Course Description

Title: Dude, it's all about food!
Fields of activity: Aerospace/Aeronautical Engineering, Agronomics/Forestry, Applied Sciences, Architectural Engineering, Architecture, Automotive Engineering, Biological/Biotechnical/Gene Engineering, Biology, Biomedical Engineering, Chemical Engineering, Chemistry/Chemical Technology, Civil Engineering, Computational Sciences, Computer Engineering, Computer Science/Automatic Control/Informatics, Control Engineering/Systems engineering, Economics/Business Administration/Marketing, Electrical/Electromechanical Engineering, Electronic/Electrotechnical Engineering, Environmental Engineering, Food Engineering, Industrial Engineering, Industrial Management, Machine & Instrument engineering/Design, Materials Engineering, Mathematics, Mechanical Engineering, Mechatronics, Mining/Mineral Resources Engineering, Multimedia and Communication Design, Naval Architecture & Engineering, Optics/Optometry, Petroleum Engineering, Physics/Physics Engineering, Power Engineering, Production Engineering/Management, Rural and Surveying Engineering, Telecommunications/Electronics, Transport Engineering, Veterinary Medicine
Examination type: written exam
Number of ECTS credits issued: Not known yet
Learning Goals and Objective: learn and improve new gastronomical skills, get more accustomed with in-depth knowledge regarding the technology behind the production of food items.

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Dude, it's all about food!

Syllabus

Name of activity	Introduction to food production
Number of working hours	2 h
Type of activity	Lecture
Lecturer	Ph. D Master of Sc. Adam Ruciński
Short summary of content	Students will learn about food properties, food production philosophy, some issues about health and food safety, food engineering, transport, packaging and storage.
Bibliography	'Handbook of Food Engineering Practice' by Kenneth J. Valentas at all
Expected effect	To remember basic aspects of food production

Name of activity	E. Wedel - chocolate factory
Number of working hours	3 h
Type of activity	Company Visit
Lecturer	Technologists from the R&D Team
Short summary of content	Students will participate in a lecture on chocolate production, visit the factory and observe the work of production lines.
Bibliography	Not needed
Expected effect	Participants will learn about the production of chocolate – from the very beginning to the very end. Raw materials, final products, production lines, types of confectionery products.

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Name of activity	Chocolate sensory lab
Number of working hours	1h
Type of activity	Laboratory
Lecturer	Marta Midak
Short summary of content	During the sensory lab students will analyse chocolate and learn how the sensory laboratory works.
Bibliography	Not needed
Expected effect	Participants will learn what is sensory analysis from theoretical and practical side.

Name of activity	History of baking bread. Visiting the bread museum.
Number of working hours	3h
Type of activity	Company visit
Lecturer	Marian Pozorek
Short summary of content	How was bread baked many years ago and how is it baked nowadays? How the equipment of a bakery has changed through years?
Bibliography	Not needed
Expected effect	Participants know how bread was baked, what is needed to prepare a bread, which machines, technologies and ingredients were used in the past and which are used these days.

Name of activity	Drying of food
Number of working hours	2 h
Type of activity	Laboratory

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Lecturer	Ph. D Master of Sc. Adam Ruciński
Short summary of content	Students will observe different ways of food drying, will measure temperatures and air velocities, pressure differential during fluidized drying.
Bibliography	'Handbook of Food Engineering Practice' by Kenneth J. Valentas at all
Expected effect	Knowledge of some unit operations in food production

Name of activity	Distillation of alcohol
Number of working hours	2 h
Type of activity	Laboratory
Lecturer	Ph. D Master of Sc. Adam Ruciński
Short summary of content	Students will learn how alcohol is industrially produced and will examine distillation column.
Bibliography	'Handbook of Food Engineering Practice' by Kenneth J. Valentas at all
Expected effect	Knowledge of some unit operations in food production

Name of activity	Polish your cooking. How to make perfect dumplings
Number of working hours	3h
Type of activity	Workshop
Lecturer	Ewa Antosiak
Short summary of content	Interactive cooking workshop - preparing dumplings (traditional polish dish) step by step. Which ingredients are needed and how to choose them to achieve the best taste? Different techniques of sticking and shaping dumplings.

Bibliography	Not needed
Expected effect	Participant know how to make dumplings on their own.

Name of activity	Label food detective. How is it made by Warsaw Food Academy
Number of working hours	2h
Type of activity	1h lecture + 1h workshop
Lecturer	B. Eng. Aleksandra Szczęsna
Short summary of content	How to read food labels? What is hidden behind difficult names of ingredients? How are they transformed into food?
Bibliography	Not needed
Expected effect	Participants know which food products they should choose and what they contain. They also know why those ingredients are used in production process.

Name of activity	How to balance the student's diet?
Number of working hours	2 h
Type of activity	1h lecture, 0.5h workshop, 0.5 individual work
Lecturer	M. Sc. Justyna Markowska
Short summary of content	Which nutrients can be found in foods and what should be their proportions in a well-balanced diet? Exercise: how to check if my diet is correct? Working on own diet proposal.
Bibliography	„Human Nutrition" by Catherine Geissler et al. only part 1, and 3 „Pocket Guide to Nutrition and Dietetics" by Sarah Byrom et al. "Modern Nutrition in Health and Disease" by Maurice Edward Shils et al.
Expected effect	Students can prepare a well-balanced diet with commonly

	available products. They know macronutrients and their impact on the functioning of the body.

Name of activity	Lean manufacturing and kaizen philosophy
Number of working hours	4 h
Type of activity	Workshop
Lecturer	Jarosław Ruta,
Short summary of content	The topic of the lecture is lean manufacturing and kaizen philosophy and their use on international as well as polish market. During class students will focus on case studies to find out what changes occur in company. They will be informed about innovations that have been introduced in the company to maximise the efficiency of production. Students will work in groups in order to realise the importance of teamwork and work management. They will be encouraged to develop their interest in production and polish economy.
Bibliography	Not needed
Expected effect	Students are interested in production field and polish enterprise, they are aware of processes occurring in company. They understand the importance of lean manufacturing.

Name of activity	Lollipops' production
Number of working hours	2h
Type of activity	Workshop
Lecturer	Małgorzata Pietrzak
Short summary of content	During class students will find out how lollipops and candies are produced. They will see how the natural dyes are used and they

	will be able to make their own lollipops.
Bibliography	Not needed
Expected effect	Students will understand the stages of lollipops' production and which natural dyes are used.

Name of activity	Exam
Number of working hours	2h
Type of activity	Exam
Lecturer	Phd. Eng. Adam Ruciński, B. Eng. Aleksandra Szczęsna,
Short summary of content	Written exam
Bibliography	Not needed
Expected effect	Students pass the exam.

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Pre-materials

Introduction

The **aims of the food industry** today, as in the past, are fourfold:

1. **To extend the period during which a food remains wholesome** (the shelf life) by preservation techniques which inhibit microbiological or biochemical changes and thus allow time for distribution, sales and home storage.
2. **To increase variety in the diet** by providing a range of attractive flavours, colours, aromas and textures in food (collectively known as *eating quality*, *sensory characteristics* or *organoleptic quality*); a related aim is to change the form of the food to allow further processing (for example the milling of grains to flour).
3. **To provide the nutrients required for health** (termed *nutritional quality* of a food).
4. **To generate income for the manufacturing company.**

Each of these aims exists to a greater or lesser extent in all food production, but the processing of a given product may emphasise some more than others. For example, frozen vegetables are intended to have sensory and nutritional qualities that are as close as possible to the fresh product, but with a shelf life of several months instead of a few days or weeks. The main purpose of freezing is therefore to preserve the food. In contrast, sugar confectionery and snackfoods are intended to provide variety in the diet, and a large number of shapes, flavours, colours and textures are produced from basic raw materials. **All food processing involves a combination of procedures to achieve the intended changes to the raw materials.** These are conveniently categorised as ***unit operations***, **each of which has a specific, identifiable and predictable effect on a food.** Unit operations are grouped together to form a process. The combination and sequence of operations determines the nature of the final product.

In industrialised countries the market for processed foods is changing, and in contrast to earlier years, consumers no longer require a shelf life of several months at ambient temperature for the majority of their foods. Changes in family lifestyle, and increased ownership of freezers and microwave ovens, are reflected in demands for foods that are convenient to prepare, are suitable for frozen or chilled storage, or have a moderate shelf life at ambient temperatures.

There is now an increasing demand by consumers for foods that have fewer synthetic additives, or have undergone fewer changes during processing. These foods more closely resemble the original raw materials and have a 'healthy' or 'natural' image. Correspondingly, growth in demand for organic foods has significantly increased in Europe during the 1990s. These pressures are an important influence on changes that are taking place in the food processing industry, and manufacturers have responded by reducing or eliminating synthetic additives from products (particularly colourants and flavours) and substituting them with natural or 'nature-equivalent' alternatives. They have also introduced new ranges of low-fat, sugar-free or low-salt products in nearly all sub-sectors (Anon., 1999). New products that are supplemented with vitamins, minerals and probiotic cultures (or 'functional' foods) have appeared in recent years, and products containing organic ingredients are now widely available. At the time of writing (2000), a debate over the safety of genetically modified (GM) food ingredients is unresolved. Consumer pressure for more 'natural' products has also stimulated development of novel 'minimal' processes that reduce the changes to sensory characteristics or nutritional value of foods. Improvements to food quality during the last 10–15 years have also been achieved through changes in legislation, including legal requirements on manufacturers and retailers to display 'due diligence' in protecting consumers from potentially hazardous foods. This has in part arisen from a series of highly publicised cases of food poisoning and food adulteration in Europe during the 1980s and 1990s, and the outbreak of Bovine Spongiform Encephalitis (BSE) in British cattle, which led to public pressure for improved food safety and quality. Legislation is now increasingly international in its focus and application, and international standards for both specific products and also for methods of achieving quality assurance are in force. Trends that started during the 1960s and 1970s, and accelerated during the last 10–15 years, have caused food processors to change their operations in four key respects. First, there is increasing investment in capital intensive, automated processes to reduce labour and energy costs. Second, there has been a change in philosophy from quality control, achieved by testing final products, to a more sophisticated approach to quality assurance, which involves all aspects of management. Third, high levels of competition and slowing of the growth in the food market in Europe and USA during the 1970s, has caused manufacturers to adopt a more proactive approach to creating demand, using sophisticated marketing techniques and large advertising budgets. Mergers or take-overs of competitors have resulted from the increased competition. Fourth, there has been a shift in power and control of food markets from manufacturers to large retail companies.

The changes in technology have been influenced by a variety of factors: substantial increases in the costs of both energy and labour, by public pressure and legislation to reduce negative environmental effects of processing, particularly air or water pollution and energy consumption. Food processing equipment now has increasingly sophisticated levels of control to reduce processing costs, enable rapid change-overs between shorter production runs, to improve product quality and to provide improved records for management decisions. Microprocessors are now almost universally used to control food processing equipment. The automation of entire processes, from reception of materials, through processing and packaging to warehousing, has

become a reality. This requires a higher capital investment by manufacturers but, together with improved quality assurance, reduces production costs and wastage. It increases production efficiency, uses less energy and often fewer operators, and generates increased revenue and market share from products that have higher quality.

The food industry has now become a global industry, dominated by a relatively few multinational conglomerates. Many of the mergers and take-overs that created these companies took place in the 1980s and early 1990s when large companies bought their competitors in order to acquire brand names and increase their market share. In 1988 for example, a total of $42.5 billion was spent on the purchase of just three companies (Rowntree, Kraft and Nabisco) (Giles, 1993). Multinational companies are now focusing on development of new markets and are either buying up or forming alliances with local competitors in South East Asia, India, Eastern Europe and Latin America. Global sourcing of raw materials and ingredients has been a feature of some industries from their inception (spices, coffee, cocoa are a few examples), but this has now expanded to many more sectors, to reduce costs and ensure continuity of supply. These developments have in turn prompted increased consumer awareness of both ethical purchasing issues, such as employment and working conditions in suppliers' factories, and also environmental issues, such as safeguards in countries which have less developed legislative controls, and the environmental impact of international transportation of foods by air. There has also been a resurgence of consumer interest in locally distinctive foods and 'Fair-Traded' foods in some European countries, but at the time of writing this is confined to higher value niche products.

During the last decade or so, there has been a substantial increase in the power and influence of large retailing companies, especially in the USA and Europe. Much of the change in food quality and choice that has been witnessed during this time has arisen from competition between these retail companies and the pressures that they have exerted on manufacturers. Manufacturers are now responding to the shift in power to supermarkets by forming international strategic alliances with other large manufacturers. This enables them to develop pan-regional economies of scale and to focus on their own core products while sharing the benefits of joint marketing or research and development. They are also promoting 'tele-shopping', especially using the Internet, and developing other types of sales outlets (e.g. at sports or cultural venues) that by-pass existing
retailers.

Source: *Food Processing Technology. Principles and Practice* book by P. Fellows, CRC Press LLC, 2000.

Useful links:

Name	*en.wikipedia.org/wiki/**Food_processing***
Topic/field	Some basic information about food processing

Name	*www.**foodprocessing**.com*
Topic/field	Information source for the entire food and beverage industry.

Name	http://www.jhsph.edu/research/centers-and-institutes/teaching-the-food-system/curriculum/_pdf/Food_Processing-Slides.pdf
Topic/field	Information source for basic concepts of food processing

Books and articles:

Name	'Handbook of Food Processing Equipment'
Topic/field	Food Processing
Professor/Author	George D. Saravacos and Athanasios E. Kostaropoulos
References	Chapters: 1,2,4,6,8,13 https://books.google.pl/books?hl=pl&lr=&id=DzLACdHHg2AC&oi=fnd&pg=PA1&dq=%E2%80%98Handbook+of+Food+Processing+Equipment%E2%80%99&ots=Pc7CfuimPF&sig=1HLVvaqqYFzzZRYKS4e7werksZo&redir_esc=y#v=onepage&q=%E2%80%98Handbook%20of%20Food%20Processing%20Equipment%E2%80%99&f=false

Name	'Food Processing Technology. Principles and Practice'
Topic/field	Food Processing

Professor/Author	P. Fellows
References	Parts: I, II(2,6,7,8), III(10,16,18,19,21,22,23,24) https://books.google.pl/books?hl=pl&lr=&id=t4ykAgAAQBAJ&oi=fnd&pg=PP1&dq=%E2%80%98Food+Processing+Technology.+Principles+and+Practice%E2%80%99&ots=xenqwJloP-&sig=siKgrCxkWduEN1VfmYVP9568eKU&redir_esc=y#v=onepage&q=%E2%80%98Food%20Processing%20Technology.%20Principles%20and%20Practice%E2%80%99&f=false

Name	'Handbook of Food Engineering Practice'
Topic/field	Food Engineering
Professor/Author	Kenneth J. Valentas at all
References	Parts: 1.1, 1.2, 1.4 https://books.google.pl/books?hl=pl&lr=&id=tX7NXLH4oyAC&oi=fnd&pg=PA1&dq=%27Handbook+of+Food+Engineering+Practice%27&ots=K7d9bvXdlJ&sig=9DLkv6gp9oLsVLob8yq-kWwDCG4&redir_esc=y#v=onepage&q=%27Handbook%20of%20Food%20Engineering%20Practice%27&f=false

Name	Modern Nutrition in Health and Disease
Topic/field	Nutrition, dietetics
Professor/Author	Maurice Edward Shils, Moshe Shike
References	Parts: I, II, III https://books.google.pl/books?hl=pl&lr=&id=S5oCjZZZ1ggC&oi=fnd&pg=PA3&dq=Modern+Nutrition+in+Health+and+Disease&ots=2xKEz1nHsC&sig=1SIFGDZ1CXwyBPPmmyf7WcrhLZ0&redir_esc=y#v=onepage&q=Modern%20Nutrition%20in%20Health%20and%20Disease&f=false