical analysis lab is equipped with:

- Gaschromatography
- HPLC

- Atom absorption spectrometer
- NIR-spectrometer

There are also microbiology/hygiene and sensorical evaluation of food laboratories within the Departments.

(Further information [www.lbv.hs-anhalt.de](http://www.lbv.hs-anhalt.de) and [www.bbg.hrz.hs-anhalt.de/loel/](http://www.bbg.hrz.hs-anhalt.de/loel/) )

#### **2.4.1.2 Office Space HSA NH**

There is adequate office space facilities.

#### **2.4.1.3 Computer Facilities HSA NH**

All of the project/research laboratories are equipped with computer facilities.

The CIP-Pool (used for the education of students) owned by Department 7 (Campus Koethen) is equipped as follows:

- 15 PC – places for students
- 1 PC for the lecturer
- 1 Server
- 1 Scanner
- 1 Laser Printer (black & White)
- 1 Ink-Jet Printer (colour)
- 1 Plotter
- 1 Beamer

These computers are connected to the main computer network at the Anhalt University. The computer centre at Kothen provides an internet link between the Kothen campus and the other campus and to the world-wide web via the local server.

Department 1 has the same resources. The students can have the use of 8 PC pools on the Bernburg Campus.

In both Departments all academic staff have PCs and are connected to University network and to the world-wide web, beamers, scanners, printers, plotters and other ancillary equipment are

also available.

#### **2.4.1.4 Equipment HSA NH**

As listed in Section 2.4.1.1

#### **2.4.1.5 Library Resources and Services HSA NH**

The Library at Anhalt University of Applied Sciences has services in all three sites. Detailed information from [www.hs-anhalt.de/betrieb/](http://www.hs-anhalt.de/betrieb/) .

The users (students and staff members), in addition to normal services and data bases, can get literature which is not available via library inter-lending facilities.

### **3. Institutional Overview**

#### **3.1 Dublin Institute of Technology**

Dublin Institute of Technology (DIT) has a proud tradition of providing education and training for more than 100 years. The first College was founded in Kevin Street in 1887. Lord Meath donated the site, the Guinness family subscribed generously and many of the most important political figures of the day were active in the foundation of the College, including Michael Davitt, Charles Stewart Parnell and Lord Mayor O'Sullivan. The distinguished Trinity scientist George Francis Fitzgerald was a member of the first Board of the College. The objective of the founders was to provide an education and training in relation to the technological skills required by Irish industry. Since its foundation, the DIT Kevin Street has been true to this broad objective and has adapted in accordance with the needs of evolving society.

In 1903, a relationship was established whereby students could obtain External Degrees of the University of London.

Food Science and Food Technology programmes were started in the mid – 1920's. In the 1940's, 50's and 60's society required new health sciences professions: Dietetics and Human Nutrition, Ophthalmic Optics and Medical Laboratory Sciences. The Kevin Street College initiated programmes catering for the needs of these new professions.

In 1981, two departments, a Department of Chemistry and a Department of Biological Sciences were formed from the original Department of Chemistry and Biology. Both departments recruited new members of academic staff at this time; many of these lecturers held good research degrees as well as quality industrial experience. It was College policy to encourage collaborative research and development with industry and this developed significantly since the mid 1980's.

Under the Dublin Institute of Technology Act, 1992, six colleges formerly under the direction of the City of Dublin Vocational Education Committee (CDVEC) became a single autonomous education Institute in 1993. Today the DIT has an enrolment of approximately 18,500 full time equivalent and close to 1000 postgraduate students, in six campuses within a 3km radius. It has recently acquired a 26ha site, situated 2km from the city centre at Grangegorman, for future

developments. Planning for the new campus is now at an advanced stage with building due to commence 2013 with a completion date in 2016. The DIT is now organised into four Colleges: Sciences and Health, Arts and Tourism, Business, Engineering and Built Environment. The School of Biological Sciences is one of six Schools within the College of Sciences and Health.

### **3.1.1 College of Sciences and Health, DIT**

The College of Sciences and Health is one of four Colleges formed in the recent reorganisation of the Dublin Institute of Technology. The College comprises six Schools, five located at the Kevin Street campus of the Institute: Biological Sciences; Chemical and Pharmaceutical Sciences; Mathematical Sciences, Computing and Physics. The sixth School Food Science and Environmental Health is located on the Cathal Brugha Street Campus.

### **3.1.2 School of Biological Sciences**

The School of Biological Science has a total complement of thirty-three academic staff, seven technical officers, three laboratory aides and two administrative staff. In addition, part-time lecturers and guest lecturers are employed to supplement teaching. There are eighty postgraduate students registered on two taught Masters programmes, MPhil and PhD by research.

### **3.1.3 Programmes at DIT**

Currently the School of Biological Sciences offers and administers a suite of six major programmes with a projected enrolment of 550 students in the 2010/2011 academic session as highlighted in Table 2 overleaf:

- BSc (Ordinary) in Biosciences
- BSc (Honours) in Human Nutrition and Dietetics\*
- BSc (Honours) in Biomedical Science
- BSc (Honours) in Biomolecular Science
- MSc in Laboratory Medicine\*
- Erasmus Mundus MSc Food Science, Technology and Nutrition

\* Joint Degree with the University of Dublin

The School provides teaching to the following Honours degree programmes offered by the School of Physics (College of Sciences and Health) (a) Optometry, (b) Clinical Measurement

Science, (c) Science with Nanotechnology and (d) Medical Physics and Bioengineering; and to the following Honours degree programmes offered by the School of Chemical and Pharmaceutical Sciences (a) Forensic and Environmental Science and (b) Chemical Sciences and (c) Medicinal Chemistry and Pharmaceutical Science. In the 2010/2011 academic session there are just over 300 students registered on these programmes (Table 2). Staff from the School also provide teaching on the MSc in Pharmaceutical Quality Assurance and Biotechnology offered by the School of Chemical and Pharmaceutical Sciences. The School of Biological Sciences also provides a part time course in Diet, Nutrition and Health and offers a range of Continuous Professional Development (CPD) and short courses on demand.



**TABLE 2: SCHOOL OF BIOLOGICAL SCIENCES STUDENT NUMBERS SESSION 2010/2011**

	PROGRAMME REFERENCE	COURSE TITLE	YEAR(S)	NUMBER OF STUDENTS
<b>WHOLETIME</b>				
	DT204	BSc Biomedical Science	4	219
	DT223	BSc Human Nutrition & Dietetics	4	103
	DT259	BSc Biosciences	3	135
	FT226	BSc Biomolecular Science	4 & 5	17
	DT218	Erasmus Mundus MSc Food Science, Technology and Nutrition	2	24
<b>TOTAL</b>				<b>498</b>
<b>PART-TIME</b>				
	DT236	MSc Laboratory Medicine	2 (PT)	31
<b>TOTAL</b>				<b>31</b>
<b>Teaching provided by Biological Sciences to courses offered in other schools</b>				
	DT203	BSc Forensic & Environmental Science	1	24
	DT224	BSc Optometry	1 – 2	41
	DT229	BSc Clinical Measurement science	1 – 2	50
	DT227	BSc Science with Nanotechnology	1	15
	DT235	BSc Medical Physics and Bioengineering	1 - 2	23
	DT299T	BSc Chemical Sciences	1 - 2	13
	DT261	BSc Medicinal Chemistry and Pharmaceutical Science	1 - 2	43
<b>TOTAL</b>				<b>209</b>
<b>GRAND TOTAL</b>				<b>738</b>

### **Interdependence of Courses**

The multidisciplinary nature of the staff expertise in the School combined with the wide range of programmes offered has provided an ideal setting for the provision of the European MSc in Food Science, Technology and Nutrition. Such an environment leads to considerable synergy in the development of undergraduate and post graduate training.

This parallels developments in locations such as Sweden, Finland, Belgium, Germany, Portugal and Singapore, countries with which we have formed links for staff and student exchange and research.

### **3.1.4 Staff Professional Development**

The Dublin Institute of Technology is committed to continuing staff professional development. The Staff Training and Development Centre provide a series of courses and workshops designed to meet the needs of all staff in accordance with the Institute's Charter on Staff development. In addition the Learning and Teaching Centre (LTC) offers resources, consultation and a forum for discussion to help academic staff provide a valuable learning experience to all DIT students.

The School of Biological Sciences uses its staff development budget to facilitate attendance at conferences, workshops, and training courses. Staff development in the School of Biological Sciences has also been fostered by several European exchange programmes. Formal agreements have been established with the following:

- Karolinska Institutet, Sweden
- Uppsala University, Sweden
- Institute Paul Lambin, University Catholique de Louvain, Brussels, Belgium
- Turku Polytechnic Finland
- Turku University, Finland
- University of Portsmouth, England
- Katholieke Hogeschool Sint Lieven, Gent, Belgium
- Universidade Catolica Portuguesa(Escola Superior de Biotecnologia)
- Hochschule Anhalt, Kothen, Germany.

These links have resulted in academic staff exchanges and research collaborations.

Significant contributions to the development of technological education have been made by staff members in Lesotho, Zambia, Uganda, Tanzania, Rwanda, Kenya, Romania, Swaziland, Singapore and Jordan under various international and development aid programmes. These have been funded by the Irish Government, the EU, the World Bank and the ASEAN-EU Science Technology Co-operation Programme.

### 3.1.5 Links with Professional Bodies

In the preparation, accreditation, validation and running of the above courses the School of Biological Sciences has developed close links with the following professional bodies:

- Irish Nutrition and Dietetics Institute.
- British Dietetic Association.
- Academy of Medical Laboratory Sciences (Ireland).
- The Institute of Biomedical Sciences (London).
- The Institute of Food Science and Food Technology (London).
- The Institute of Biology (London).
- The Irish Health Service Management Institute.

### 3.1.6 Personnel (DIT)

#### ***School of Biological Sciences Academic Staff***

- Louis Armstrong BSc PhD. *Head of School:* Research interests: include reversible phosphorylation of proteins.
  
- Brenda Brankin BSc in Biochemistry PhD in Biochemistry. *Lecturer in Biochemistry, DIT. Conway Investigator, The Conway Institute.* Postgraduate supervision: currently supervising two PhD students and co-supervising third postgraduate student registered for PhD. Research interests: Effects of VEGF, PLGF and endostatin on blood retinal barrier function. Determination of tight junction and adherens junctional protein expression in ocular diseases. Gene microarray analysis of inflammatory diseases of the central nervous system.
  
- Greg Byrne Bsc, PhD. *Assistant Lecturer in Immunology.* Research interest: pathogenic mechanisms in coeliac disease; molecular dissection of autoantibody responses in disease and mechanisms of antigen presentation.
  
- Frank Clarke FAMLS, MSc *Lecturer in Clinical Chemistry.*  
Relevant Experience: 20 years working in various clinical hospital laboratories. Research Interests: Health Informatics; Biomarkers of life style and environment; Immunoassays.

- Debbie Corcoran BSc, PhD. *Assistant Lecturer in Clinical Chemistry and Haematology*  
Research interests: molecular based mutation detection in genetic disorders; molecular microbial genetics; antimicrobial resistance in bacterial isolates such as *Campylobacter*, *Salmonella* and *Listeria* sp.
- James Curtin BSc, PhD. *Lecturer in Biochemistry*: Research interests: investigation at a molecular level how cancer cells and the immune system interacts; gene therapy and RNA interference are used to specifically modulate protein expression in cancer cells and immune cells with therapeutic intent.
- Denise Drudy BSc, PhD. *Lecturer in Medical Microbiology*: Research interests: molecular detection, epidemiological investigation and antimicrobial resistance in healthcare-acquired pathogens such as *Clostridium difficile*.
- Jan Guerin, BSc, Ph.D. Assistant Head, School of Biological Sciences  
Research Interests: autoimmune pathogenic mechanisms in the antiphospholipid syndrome; host genetic and immunological factors associated with HIV disease pathogenesis; Biomarker discovery, development and clinical validation.
- Celine Herra Dip Med Lab Science, MSc, PhD. *Lecturer in Medical Microbiology*. Research interests: Rapid molecular detection and characterization of MRSA.
- Orla Howe: Dip in Applied Science, MSc, PhD. *Assistant Lecturer in Cell Biology*.  
Research interests: translation radiobiological research on a cellular and molecular level.
- Natalie Hopkins BSc, Diploma in Industrial Studies, PhD. *Lecturer in Physiology*. Research interests: Gene therapy in chronic lung infection.
- Mary Hunt Dip Applied Science, GIBiol, MSc, PhD. Assistant Head. Research interest: Biologically active conjugates of fatty acids.

- John Kearney BSc MSc PhD. *Lecturer in Biology/Epidemiology*. Research interest in Nutrition and Lifestyle. Collaborative links with University of Barcelona and Karolinska Institute Stockholm.
- Helen Lambkin FAMS PhD. *Lecturer in Cellular Pathology*. Research interests: collaborative research with the Karolinska Institute, Stockholm, Sweden on human papillomaviruses in uterine cervical adenocarcinomas; prostate cancer. Post-graduate student supervision.
- Sara Lynch BSc PhD. *Lecturer*. Research interests: collaborative research in Coeliac Disease with the Department of Immunology, St James Hospital and Trinity College Dublin.
- Alice McEvoy BSc PhD. *Lecturer in Cell and Molecular Biology*  
Research interests: Immunology and Biopharmacology.
- Alison Malkin FIBMS *Lecturer in Clinical Cytology*. Research interests: automated screening systems and digital imaging.
- Fabian McGrath BSc, MSc, FAMS, FIBMS. *Lecturer in Transfusion Science*. Research interests: Complement component C1q and its role in innate immunity.
- Patrick J McHale BA (Mod) MA PhD. *Senior Lecturer I in Medical Microbiology*. Research interests: bacterial systematics, hospital-acquired infection, microbial typing methods, antibiotic resistance, genetic control of virulence, pathogenic mechanisms, foodborne disease, probiotics and disinfection of contact lenses. Member of the Microbiology Advisory Body of the Academy of Medical Laboratory Sciences. College of Sciences and Health representative on the DIT Library Committee. Course co-ordinator for the Degree in Biomedical Sciences (BSc Applied Sciences).
- Steve Meaney BSc, MSc, PhD. *Lecturer in Biochemistry and Clinical Chemistry*. Research interests: biochemistry and molecular biology of sterols.
- Mary Moloney DipDietetics, MSc SRD (UK). *Senior Lecturer I in Human Nutrition and Dietetics*. Research interests in guar enriched bread as a food in non-insulin dependent

diabetics, food and nutritional support for elite athletes, food requirements and nutritional support for the elderly, food and nutrients in national surveys and education for nutrition/dietetics. Supervisor of postgraduate students. External Assessor for two BSc (Human Nutrition and Dietetics) Courses in the UK, Postgraduate course in Sports Nutrition (London) accredited by BDA. Nominated by the Dept of Health as Irish Representative to undertake EU SCOOP Task: VLCD. Past President and Honorary Member of INDI.

- Michael Mulvaney DipEng MSc. *Lecturer in Food Technology*. Experience: 20 years industrial experience in areas such as process design and optimization and in World Class Manufacturing MRP II. R&D experience includes the soft drinks industry, ready meals and the blending and packaging of vitamins and minerals.
- Derek Neylan BSc PhD. *Senior Lecturer 1 in Cell Biology*. Research interests: growth factors in tissue culture and in the regulation of the cell cycle.
- Nuala O'Byrne-Ring. BSc PhD. *Lecturer in Biology*. Research interests: the study of Salmonid fish particularly in relation to aquaculture: Smoltification in Salmonid fish. Biochemical Studies of Salmonid fish throughout their life cycle. Histological study of Salmonid fish skin and mucus producing cells throughout their life cycle.
- Fergus Ryan BSc PhD. *Lecturer in Molecular Biology*. Has held research fellowships with Bio Research, Ireland and the Harvard Medical School working on the control of gene expression by thyroid hormones. Research interests: investigation of the molecular aetiology of Friedreichs Ataxia, Hyperinsulinism and Fragile X Syndromes.
- Mairead Stack BA (Mod) PhD MAppI Sc. (Food Sc). *Lecturer in Physiology*. Research interest: exercise physiology, histology and on-line learning.
- Sheila Sugrue DipHumNut&Diet MSc. *Lecturer in Dietetics*. Research interests: food allergies, food intolerance, Irish representative on European Food Intolerance Database.
- Joseph Vaughan MSc. *Senior Lecturer I in Haematology* Research interests: the study of the genetic aberrations consequent to the inheritance of Haemophilia A and Factor V

Leiden. Supervision of final year undergraduate projects. Member of a number of professional bodies.

- Kate Younger BSc MSc PhD. *Lecturer in Nutrition and Physiology*. Research interests in lipids and lipid metabolism. Research interests: the microencapsulation of marine oils and its potential use in food fortification. In collaboration with the Food Science Department, University College Dublin, has developed methodology for the measurement of *trans* fatty acids in food and adipose tissue samples. Supervision of two postgraduate PhD students studying iron status and body image concerns of Dublin women and children recently and currently supervises one PhD student.
- Gwilym Williams BSc PhD CBiol MIBiol *Lecturer in Biotechnology and Bioethics*  
Research interests: span analytical glycobiology and the business – market aspects of biotechnology. Served as a member of 8 national and international committees on biotechnology (including COST and FP6) and is an elected member of 6 international scientific organisations. Published over 50 papers and articles and has acted as a manuscript reviewer of *Journal of the Science of Food and Agriculture* and *AGRO-food-INDUSTRY HI-TECH*.

### 3.1.7 Research and Development

DIT is a comprehensive Higher Education Institute with a remit to provide teaching, research, development and consultancy across the broad range of disciplines it embodies. The Institute has a unique multi-level structure which incorporates the education spectrum from craft-based to doctoral level qualifications. The DIT strategy document "Vision for DIT's Development 2001-2015" concludes that future institutional growth and development should be characterised by the promotion of a multi-level, learner-centered environment, closely allied with and responsive to industry and with strong postgraduate courses and research programmes. The DIT policy on research and scholarly activity recognises that research "plays a central and critical role within DIT." This policy recognises that it is imperative for DIT to continue to strengthen the interaction between the twin activities of knowledge creation and dissemination in order to develop its teaching and learning environment. The College of Sciences and Health and the School of Biological Sciences embrace this strategic vision.

The School of Biological Sciences has had an active research profile over a number of years. The areas of research undertaken reflect the wide range of expertise of the staff. Taking cognisance of the importance of research in underpinning undergraduate and postgraduate teaching, and for self development, staff have invested significant effort in research and development. Key areas of research strength within the School include **Nutritional Science and Dietetics, Biotechnology and Biomedical Science.**

In **Nutritional Science and Dietetics** the main research strengths are in public health nutrition; applying the science of nutrition and dietetics to human health and wellbeing at the individual and community level and include studies in the following areas

- The prevalence and determinants of breast feeding.
- The socio-demographic, attitudinal & cultural factors related to breast feeding.
- The socio-demographic, attitudinal & cultural factors related to infant weaning.
- The role of health professionals in the promotion of breast feeding.
- The use of Vitamin D supplementation in pregnancy – behaviour, knowledge and attitudes among consumers and health professionals.
- Infant diets (before pre-school) and their attitudinal determinants.



- The prevalence and determinants of breast feeding among Chinese immigrants to Ireland.
- Dietary practices in the pre-school setting.
- Dietary patterns, food intakes, attitudes & their determinants among low socio-economic women.
- Dietary patterns, food intakes, attitudes & their determinants among young male apprentice construction workers.
- Assessment and development of resource materials to improve practice of health professionals within the community setting.
- The nutritional status and dietary patterns of older persons in the community and in long-stay care.
- Dietetic training and research practice.
- Reducing stress among college students through the provision of improved college lifestyles.

The Dietetics Group within the School is a partner in the EU funded Dietitians Improving Education and Training Standards (DIETS) Thematic Network of Dietetic Associations, Departments of Nutrition and Dietetics in Higher Education and NGOs across 31 European countries ([www.efad.org](http://www.efad.org) / [www.thematicnetworkdietetics.eu](http://www.thematicnetworkdietetics.eu)).

In **Biotechnology** the main research focus is in the areas of;

- Control of fungal morphogenesis in industrial fermentation
- Production of enzymes used in analytical and preparative deglycosylation
- Studying best practice in technology transfer at the academic – industry interface
- Investigation of public attitudes to modern food biotechnologies

In **Biomedical Science** there is both basic and applied research in the areas of human papilloma virus infection in cervical carcinoma, the aetiology of coeliac disease, genetic polymorphisms predisposing to thrombosis, neurodegenerative diseases, microbial diagnostics, epigenetics and novel cancer therapies. Another major area of research over the past number of years has been the use of molecular diagnostics for genetic and infectious disease detection and typing. A number of national and international collaborations have been established by staff within the School with leading scientists and clinicians in these fields to advance this research agenda.

SOCRATES, ERASMUS, MINERVA and LEONARDO programmes have fostered staff and student exchange and collaborative postgraduate research linkages with European partners. The Swedish Government has funded a staff exchange programme which enabled ten academic staff to spend a two month period at the University College of Health Sciences/Karolinska Institute Stockholm, Sweden and ten Swedish staff to teach and carry out research in the School of Biological Sciences. A telematic teaching classroom in the adjacent DIT campus at Aungier Street has enabled audio-visual communications and interactions with co-researchers and with our postgraduate students in European placements.

Staff have received funding from both the Higher Education Authority (Technological Sector Research) and Science Foundation Ireland (SFI), together with funding from numerous other smaller funding agencies. The School was awarded a prestigious Stokes Professorship from Science Foundation Ireland (SFI) in 2007, and these professorships were granted from SFI to support the strategic planning for increasing the number of research active faculty members in the short term in Irish Higher Education Institutes. The Stokes Professorship was granted to Professor Stefan Schwartz, for research into the genetics of human papilloma virus splicing.

Staff within the School of Biological Sciences are also engaged in collaborative research with research groups in the two research institutes at DIT, the multidisciplinary FOCAS Institute and the Environmental Health Science Institute (EHSII). The School has also established international collaborations with the Karolinska Institute, Stockholm, University of Uppsala, Sweden, and Stockholm University, Sweden. Finally, environmental and health sciences is a key strategic area for the DIT and the College of Sciences and Health and the School of Biological Sciences has played a key role in the successful award of €12.6M of funding from the Higher Education Authority in 2010 for the establishment of a new Environmental Health Sciences Institute (EHSI), which will be built on the new DIT campus site at Grangegorman.

### **3.1.8 Quality Assurance of DIT Degree Programmes**

Routine monitoring of the academic quality of the programme is carried out in line with the quality assurance procedures in existence at DIT. The procedures are documented in the **Handbook for Academic Quality Enhancement (June 2010)** available at <http://www.dit.ie/services/academicregistrar/quality>). These procedures ensure continued adherence to excellence in academic standards. In DIT the academic content and quality is the responsibility of the Directorate of Academic Affairs and Registrar. The overall principles are

based on a combination of report processes involving external examiners, student and staff feedback.

Each new or revised degree programme is reviewed and validated by internal and external assessors in accordance with procedures specified in Part B – Arrangements for Validation, **DIT Handbook for Academic Quality Enhancement (June 2010)**. Part C of the Handbook deals with Arrangements for Monitoring and Review of Academic Activities and includes procedures for minor and major Programme amendments, School Review, and College Review. For re-validation and/or re-accreditation of a programme the programme documents are revised by the programme committee and approved by the School Executive and College Board prior to submission to the Directorate of Academic Affairs and Registrar. The validation and/or accreditation event is the responsibility of the Directorate of Academic Affairs and Registrar who will arrange the distribution of all required documentation to the members of the validation/accreditation panel.

### **Student-centered Feedback Process**

A student-centered feedback process is in place which is designed to evaluate the effectiveness of teaching and learning methods and to identify critical issues at an early stage. This process is based on a system of feedback provided by students to the module coordinator (Form Q6A). A subsequent summary (Form Q6B) of this feedback is then provided to the Programme Director, who prepares a quality report (Q5 quality report) which also incorporates feedback from staff and recommendations/comments from external examiner reports. The Q5 quality report must be reviewed and approved by the Programme Committee before submission to the School Executive and then to the Board of the College of Sciences and Health. Details of these procedures are provided in the **DIT Handbook for Academic Quality Enhancement June 2010** (<http://www.dit.ie/services/academicregistrar/quality>). The annual DIT programme reporting process (Q5 quality report) is designed to evaluate the continued effectiveness and quality of taught provision at DIT. Submission of the annual Q5 quality report approved by the Programme Committee and School Executive to both the Board of the College of Sciences and Health and the DIT Academic Affairs Committee is mandatory. Actions to address shortcomings and/or further enhance the quality of the student experience will be agreed by (a) Programme Committee (b) School Executive and (c) Board of the College of Sciences and Health as appropriate. Issues to be addressed by the School Executive will be documented in the School Action Plan while issues requiring an input at College level will be documented in the

College Action Plan. The Programme Committee will directly address issues within their remit. The Q5 report together with the response of the College of Sciences and Health Board is submitted to the DIT Academic Quality Assurance committee which reports to the DIT Academic Council on all matters relating to quality assurance. In DIT academic content and quality is the responsibility of the Director of Academic Affairs.

### **External Examiners**

Monitoring of the quality of the programme will be carried out *via* the external examiners appointed by the DIT Academic Council. External examiner(s) must always be employed in respect of the final assessments of a programme leading to an award of the Institute. These appointments are made at the recommendation of the Programme Committee on submissions brought to the College of Sciences and Health Board in DIT by the Head of School of Biological Sciences. The external examiners' reports are returned to the College of Sciences and Health Board (DIT). The reports will be submitted to the Programme Committee for review and implementation. In the case of this joint Masters degree copies of the external examiner reports will be submitted to the programme office at KaHo Sint Lieven. The functions and responsibilities of an external examiner are described in the General Assessment Regulations of DIT (<http://www.dit.ie/services/academicregistrar/student-assessment-regulations/general/>)

### **3.2 Universidade Catolica Portuguesa**

The Universidade Catolica Portuguesa (UCP), located in Porto, the second city in Portugal and the capital of the north of the country, was founded in 1984 and has developed a number of activities organised into two operational divisions (1) Academic (Undergraduate Programmes and Graduate Studies and Research) and (2) Extension Post-Graduate courses in Food Engineering, Environmental Engineering and Microbiology. Since 1999 further undergraduate degree programmes in Biological Production Engineering have been offered in Caldas da Rainha, a major agricultural region located in the centre of Portugal.

#### **3.2.1 Escola Superior de Biotechnologia UCP**

The Escola Superior de Biotechnologia currently has 780 students and a total complement of 67 academic staff. There are 80 postgraduate students undertaking taught Masters courses, MSc and PhD by research.

#### **3.2.2 Courses UCP**

Currently the Escola Superior de Biotechnologia offers and administers four major courses with a projected enrolment of 700 students in the 2004/2005 academic session. These courses are as follows:

- BSc Food Engineering.
- BSc Environmental Engineering.
- BSc Microbiology.
- BSc Biological Production Engineering.

#### **3.2.3 Staff Professional Development UCP**

UCP has an active staff professional development programme in place.

#### **3.2.4 Links with Professional Bodies UCP**

Escola Superior de Biotechnologia has developed close links with the following professional bodies:

- Ordem dos Engenheiros (Portuguese Association of Professional Engineers), Portugal.
- Institute of Food Technologists (IFT), USA.
- American Dairy Science Association (ADSA), USA.

- American Association for the Advancement of Science (AAAS), USA.
- American Oil Chemists' Society (AOCS), USA.
- American Chemical Society (ACS), USA.
- American Institute of Chemical Engineers (AIChE), USA.
- Sociedade Portuguesa de Bioquímica, seccao de Biotecnologia (Portuguese Society of Biochemistry, Society of Biochemistry, Section of Biotechnology) (SPB), Portugal.
- International Association of Milk, Food & Environmental Sanitarians (IAMFES), USA.
- European Alliance of Dairy Teachers (EUROPEL), France.
- International Union of Food Science and Technology (IUFoST), UK.
- Sociedade Portuguesa de Química (Portuguese Society of Chemistry) (SPQ), Portugal.
- Comissao de Viticultura da Regiao dos Vinhos Verdes (Portuguese Commission of Vinho Verde Region).
- Jose Maria da Fonseca Sucrs. – Vinhos, AS.
- Instituto do Vinho do Porto (Portwine Institute).
- Cockburns Smithes & C<sup>a</sup>, AS.
- Adriano Ramos Pinto Vinhos, AS.
- Sygminton – Comercio e Servicos AS.
- Sociedade Vinhos Borges, AS.
- UNICER Bebibad se Portugal AS.
- Taylor, Fonseca – Vinhos AS.
- SOGRAPE

### 3.2.5 Personnel UCP

- F. Xavier Malcata BSc, PhD  
 Doctor of Food Engineering. Associate Professor Director Escola Superior de Biotecnologia since 1998. Fulbright Foundation Scholarship, USA 1990. Experienced Researcher Individual Fellowship, Marie Curie Program, EU (2001-02). Professor Malcata is the recipient of 24 funded grants since 1992-93. He has 173 papers in refereed international journals, 8 monographic and edited books, 62 chapters in books and extended abstracts in proceedings, 79 technical publications, 234 volunteered presentations at scientific and teaching meetings.
- Alcina Maria Miranda Bernardo de Morais BSc, MSc, PhD  
 Lecturer in Technology and Food Processing Engineering. Research interest include post

harvest technologies for fresh fruits and vegetables, nutrition considerations

### **3.2.6 Research and Development UCP**

The main objectives in this area are to develop the advanced training of science and engineering graduates in core areas of competence. To this end, a range of MSc and PhD programmes and Postgraduate Diplomas are currently active, especially in the biotechnological sectors of Food and the Environment. In addition, a wide range of research projects are currently under development, both in fundamental and applied science. Many of these projects are in collaboration with national and foreign partners or integrated into larger collaborative networks especially within the EU, the USA and Latin America, under the auspices of the Centre of Biotechnology and Fine Chemistry.

The Extension Division is dedicated to technology transfer and permanent professional training in the agro-food and environmental areas. This is made possible by close collaboration with the other activities which are more academic in nature. This division has two operational departments, the department of training and development and the department of innovation and technological support. Both are designed to provide industrial services, which range from sample analysis through short-training courses, technological trouble shooting and consultancy contracts, up to full scale research and development projects. These services are operated at the interface of University/Industry, thus actively contributing to the development of the Portuguese economy.

### **3.3 Katholieke Hogeschool Sint-Lieven**

In 1895 the Brewery School Sint-Lieven was founded and was located in the city centre of Gent. This school provided a technical training for brewers' sons and technical support for the many small breweries all over the country.

The Brewery School became an officially recognised Higher Technical Institute (HTI) in the first decades of the twentieth century and kept that status up to 1975. After 1945 the social and economical situation on the continent had changed dramatically and the educational institute had to adapt to this situation by updating and changing the curricula that were offered to provide an up to date technical training for engineers. Brewing Engineering and a Chemical Engineering curriculum have been drawn up.

From 1950 very carefully and from 1960 decidedly, the HTI expanded its scope of interest from the restricted domain of Brewing Science to the general Biochemistry and Food Science. So in the early nineteen seventies the training in Biochemical Science and Engineering offered a complete training in Biochemistry and Biotechnology, with main emphasis on Brewing Technology and Meat Science.

In 1975 HTI Sint-Lieven by merging with three other Flemish Higher Technical Institutes, became the Chemistry and Biochemistry section of the Katholieke Industriële Hogeschool van Oost-Vlaanderen (K.I.H.O.), a College for Engineering.

In 1995 K.I.H.O. was involved in a merging with four other institutes for higher technical education giving origin to the Polytechnical Institute KAHO Sint-Lieven. In 2003 the total number of students amounted to approximately 4,800, 1,500 of them being enrolled in the College for Engineering. The association with the Katholieke Universiteit Leuven (K.U. Leuven) was established in 2002. All curricula that are offered by KAHO Sint-Lieven have been accredited by the "Association K.U. Leuven" in 2003.

The Department of Chemistry and Biochemistry had an external audit by VLHORA (Flemish organisation of Polytechnic Institutes) in 2002 and has been accredited by the Flemish Government, Department of Education in 2003.



From 2003 the KAHO, Sint-Lieven, College for Engineering has offered the curricula for:

BSc in Industrial Sciences – Chemistry  
BSc in Industrial Sciences – Civil Construction  
BSc in Industrial Sciences – Electromechanics  
BSc in Industrial Sciences – Electronics  
MSc in Chemistry  
MSc in Biochemistry  
MSc in Civil Construction  
MSc in Land Survey and Cartography  
MSc in Electromechanics  
MSc in Electrotechnics  
MSc in Electronics and ICT

All curricula are offered in Dutch. Curriculum composition and course contents can be consulted on the Internet homepage and ECTS information files of KAHO Sint-Lieven. All MSc degrees awarded by KAHO Sint-Lieven are accredited by the Flemish Government and entitle the holder to use the title of “Engineer” in the corresponding professional branch.

In cooperation with the K.U. Leuven a MSc in Industrial Management is offered in English. The next accreditation is being scheduled for 2013 by the NVAO (Dutch-Flemish Accreditation Organisation); an intermediate self-assessment report has to be presented and will be audited in 2007.

### **3.3.1 Department of Chemistry and Biochemistry**

The Department of Chemistry and Biochemistry has a total complement of 26 academic staff and 18 full time researchers. There are 6 postgraduate students undertaking research for PhD study.

### **3.3.2 Courses KAHO Sint-Lieven, Department of Chemistry and Biochemistry**

Currently the Department of Chemistry and Biochemistry offers and administers 3 major engineering curricula, a BSc in Chemistry, an MSc in Chemistry and an MSc in Biochemistry, with a projected enrolment of 100 students in the 2004/2005 academic session. These courses are as follows:

BSc in Industrial Sciences, 180 credits, 3 year training.

MSc in Chemistry, 60 credits, 1 year training.

MSc in Biochemistry, 60 credits, 1 year training

### **3.3.3 Staff Professional Development KAHO Sint-Lieven, Department of Chemistry and Biochemistry**

KAHO Sint-Lieven has an active staff professional development programme.

### **3.3.4 Links with Professional Bodies in KAHO Sint-Lieven, Department of Chemistry and Biochemistry.**

The Department of Chemistry and Biochemistry have been developed close links with the following professional bodies:

- EFB, European Federation of Biochemistry.
- ASM, American Society of Microbiology.
- BVVM, Belgian Society of Microbiology.
- KVCV, Royal Flemish Society for Chemistry.
- Fenavian Belgian Federation for Meat Processing Companies.
- C.B.B. Centre for Malting and Brewing.
- GOMOV, Regional Economical Development Organisation for East-Flanders

### **3.3.5 Personnel KAHO**

The Department of Chemistry and Biochemistry contractual research personnel (18) can take part in educational activities according to required competences and educational staff requirements.

Academic Staff:

- Guido Aerts. PhD in Chemistry, MSc in Chemistry. *Head of Dept Biochemistry.* Research topics: enzymology, fermentation technology.
- Annemie De Buck. MSc in Chemical Engineering – Biochemistry. Research topics: enzymology, research interests education technology and computer aided learning in Biochemistry.

- Luc De Cooman. PhD in Chemistry, MSc in Biology. Head of Lab for Microbiology. Research topics: Brewing chemistry, fermentation technology.
- Gert De Rouck. MSc in Biology, MSc in Chemical Engineering – Fermentation Technology. Research topics: brewing technology.
- Joris Hoozee. MSc in Biology, MSc in Chemical Engineering – Fermentation Technology. Head of Laboratory for Fermentation Technology. Research topics: fermentation technology.
- Hubert Paelinck. PhD in Applied Sciences – Agricultural Sciences, MSc in Agricultural Engineering, MSc in Environmental Engineering. Head of Laboratory for Meat Technology. Research topics: meat science and technology.
- An Van Hauwermeiren. MSc in Chemical Engineering – Biochemistry. Research topics: microbiology.
- Chris Van Keer. PhD in Biology, MSc in Biology. Vice-Head College for Engineering. Research topics: food microbiology, drinking water microbiology, microbial ecology, food safety and quality management, research interests education technology and computer aided learning in biochemistry.
- Filip Van Opstaele. MSc in Chemical Engineering – Biochemistry. Research topics: brewing technology, flavour analysis.
- Dorine, Bruneel. PhD in Chemistry, MSc in Chemistry. Research topics: polymer chemistry, packaging materials, research interests education technology and computer aided learning in chemistry.
- Eddy Courtijn. PhD in Chemistry, MSc in Chemistry. Head of Department of Chemistry. Research topics: food analysis.
- Ann De Winne. MSc in Chemical Engineering – Biochemistry. Research topics: flavour analysis.

- PhD in Chemistry, MSc in Chemistry. Head of Laboratory for flavour analysis. Research topics: flavour analysis.
- Edward, Matthijs. PhD in Applied Sciences – Chemistry, MSc in Chemical Engineering. Research topics: galvano-technics, membrane technology in waste water treatment.
- Luc Pinoy. PhD in Applied Sciences – Chemical Engineering, MSc in Engineering. Research topics: galvano-technics, membrane technology in waste water treatment.
- Marc Van Acker. MSc in Chemical Engineering, MSc in Fermentation Technology, MSc in Environment Sciences. Research topics: waste treatment and waste management.
- Daniel Van Beneden. MSc in Chemical Engineering, MSc in Fermentation Technology. Research topics: food analysis.
- Brenda Van Hijfte. MSc in Chemical Engineering. Research topics: enzyme analysis and technology.

### **3.3.6 Research and Development KAHO**

The KAHO Sint-Lieven College for Engineering aims at being a leading institute providing education and research in engineering, being widely known for excellence in its target areas of technology, having good international relations with comparable universities and polytechnics and with industry and professional bodies. Regular curricula are offered in education for engineering and connected post-graduate training. Research is performed for yielding and supporting the academic level of the education and staff.

Therefore, the Biochemistry section of the Department of Chemistry and Biochemistry deploys research and education activities in food science and technology and specialises in fermentation technology and meat technology. The academic level education offered aims at training scientists and engineers in these targeted fields of technology. Research is performed in national and international research projects, in the framework of university – industry network

agreements and in bilateral industrial contract research and service projects.

To establish a stable and competitive research organisation a campus research company, CBOK has been founded, providing the premises, means and facilities allowing the practical execution of research and social service projects, organising and coordinating all research and service projects.

The research results obtained in these projects shall contribute to maintain and improve the academic level of educational assignments of the Institute.

Being a non-profit organisation all financial benefits will be used for contributing to the future activities of the organisation and to the educational activities of KAHO Sint-Lieven.

The research domains of the Department of Chemistry and Biochemistry are as follows:

Biochemistry:

- Brewing Chemistry
- Meat Technology
- Fermentation Technology
- Quality Management in Food Industry

Chemistry:

- Flavour Analysis.
- Environmental Technology.
- Surface Treatment Technology.

In all of these domains research projects are ongoing. Most projects, except for bilateral industrial contracts, are lasting 2 – 3 years, according to the type of project.

Projects' funding is provided by the Flemish Government (IWT), the EU (6Fp, Copernicus) or by industry. Government projects commonly are executed in cooperation with the industry. This cooperation lasts for over 20 years and resulted in numerous, intensive and fruitful links to industry and in the acquirement of state of the art knowledge and instrumentation in our labs. The research project activity allows the maintenance of a considerable number of researchers

and PhD students in the Department and provides the financial means for keeping the lab instrumentation up to date.

The Department of Chemistry and Biochemistry started building out its international relations from 1989, DIT being one of the very first and most active contacts since then. In 2003 the Institutional network of KAHO Sint-Lieven consisted of 48 institutions all over Europe and used for staff and students exchange and in research projects.

Since 1995, there are a total of approximately 60 to 75 final year undergraduate students, the Department of Chemistry and Biochemistry sends out  $\pm$  10 students and received 15 to 20 students from abroad. Student exchanges are realised in semester 8 of the curriculum and are being performed with several of these international partner institutions.

### 3.4 Anhalt University of Applied Sciences (Hochschule Anhalt)

Engineering courses have been taught for over 100 years in Kothen. The first Institute was the Friedrich-Technikum. The Anhalt University of Applied Sciences was founded in October 1991 based on the Technischen Hochschule Kothen.

The Anhalt University of Applied Sciences currently has 6,000 students and an academic staff of about 170. The University, which lies in the centre of the Anhalt cultural and economic region, has its main campus in Kothen with further sites at Bernburg and Dessau. With twenty-five degree courses it offers a broad profile of technical, business, agricultural and design fields of study. The Anhalt University has nine Departments:

Department 1	Agriculture, Nutritional Science and Landscape Architecture.
Department 2	Economics.
Department 3	Architecture and Civil (Construction) Engineering.
Department 4	Design.
Department 5	Surveying and Mapping.
Department 6	Electrical Engineering.
Department 7	Food Technology and Biotechnology/Chemical and Environmental Engineering.
Department 8	Mechanical Engineering/Industrial Engineering.
Department 9	Informatics.

#### 3.4.1 Department 1

##### **Agriculture, Nutritional Science and Landscape Architecture**

Currently Department 1 offers and administers the following courses.

- B Eng Agriculture
- B Eng Landscape Architecture and Environmental Planning
- BSc Nature Conservations and Landscape Planning
- BSc in Nutrition and Household
- MSc Nature Conservations
- MLA Landscape Architecture
- MSc Food & Agribusiness

Department 1 offers and administers one distance learning diploma course in Agriculture/Agrimanagement.

### **Department 7**

#### **Food Technology and Biotechnology/Chemical and Environmental Engineering**

Currently Department 7 offers and administers four major courses with a projected enrolment of 130 students for the academic session 2004/2005. These courses are as follows:

- BaEng in Food Technology
- BaEng Biotechnology Processes
- BaEng Process Engineering
- BaEng in Pharmaceutical Engineering

#### **3.4.2 Courses**

As in Section 3.4.1

#### **3.4.3 Staff Professional Development HSA NH**

HSA NH has a major commitment to staff development. For example this can be seen in their international relations with the following Universities:

University of Food Technologies Plovdiv/Bulgaria

Tharkian University Stara Zagora/Bulgaria

Rijshogeschool Ijselland, Institute of Facility Management and Consumer Affairs  
Deventer/Netherlands

HS fur Landwirtschaft, Lebensmittelwissenschaften und Veterinarmedizin (ARGENAj)  
Rennes/Frances

Agrauniversitat Sankt Petersburg/Russia

Food College Kaunas/Lithuania

Agraruniversitat Mitschurinsk/Russia

Fachhochschule Zurich Hochschule Wadenswil/Switzerland

ENSAIA Nancy France

Dublin Institute of Technology Ireland



KAHO Sint Lieven Gent Belgium

Universidade Católica Portuguesa Escola Superior de Biotechnologia

Escuela Superior Politécnica Agropecuaria de Manabí Cacha/Cuaca/Ecuador

#### **3.4.4 Links with Professional Bodies HSNH**

Both Departments have developed close links with the following professional bodies:

- Deutscher Brauerbund
- Forschungsinstitut Ernährung
- AiF
- Gesellschaft Deutscher Lebensmitteltechnologien
- Gesellschaft für Milchwirtschaft
- Deutscher Essenzverband
- Institut für Lebensmittel-Technik und Qualitätssicherung an der Hochschule Anhalt (FH)
- Prof Hellriegel Institut an der Hochschule Anhalt

#### **3.4.5 Personnel HSNH**

- Ulrich Junghanss. Lecturer in Microbiology and Hygiene with expertise in Medical, Applied Industrial Microbiology and Hygiene. Experience includes many senior appointments in Medical and hospital microbiology and hygiene prior to appointment in 1995 at the University of Anhalt.
- Gerhard Kater Professor, Dr – Ing.  
Lecturer in Food Technology, Food Engineering, Plant and Apparatus Engineering. Experience in product development, optimisation of processes in food industry, raw material consumption (optimisation) water and energy in breweries. Professor Kater has considerable experience in start up processes in breweries. He spent two years in a brewery as a scientific advisor and one and a half years in Cuba as a breweries start up assignment expert.
- Thomas Kleinschmidt, Professor, Dr – Ing  
Lecturer in Food Process Engineering, Packing Technology and Conservation Technology. Research interest Dairy Science and Technology.
- Renate Richter, Prof. Dr of Chemistry

Lecturer in Chemistry and Food Analysis with expertise in food analysis in the control of the product quality especially for beverages. Research interests include the analysis of secondary substances in plants and foodstuffs and the antioxidant potential. Current research work also includes studies on the permeation of aroma compounds across polymeric packaging materials. Dr Richter is the co-ordinator for the exchange of students with ENSAIA in Nancy (France).

- Wolfram Schnäckel, Professor, Dr  
Lecturer in Food Processing, Food Technology and Economics in the Food Industry. Experience in meat science, especially beef and lamb meat quality, meat processing (cutting, salting, smoking) experience in food marketing and consumer habits. Professor Schnäckel works for national and international organisations as consultant for the development of food industry in developing and new EU-member countries (Kazakhstan, Russia, Lithuania, Bulgaria and others). He has considerable experience in international project management. He works as auditor for the German Agriculture Association in the field of sensorics of meat products.

### **3.4.6 Research and Development HSANH**

The Anhalt University research strategy is orientated as follows:

- Technical and technological development and use of regenerative energies.
- Development of instruments for measurement and automation in medical and process engineering.
- Micro and nano technologies.
- Innovative connective technologies.
- Innovative technologies for the production of foods and product development.
- Biotechnology.
- Agriculture.
- Producing, utilising and recycling raw materials.
- Technologies of environmental engineering, environmental analysis, environmental monitoring.
- Applied ecology and strategies for the planning of nature conservation.

- Application of geo information systems in architecture (civil engineering), in environmental and landscape planning and agriculture.
- Measurement engineering.
- Technologies for innovative and environmental in building construction.
- Development and utilisation of multimedia data bases.
- Development and utilisation of e-learning systems.
- Management of home economic service.
- Landscape planning/landscape architecture.
- Economics and communication.

The research strategy in the areas of food science, technology and nutrition in Departments 1 and 7 is directed with a view to meeting the needs of the Food Industry and involves; product and process control, quality assurance, product development and food engineering.

The following are the research interests in Food and Nutrition:

- Modeling and optimisation of processes of food technology.
- Dynamical process management in the thermal treatment of different foods.
- Research on equipment for the food industry for their constructive optimisation.
- Research for interactions between food and packaging materials.
- Bioprocess technical investigations of fermentation processes.
- Investigation of food ingredients.
- Microbiological control of processes and development of HACCP concepts.
- Development of measurement and sensor techniques for the quality assurance and process control in the Food Industry.
- Signal analysis of sensor arrays.
- Process automatisation in the food industry.
- Electronical nose as instrument of measurement of food quality.
- Fuzzy neuronal network for quality insurance of food products.
- Project planning in the food industry.
- Consumer affairs.
- Production of high quality beef.

- Cutting processes in the food industry.
- Identification of pathogenic microorganisms in food products.

#### 4. Programme Governance

Details of the governance structures for this joint masters programme is provided in programme document B, section 7. Taught modules will be offered by the four partner Institutions: (i) the School of Biological Sciences, College of Sciences and Health, DIT, (ii) the Escola Superior de Biotechnologia, UCP, (iii) the Department of Chemistry and Biochemistry, KAHO and (iv) the Department of Food Technology and Biotechnology/Chemical and Environmental Engineering, HSANH. The professional competence module and the project/thesis can be offered by partner and associate partner institutions.

##### 4.1. Programme Directors

The duties and responsibilities of the programme directors within each partner institute are as set out as follows to:

- liaise with course co-directors in other centres.
- liaise with and co-ordinate the modules with the module organisers.
- convey relevant information to the students regarding course requirements.
- convene meetings of the course committee.
- collate examination papers and assignments.
- oversee in conjunction with the course committee the further development of the course.

The current programme Directors are: Mairead Stack (DIT), Francisco Xavier Malcata (UCP), Chris Van Keer (KAHO), Prof Gerhard Kater (HSANH)

##### 4.2 Module Organisers

Each module of the course is co-ordinated by a member of the academic staff. The role of each module organiser is to:

- check that lectures and assignments take place according to the agreed timetable for the module
- liaise with the class representative
- bring issues to the attention of the course committee and co-coordinators
- collate the results of examinations and assignments for the modules

The current module organisers are:

MODULE	TITLE	DIT ORGANISER	UCP ORGANISER	KAHO ORGANISER	HSANH ORGANISER
Module 1	Food Safety	Dr Mairead Stack	Prof Rui Morais	Dr C Van Keer	Prof Junghannss Prof Richter
Module 2	Ecological Aspects of Food Production	Dr John Kearney	Prof Rui Morais	Dr H Paelinck	Prof Junghannss
Module 3	Nutritional Aspects of Food	Dr John Kearney	Prof Rui Morais	Dr L DeCooman	Prof Seewald
Module 4	Total Quality Management	Mr Michael Mulvaney	Prof Rui Morais	Dr C Van Keer	Prof Richter
Module 5	Food Biotechnology	Dr Fergus Ryan Dr Gwilym Williams	Prof Rui Morais	Mr J Hoozee Dr P Dirinck	Prof Kkappach
Module 6	Global Food Issues	Dr John Kearney	Prof Rui Morais	*Dr Paul Mathias	Prof Kater
Module 7	Malt and Beer Production			Dr G Aerts Dr L DeCooman	Prof Kater
Module 8	Production of Wine, Sparkling Wine and Spirits		Dr Tim Hogg		Prof Kater
Module 9	Meat and Meat Products			Dr H Paelinck	Prof Schnackel
Module 10	Dairy Science and Technology	Mr Mike Mulvaney Dr Mairead Stack			Prof Kleinschmidt
Module 11	Fats and Oils		Prof X Malcata		Dr Harnisch Prof Kater
Module 12	Cereals and Cereal Products		Prof Rui Morais		
Module 13	Fruits and Vegetables		Dr Alcina Bernardo		
Module 14	Nutrition and Public Health	Dr John Kearney			
Module 15	Professional Competence	Dr Mairead Stack			
Module 16	Project/Thesis	Dr John Kearney Dr Mairead Stack Dr Gwilym Williams		Dr G Aerts	

\* Telematic Teaching

## 4.3 Governance Structures

### 4.3.1 Joint Management Board and Institute Management Boards

Details for the composition and function of the Joint Management Board and the function of local Institute Management Boards within each partner Institute are provided in programme document B, section 7. The composition of local Institute management boards are detailed in the following section.

### 4.3.2 The composition of the (Local) Management Board DIT :

**Chair:** Dr Mairead Stack DIT

Dr Jan Guerin

Mr Michael Mulvaney

Dr Denise Drudy

Dr Gwilym Williams

Dr Kate Younger

Dr John Kearney

Dr Fergus Ryan

The Head of School or nominee.

Secretary School of Biological Sciences (in attendance)

Student representatives.

### 4.3.3 The composition of the (Local) Management Board UCP:

**Chair:** Prof X Malcata, ESB

Dr Isabel Vasconcelos

Dr Cristina Silva

Dr Celia Manaia

Dr Paula Castro

Dr Tim Hogg

Dr Joao Paulo Ferreira

Dr Claudia Drummond

Dr Margarida Silva

Dr Rui Morais

Dr Antonio Rangel  
Dr Conceicao Hogg  
Dr Alcina Bernardo

#### **4.3.4 The composition of the (Local) Management Board KAHO:**

**Chair:** Dr Chris Van Keer – KAHO

Dr Guido Aerts

Dr Luc De Cooman

Mr Joris Hoozee

Dr Hubert Paelinck

Head of College for Engineering: Mr L Vanhooymissen

Head of Educational Department Chemistry and Biochemistry: Dr Dorine Bruneel

#### **4.3.5 The composition of the (Local) Management Board HSAH:**

**Chair:** Dr Gerhard Kater - HSAH

Prof Dr Ulrich Junghannß

Dr Regina Harnisch

Prof Dr Thomas Kleinschmidt

Prof Dr Renate Richter

Prof Dr Gunther Klappach

Prof Dr Marcus Seewald

Prof Dr Wolfram Schnackel

Leader of the examination committee

Student representation



#### **4.4.1 Specialist Working Groups DIT**

Dr Jan Guerin

Dr Mairead Stack

Mr Michael Mulvaney

Dr Gwilym Williams

Dr John Kearney

#### **4.4.2 Specialist Work Groups UCP**

Prof X Malcata

Dr Ana Gomes

Dr Susana Caldas

Dr Alcina Bernardo

Dr Rui Morais

Dr Tim Hogg

Dr Paula Pinho

#### **4.4.3 Specialist Working Groups KAHO**

Research Projects Group.

Employers Liaison Group (Advisory).

CBOK – Biotech – Dr M De Moor.

CBOK – Chemistry – Dr E Courtijn.

#### **4.4.4 Specialist Working Groups HSA NH**

##### **Prof Dr Hellriegel Institut:**

Aninstitut an der HS Anhalt (FH), Direktor Prof Dr Dieter Orzessek.

##### **Institut für Lebensmitteltechnik – Qualitätssicherung**

Aninstitut an der HS Anhalt (FH), Direktor Prof D J Wilke

##### **Centre of Life Sciences**

in der Hochschule Anhalt (FH)

- Department environmental and pharmabiotechnology
- Department Food Biotechnology/Nutrition
- Department of Raw Materials/Agricultural Biotechnology

## 4.5 Examination Boards

Details with regard to the Examination Boards are provided in Programme Document B, section 12.3.

## **5. Course Development**

### **5.1 Recommendations for Future Development.**

Innovations will be made taking cognisance of the needs of employers, graduates, government strategies, industrial developments, international linkages, and Global issues. Molecular Biology/Biotechnology will be further developed and strengthened. Molecular aspects of Nutrition will be further augmented.

## 5.2 Conclusions

- There is a market demand for the course including enquiries from non-EU candidates.
- Candidates with appropriate backgrounds may apply to take individual modules and accumulate credits provided there are sufficient places.
- Modules can be used as part of Continuous Professional Development (CPD) by industry.
- Candidates may choose to take modules over a longer timeframe on a part-time basis and accumulate credits.
- Student directed learning will be enhanced in practicals, workshops, seminars, by site visits and e-learning. The Cell Talk e-learning course developed in the Minerva Project with European partners will be used.
- The project will represent 30 ECTS credits (one credit represents twenty hours of learning).
- English will be the language used for international communication.
- Modules will be timetabled in such a way as to concentrate the teaching in a given subject to enable the uptake of individual Modules by candidates.
- Modules will be assessed on completion of each module and ECTS Credits awarded.

## 6. FUTURE DEVELOPMENTS OF THE COURSE

A number of aspirations exist for the future:

- **Development of additional Modules**

The availability of additional Modules as market feedback demands will allow further choices.

- **Expand research project collaboration network.**

This will include additional European industries and institutes. Students who undertake projects in industry and workplace will serve to further enhance the mutual interest of the graduates, industry and the EU giving rise to better employment opportunities and collaborative research and development.

- **Investigate the feasibility of work placements in industry, research etc.**

Arrangements with Industry, which would allow a course design enabling candidates to work, take modules at their own pace and accumulate ECTS credits.

- **Strengthen specialist areas.**

Investigate the feasibility of utilising additional specialist areas that have been developed in the partner institutions. This will enhance the possibility of increasing the range of modules offered in this European MSc Programme, e.g. Bioprocess Engineering.

The Strategic Plan for the School of Biological Sciences , DIT envisages the introduction of an *ab initio* BSc (Hons) Degree in the Biosciences area, addressing the need for Biotechnology to be further developed as a matter of priority. (240 ECTS credits). Such a course would provide additional students for admission to the European MSc in Food Science, Technology and Nutrition.